



# The Future of the Cash Infrastructure in the Netherlands

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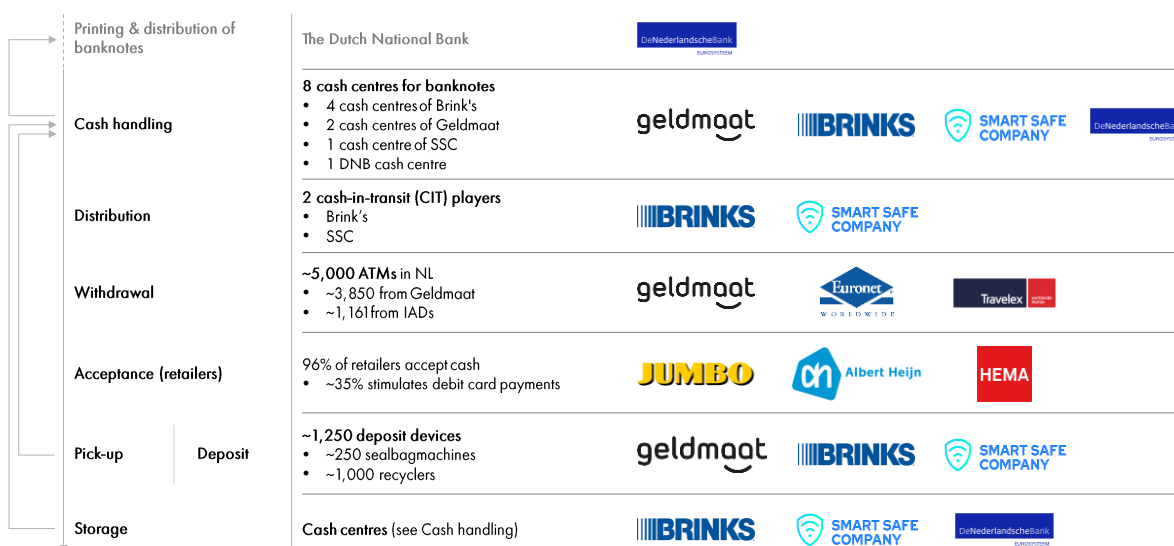
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# Management summary

Commissioned by the Dutch central bank (DNB) and at the request of the NFPS (National Forum on the Payments System: a consultative body in which almost all socially relevant stakeholders for the Dutch payment system are being represented), McKinsey & Company has carried out an independent investigation into the future of cash in the Netherlands. DNB and the NFPS have set themselves the objective to ensure a socially efficient (along so-called 'target functions', i.e. safe, accessible, sustainable, reliable, usable, robust and affordable) cash infrastructure. At the moment, the cash infrastructure is under pressure, which urgently requires an investigation. This investigation addresses the question of – taking into account DNB's and NFPS's objective – what is needed to sustain a well-functioning cash infrastructure in the coming years (until 2030). The scope of the research covers the entire cash cycle in the Netherlands, ranging from cash issuance to the end user (see exhibit 1). DNB and the NFPS have asked to study two scenarios: one in which cash functions as a back-up for card payments, and one where this is not the case. The research includes a combination of analyses and interviews with an extensive group of stakeholders. At the end of this investigation, McKinsey included its independently established findings as part of this report.

Exhibit 1

## Cash cycle in The Netherlands



Source: Geldmaat SB document, DNB, CBS, Panteia 2018 (corrected & extrapolated), Annual report ABN AMRO, ING, Rabobank 2019, article mckinsey.com [attacking the cost of cash]

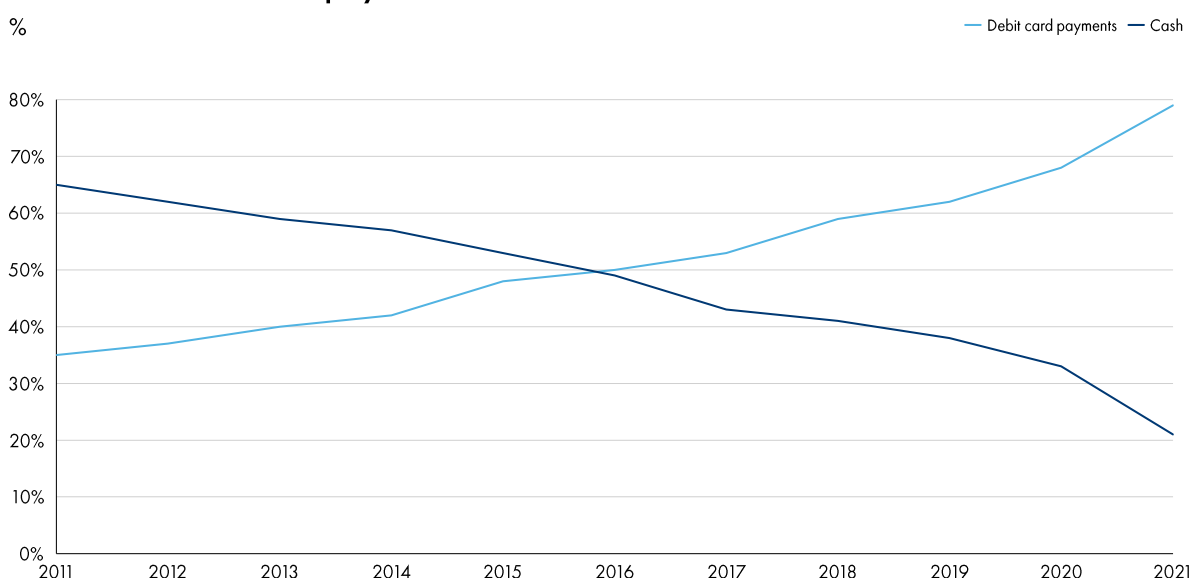
This report does not take a position on which of the target functions set by DNB and NFPS are more important than others. Nor does it include a position on whether or not cash should continue to function properly in the longer term – this is a fundamental question. A discussion about this has previously taken place in the NFPS. In addition, in 2020, the Dutch House of

