ALTERNATIVE MEANS OF PAYMENT IN THE EVENT OF AN IT BLACKOUT

Scientific study

Berlin Institute of Finance,
Innovation and Digitalization e.V.

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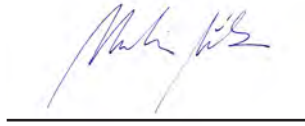

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I.- ABSTRACT

Financial crisis (3,390,000 Google hits), economic crisis (2,400,000 Google hits), euro crisis (868,000 Google hits), Greek crisis (283,000 Google hits), world crisis (44,600 Google hits), BREXIT (144,000,000 Google hits) and the federal government's civil defense concept (84,700 Google hits). The information sources are full of crisis terms and recommended actions. Interestingly, for the keyword "data crisis", Google gives only 1,640 hits. This is curious, because, in the digital age, a data crisis could trigger any of the crises mentioned above.

In this study, we pose the central question of how much cash and in what form is necessary to overcome a data crisis situation (IT blackout) of up to 10 days that limits cash procurement. The study shows that the current statistically determined amount of around €103 of cash per person is not sufficient, especially in specific situations. The simulation results show that during a crisis lasting 10 days and a loss of confidence in the currency accompanied by inelastic demand (a steep reduction in food supply) in the last quartile (25% of food supply remaining) an average of €680.36 is needed. During a correction to the last decile, of the food supply, an average of €1,894.07 is needed.

This sum not only exceeds the currently determined amount, but it can also mean that if confidence is lost, payment in euros would no longer be possible and a hedge would be necessary. This might be other currencies, or precious metals such as gold.

II.- INTRODUCTION

One of the basic ideas for the founding of the European Union (EU) was a striving for security and freedom. This basic idea was also recently confirmed in the "Global Strategy for the Foreign and Security Policy for the European Union" adopted on June 28, 2016