Representatives ruled that it is important that cash remains widely accessible and accepted (Alkaya-motion). It is against this background that McKinsey, on behalf of DNB, has investigated what it takes for cash to function properly. This report outlines – on the assumption that it is desirable for the cash payment system to continue to function properly – what is needed for each of the different target functions.

Cash is a means of payment with a number of unique characteristics: anonymous, accessible & inclusive, tangible & measurable, public, and able to grant independent decision-making power. It fulfils various roles: that of means of payment, store of value and unit of measure. The use of cash as a means of payment has declined rapidly over the past decade (see exhibit 2).

Exhibit 2

## Evolution of the use of payment methods at the counter



Source: DNB-report De rol en toekomst van contant geld; DNB/Dutch Payments Association (BVN)

At the end of 2020, approximately 20% of payments at the counter were made with cash, compared to approximately 65% in 2010. This represents an average decrease of approximately 1.1% per year. A level-shift occurred in 2020-2021 by COVID-19 and the related measures, which reduced the use from 32% to 20%. This level-shift may be partially reversed after lifting the lock-downs and full opening). In addition, several developments have taken place in recent years that put pressure on the cash infrastructure, especially its safety, availability, and affordability. There are both physical security risks related to cash, as well as risk stemming from its sensitivity to fraud. The ongoing series of gas explosion attacks on ATMs led to parts of the infrastructure being (temporarily) closed. Partly due to the anonymity of cash, there are strict requirements for transaction monitoring to prevent fraud, money laundering, counterfeit money and terrorist financing. The banks experience a dilemma between, on the one hand, offering a good cash service, and on the other hand, countering criminal activities (e.g., through transaction monitoring). In addition, retailers are increasingly discouraging the use of cash (in approximately 35% of stores in 2020, see exhibit 3) and Dutch banks and IADs (Independent ATM Deployers) have significantly reduced the number of ATMs in the last ten years: from around 8,500 in 2010 to around 5,000 in 2020.

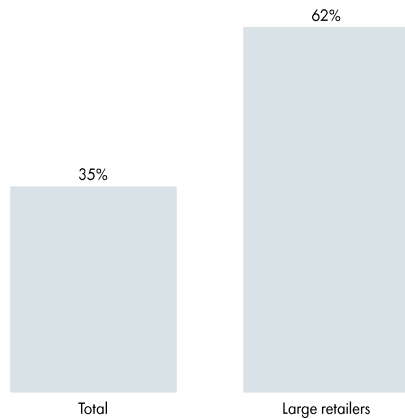
### Exhibit 3

## Merchant acceptance policies and preferences

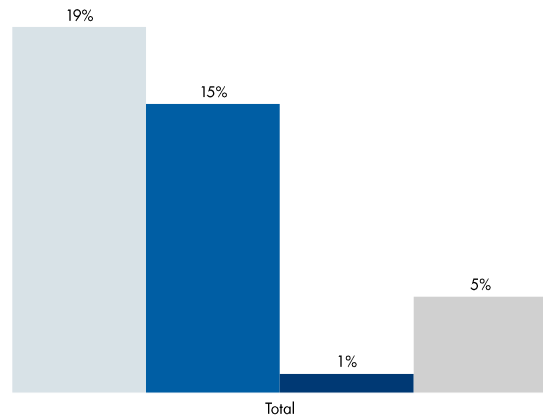
%

Via signs Via personnel Pin-only counter Other

### Share of retailers discouraging debit card payments



### Incentives used



Source: Panteia Acceptatie report

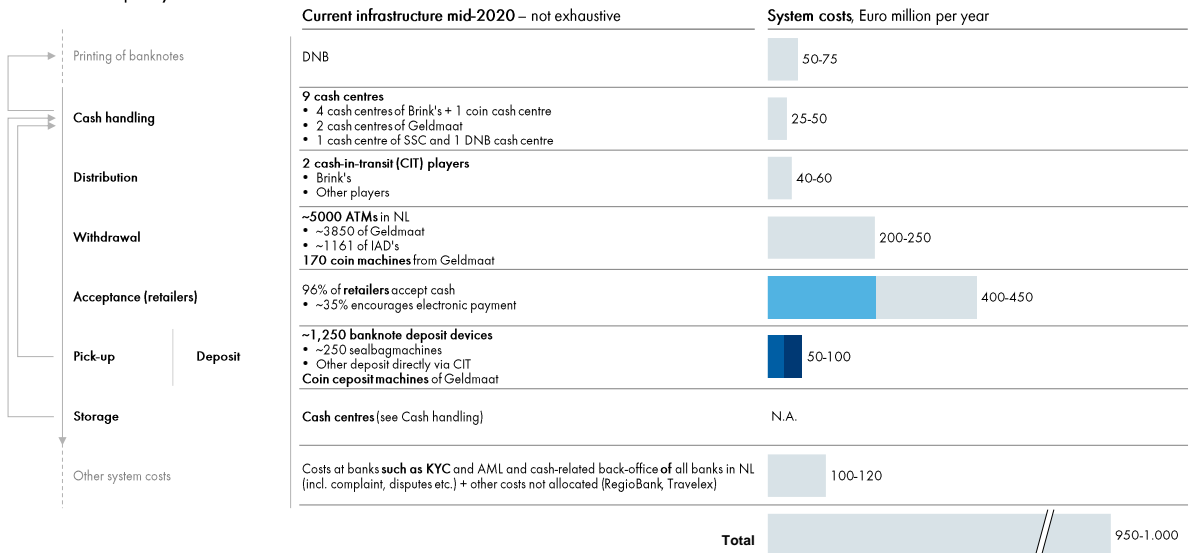
Although the total system cost of the cash cycle have decreased in recent years from around 1.5 billion euros in 2012 to around 1.2 billion euros in 2019 (see exhibit 4), due to the decline in volume, the cost per cash transaction in recent years has increased from €0.40 per transaction in 2012 to approximately €0.50 per transaction in 2019 (see exhibit 5).

### Exhibit 4

## Estimated system cost of the cash chain

Euro million per year

Variable costs that remain with substitution by debit card payment Pick-up Deposit



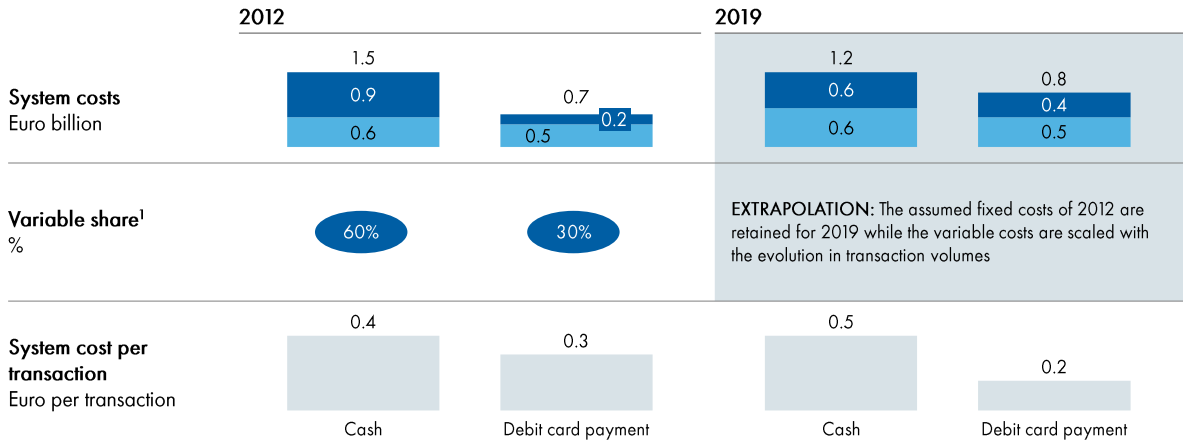
Source: Geldmaat SB document, DNB, CBS, Panteia 2018 (corrected & extrapolated), Jaoverslag ANB AMRO, ING, Rabobank 2019

## Exhibit 5

### Evolution of system costs of payments in the Netherlands

ROUGH ESTIMATE BASED ON OLDER RESEARCH

Variable costs Fixed costs



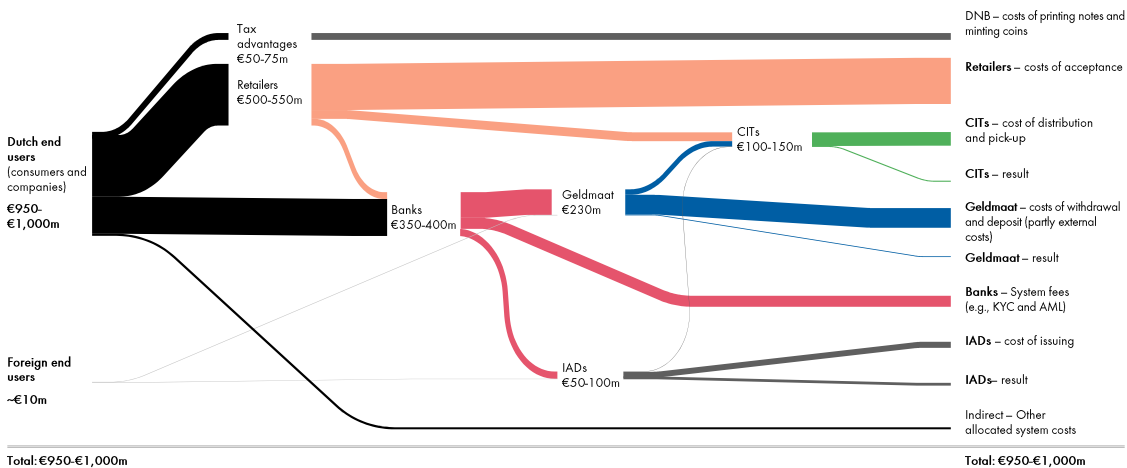
1. It is assumed that the share of variable costs in cash payments is higher than for debit card payments  
Source: Occasional Paper ECB "Social Cost of Retail Payment Systems"

Although the total absolute costs of cash have decreased, a cash payment today is relatively more expensive for society than a debit card payment, in particular for banks and for retailers (the main direct financiers of the infrastructure – ultimately their customers pay – see exhibit 6). A further transition from cash payments to card payments will reduce the total cost of the payment system, but increase the relative cost difference between card payments and cash payments. This puts even more pressure on the cash infrastructure. Lastly, for a number of steps in the cycle (e.g., cash-in-transit), there is consolidation among a small number of providers of these services, which may jeopardize the continuity of the cycle if these players were to leave the market or go bankrupt. Moreover, this also entails a risk of price increases.

## Exhibit 6

### Costs and revenues per player in the cash cycle

Euro million



Source: Geldmaat SB document, DNB, CBS, Panteia 2018 [corrected & extrapolated], Annual report ABN AMRO, ING, Rabobank 2019

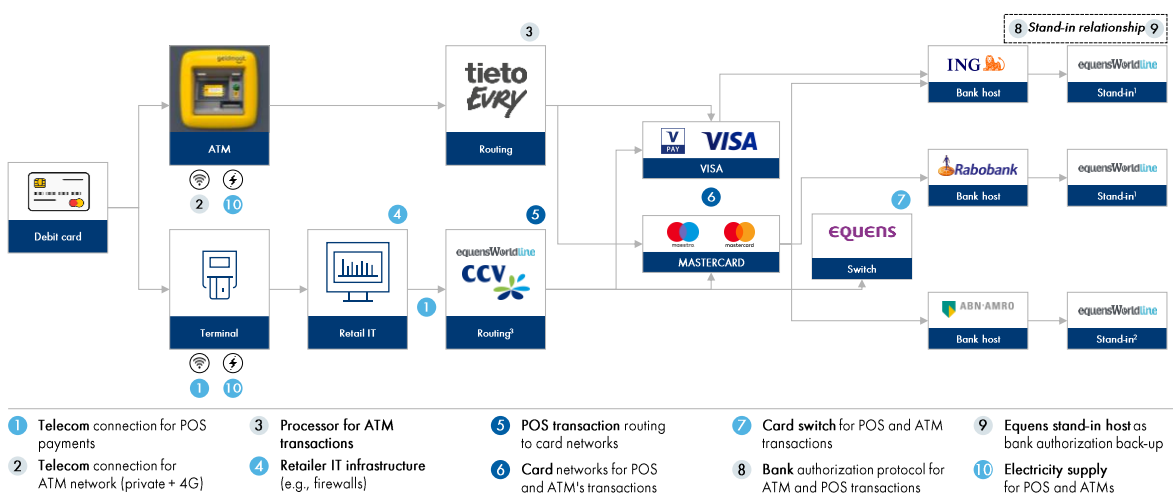
The use of cash is expected to decrease further at the same pace (with a possible flattening towards the end), analogous to markets of other phased-out means of payment, such as payment cheques. The question is to what extent a decrease in the use of cash is a problem for society. To study this, we distinguish three dimensions: firstly, cash as a back-up for card payments, secondly cash used by cash-dependent groups, and finally cash as a regular (public) means of payment.

First, cash as a back-up. Today, cash plays a role as a back-up for card payments. Despite continued investments in the robustness of the electronic payments system, outages still occur. Cash is well established and therefore plays a role as a back-up. It can partially fulfill its back-up role when it comes to short and/or local card payments system outages, which make up the vast majority of such outages. However, cash is not always able to fulfill its back-up role. One of the reasons for this, is that the ATM-network shares a critical interface with the infrastructure needed for card transactions: the card schemes (e.g., Mastercard and VISA). When these schemes fail, the ATMs also stop functioning (see exhibit 7).

## Exhibit 7

### Overview of the infrastructure for ATM and POS transactions

Critical link POS chain Critical, high concentration at one provider



1. Card scheme cannot deliver authorization request to ING or Rabobank and routes it to the Equens switch, via which then to the position in host  
2. Switch of equensWorldline cannot deliver authorization request to ABN-AMRO/Rabobank and routes to the stand-in host  
3. Some terminals can connect directly to the Equens switch (then to Visa/MC for ING)  
Note: not all players are shown – logos are illustrative

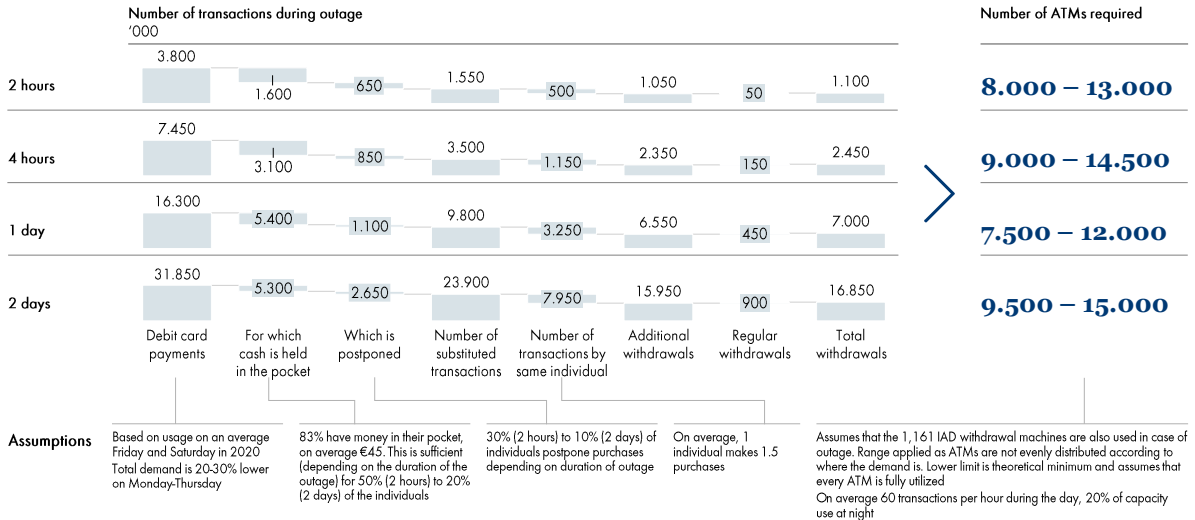
Source: DNB

In such cases, only cash which is already being held by the consumer before the outage can be used as a back-up. In addition, the cash infrastructure encounters problems when the outage is long-term (several days): the current ATM-network could cover 30-50% of the number of transactions at the counter during such large-scale outages (see exhibit 8). The upper limit of 50% (top of the bandwidth of 30-50%) assumes that all ATMs in the Netherlands are used at full capacity 24/7 and are equally distributed throughout the country (which is not a realistic assumption in practice). Lastly, the sudden increase in the volumes of cash payments would pose challenges for both the retailers and the cash-in-transit companies in their day-to-day operations (capacity issues). Nevertheless, cash is currently the only widely accepted form of back-up for card payments, even if it is not perfect and does not work in all cases.

## Exhibit 8

# Number of cash machines required to handle expected transactions during a nationwide failure of the debit card payments system

ASSUMES RATIONAL BEHAVIOUR (ONLY FOR THE SUBSTITUTION OF DEBIT CARD PAYMENTS) – IT IS NOT TAKEN INTO ACCOUNT THAT IN PRACTICE AN ADDITIONAL DEMAND FOR CASH WILL ARISE



Source: McKinsey analysis

To cater for long-term outages of the card payment system, there is already a need for a (new) fully-fledged back-up. Payment methods that are independent of the debit card payment system could create a full back-up in case of an outage. These solutions, for example mobile payments outside the card networks (such as payment requests, possibly via QR-codes), are technically available but not yet sufficiently scaled in stores and not yet adopted by all users to function as a fully-fledged back-up for debit card payments. Moreover, they will have to meet a number of additional requirements in order to be considered as a back-up for the card payment system, for example in terms of availability, usability, accessibility, reliability and robustness. The research into the concrete implementation of possible alternative back-ups is out of scope for the present investigation. In parallel with this investigation, the Dutch Payments Association (BVN) has made an inventory of possible back-up methods. Even when this alternative back-up will be available and adopted in the future, cash can still function as an additional back-up for debit card payments, but it reduces or eliminates the need to consider cash as necessary for this critical feature. It could be that there will not be a single fallback option, but rather that the back-up will consist of a combination of alternatives that may differ per use case, and together constitute an adequate back-up for the card payment system.

Secondly, cash used by cash-dependent groups. Cash is relatively widely used by groups that can be described as vulnerable (see exhibit 9): people with disabilities (of which approximately 300,000-400,000 people rely heavily on cash), the elderly (of which approximately 750.000-850,000 people rely heavily on cash), and people in debt relief or those without a current account (of which approximately 300,000 people rely heavily on cash). Some of these people actually depend on cash, another part uses cash out of habit or preference, which may be due to its anonymity. For these groups, the existence of an accessible and available cash infrastructure is important as long as they cannot use an alternative. Inclusivity of cash-dependent groups is therefore an important reason to ensure the availability of cash.



## Exhibit 9

### Number of Dutch people dependent on cash in 2020

VERY ROUGH INITIAL ESTIMATE – POSSIBLE DOUBLE COUNT NOT REMOVED

Group	Subgroup	Total '000	×	Share dependent on cash %	=	Number dependent on cash '000
People with a disability	Visual impairment	300		30%	Based on interviews with stakeholder groups	75-100
	Cognitive impairment	440		30%		100-150
	Mobile impairment (e.g., wheelchair users)	1,439		10%		125-175
People of a specific age	Seniors (70-80)	1,575		25-35%	Based on interviews with stakeholder groups	450-500
	Seniors (80+)	822		40-45%		300-350
People from socially vulnerable groups	People using cash for budgeting <sup>1</sup>	259		100%		259
	People without bank account <sup>2</sup>	36		100%		36
total		4,870		~ 30%		1,300-1,500

1. Quantified based on the number of people in debt relief

2. Quantified based on the number of homeless people

Source: Volksgezondheidszorg, CBS, College voor de Rechten van de Mens, DNB, NVVK

Finally, cash as a regular (public) means of payment. In addition to the two market-driven functions of cash, DNB and the NFPS also consider cash to be important because people can choose to use cash as the only form of 'public money' as opposed to 'electronic money' issued by commercial banks. This function remains as a social choice, regardless of the extent of the residual use of cash as a means of payment. The obligations of the Netherlands as a member of the Eurosystem (the ECB and the national central banks of the euro area) also play a role here. Indeed, the Eurosystem has recently defined a vision for cash and associated strategic goals: "Access to cash is a public good. Our vision is that by 2030 cash will be generally available, reliable and competitive as a means of payment and as a value reserve". It is up to national central banks and other local authorities to turn these strategic goals into effective policies.

This research has resulted in a number of possible initiatives, which can be implemented to improve the cash infrastructure without compromising the functioning of the cash payments system. On the supply side (e.g. distribution and ATMs), an optimization can be achieved by improving the operations. These operational improvements together can generate approximately €50-60 million savings per year. These improvements include an optimized ATM-footprint and more efficient distribution networks. Scaling up so-called 'smart counters' and reducing the number of cash centers can also contribute. Bilateral conversations with some banks indicate that in certain steps of the cash cycle even larger cost-efficiency gains can be achieved. Primarily banks, Geldmaat and Brink's should commit themselves to realize these initiatives. However, the consolidation risks in cash-in-transit should be mitigated before these initiatives can be carried out.

Also, the user experience for retailers on the demand (e.g., deposit) side can be improved in the short term through a number of initiatives, depending on the specific target group (e.g., using innovative collection methods, and migrating customers to the deposit method that best

suits their needs). Finally, as a result of a judgment of the European Court of Justice (Cardpoint judgment), the Dutch Tax Authorities have ruled that Geldmaat's services to banks have changed from VAT-exempted to VAT-non-exempted as of October 2019. This has resulted in a net additional cost of EUR 15-20 million per year. This contributes to the call for transformational improvements in infrastructure in the sector.

As indicated earlier, it is expected that the use of cash in the Netherlands will continue to decrease over the next ten years (with a possible flattening towards the end) and that new digital means of payment will develop further and achieve a higher degree of adoption. During this evolution, we distinguish three phases with different needs for cash (see exhibit 10).

## Exhibit 10 Phases of the blueprint

Switching point	<p>With sufficient adoption of digital alternatives, cash is no longer needed as a back-up By investing more in alternatives, this point is reached faster</p> <p>In case of low acceptance rates, additional measures are required Phase 3 may arrive earlier phase 2B – in which case 2B is skipped</p> <p>There are plenty of alternatives for cash-dependent groups, for example specific innovations to make digital payments user-friendly for blind people This allows the network to be further scaled down in line with residual usage. The extent of that use cannot be predicted, but by guiding cash-dependent groups in the adoption of alternatives, this point is likely to be reached more quickly</p>		
Phase	1 Cash as a back-up, for cash-dependent groups and for regular use as a means of payment	2 Cash for cash-dependent groups and for regular use as a means of payment	3 Cash only for regular use as a means of payment
		A Measures needed on withdrawal side	B Measures needed for acceptance
Objectives	Back-up function	✓	✓
	Means of payment for cash-dependent groups	✓	✓
	Regular use as a means of payment	✓	✓
Description	<p>Cash is a partial <b>back-up</b> and is indispensable as a <b>means of payment</b> for cash-dependent groups</p> <p>The <b>withdrawal network cannot be scaled down</b> and broad acceptance is required</p> <p><b>Digital alternatives</b> are implemented and scaled up to provide the back-up feature</p>	<p>Cash for <b>cash-dependent groups</b> indispensable</p> <p>Withdrawal network <b>must be</b> sufficiently accessible so that people who want to can use cash</p> <p>Sufficient acceptance due to the fact that the use of cash is high enough</p>	<p>Cash for <b>cash-dependent groups</b> indispensable</p> <p>Withdrawal network must be sufficiently accessible so that people who want to can use cash</p> <p><b>Acceptance rate too low</b> for cash-dependent groups</p> <p>Cash remains for the remaining regular use as a <b>means of payment</b></p> <p>Cash still has a role to play as <b>public money</b>. It's a valid method of settling debts – at least until digital public money is in use</p> <p>Effective use is difficult to estimate, but if this is too low to operate commercially, the <b>government will have a greater role</b> in maintaining the cash chain</p>

Source: McKinsey analysis

When determining these phases, the end user of cash is key. In the first phase (today), cash fulfils all three roles described above: as a back-up, as a means of payment for cash-dependent groups, and as a regular (public) means of payment. The switching point to phase 2 is when the adoption of digital alternatives is sufficient to provide the back-up function for debit card payments, which eliminates the (partial) role of cash in this function. At this stage, the infrastructure is determined only by the function as a means of payment for cash-dependent groups and as a public means of payment for the remaining group of users. This means that the infrastructure can be scaled down in line with the usage of these groups. Moreover, there is no need to wait until phase 2 to familiarize the cash-dependent groups with the digital alternatives. Then comes a time when alternative payment methods are sufficiently accessible and inclusive, and the cash-dependent groups have – to an acceptable degree – switched to these methods: this is when phase 3 starts. At this stage, cash only fulfils the role of a public means of payment method. It remains a valid means of payment, even though usage is decreasing further and there is probably hardly any cash left in daily life. At this stage, public authorities may play a greater role in ensuring that the cash value chain functions properly, as it will be even less commercially viable for private parties than in phases 1 and 2 (perhaps this is already the case

in earlier phases, but because of the agreements that have then been made around the back-up function and cash-dependent groups, the functioning of the cycle is not compromised – this may be the case in the final phase). The timing of these phases depends on switching points and is therefore not linked to years. It is even possible that some of these phases will be skipped (for example, if the acceptance rate at the counter does not decrease drastically). The third phase is not likely to take place before 2030 and therefore falls outside the scope of this research.

Regardless of the phases, it is likely that usage will further decrease. This report describes the options for measures that can be taken at each stage to ensure that the cash infrastructure continues to function properly according to the set objectives. These combined choices create the blueprint for the future of the cash infrastructure in the Netherlands and together make up the answer to three questions (see exhibit 11):

**Question A:** What should the cash infrastructure look like over the next ten years?

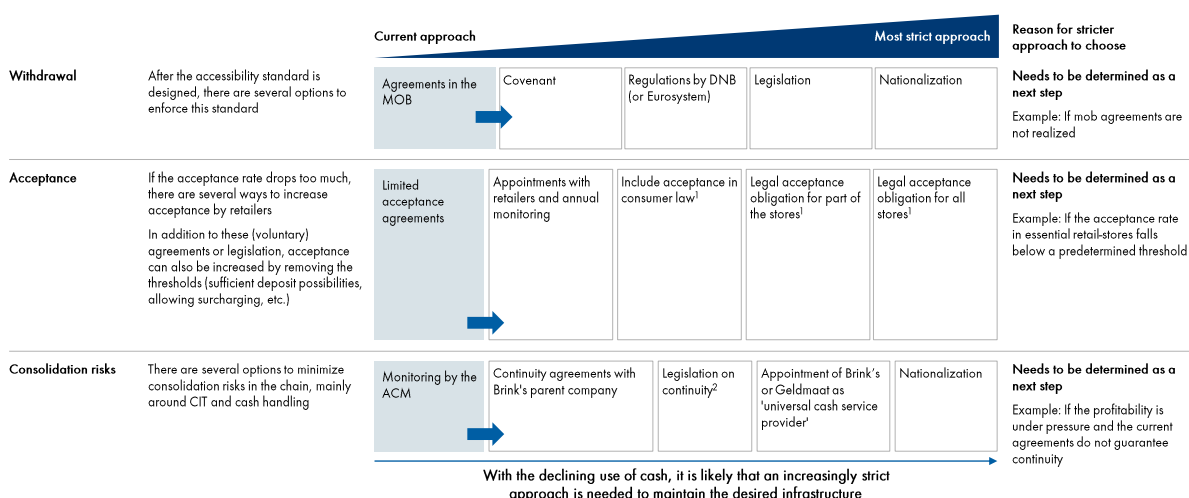
**Question B:** What agreements and/or rules are required for this?

**Question C:** How is the funding organized?

Exhibit 11

## Options for agreements or regulation

➔ Likely short-term need



1. Incl. annual monitoring of acceptance

2. For example, by legally establishing that in the event of imminent bankruptcy, the Minister can appoint a 'silent liquidator'

Source: McKinsey analysis

## Question A: What should the cash infrastructure look like over the next ten years?

The cash withdrawal network must meet different requirements at different stages. In phase 1, the network plays a role as a back-up when card payments fail. In order to fully meet the additional demand during outages, the withdrawal network should be scaled up to 7,500-15,000 ATMs (compared to the current situation of approximately 3,850 ATMs of Geldmaat, supplemented by approximately 1,150 ATMs of IADs). There is no private support for this.

However, the intended footprint of approximately 3,850 ATMs must be maintained as a partial back-up until the digital alternatives are sufficiently scaled up. The number of 3,850 ATMs stems from the current agreement between the banks and DNB. Bilateral conversations have suggested that 200-300 ATMs that still need to be migrated, require investments that can also be used to set up and scale one or more digital alternatives to cater for back-up function. The banks and DNB will have to make further agreements on this in their future discussions. In phase 2, the withdrawal network can be scaled down in line with regular usage within the accessibility standards (approximately 3,000 ATMs, using the current standard of 99.76% coverage within a 5-kilometer range of the geographical center of postal code area, supplemented with population numbers). Different standards are possible, for example based on shopping areas, or a standard based on residential addresses which is currently the case. In phase 3, accessibility standards can be relieved. The role of cash exclusively as a public means of payment requires lower accessibility levels, because the back-up function of cash and the objective of serving cash-dependent groups has disappeared.

A broad acceptance of cash at the counter is required in phase 1, both for the back-up role and for cash-dependent groups. Because cash payments represent a substantial part of the revenue of retailers, it is likely that no measures will be needed to enforce the acceptance of cash. However, strict monitoring is necessary to properly map this (which is now insufficiently happening). If the acceptance rate in phase 2 sinks below a certain threshold, measures or further improvements of the acceptance side are necessary to ensure sufficient acceptance levels for cash-dependent groups. In phase 3, the acceptance rate may decrease. The government may set a limit that is necessary to guarantee the role as a public means of payment, for which various measures are conceivable (ranging from agreements to a legal obligation).

The deposit network does not currently fit well with the needs of the different retailers, partly due to the recent (temporary) closure of part of the night-safe deposit (sealbag) machines. In phases 1 and 2, it is important to improve the deposit network in order to lower the thresholds for retailers to accept cash. The recent proposal of Geldmaat and the banks is to increase the total number of deposit machines, while a larger part of this total number will consist of recyclers instead of sealbag machines (this still needs to be validated with the different groups of retailers). In addition, Brink's offerings can also be refined and designed more in line with the needs of (smaller) retailers. In phase 3, the deposit network can further scale in line with the withdrawal network.

Regarding cash handling and cash-in-transit, it is important in phases 1 and 2 that consolidation risks in the market are monitored and mitigated where necessary. The very low volumes that are likely to be expected in phase 3, could potentially require nationalization of certain parts of the cash cycle (subject to legal and competition law review).

## **Question B: What agreements and/or rules are required for this?**

Declining usage of cash may require increasingly strict enforcement in terms of withdrawal network, acceptance levels and consolidation risks. The necessary agreements and regulation cannot be directly linked to the different phases. For example, the moment that a next phase starts and further measures are needed (part of the follow-up of this research) can be laid down

in a covenant. The instruments of agreements and rules are as follows, increasing by the level of (legal) intervention:

- For maintaining the accessibility standards: agreements in the NFPS, covenant, regulations by DNB in its role as a central bank, legislation or nationalization;
- For maintaining acceptance: no agreements, agreements with retailers and annual monitoring, further improvement of the deposit side, legal acceptance in consumer law, legal acceptance obligation for part of the stores or legal acceptance obligation for all stores;
- For mitigating consolidation risks: monitoring by the ACM, continuity agreements with Brink's parent company (possibly in consultation with Geldmaat), appointing a party as a universal cash service provider (e.g., Geldmaat, Brink's or a JV of both parties), legislation on continuity or nationalization.

### **Question C: How is the funding organized?**

As the use (number of transactions) of cash decreases faster than costs, the cost per transaction will increase further. Banks currently partly finance their cash-related activities with income from account-related services, and partly with income fees from cash-related retail banking. Nevertheless, the banks make losses on their cash services (the extent to which, depends on the imputable amount of revenues from the payment packages). This loss is covered by revenues from other activities, e.g. lending and pricing of retailers. Various forms of funding the banks' costs of cash are possible (some of which have already been put into practice):

- Users directly pay for the negative result:
  - By paying an amount per transaction;
  - With a rate per payment package;
  - With an increase in the rate for all payment accounts;
  - Banks pay for the negative result;
- The government subsidizes (part of) the costs.

The costs of acceptance are currently mainly carried by the retailers, which pass it on to their consumers. All purchases (including the ones that happen via electronic payment) thus cover the costs of the acceptance side. Simply put, the cost of cash is incorporated into the prices of the products the stores sell. Various forms of funding are possible:

- Users pay a fee per cash payment;
- Retailers pay for the entire negative result (and pass this on to the consumer in their product prices);
- The government subsidizes (part of) the costs.

## To conclude

DNB and the Ministry of Finance should determine which rules and agreements from the instruments (NFPS agreements, covenant, regulations, etc.) are needed during phase 1. Setting the thresholds to switch to further measures (such as regulations) is part of this. At the moment, the Dutch Payments Association is conducting a study into which alternative (or which alternatives) is (or are) most suitable to fulfil the role of back-up for the electronic payments system. When the results of this study are available, the roll-out can be started. The scaling and integration of this alternative (or these alternatives) will be an decisive factor in determining when the cash back-up function can be released (and transitions from phase 1 to phase 2).

Finally, on the basis of the above recommendations, there are some concrete next steps that can be taken immediately, such as exploring the initiatives described above to (operationally) improve the cash cycle, closely monitoring the actual acceptance rate at retailers, improving the deposit possibilities and safeguarding the consolidation risks through agreements between the relevant parties in the cycle and competent authorities.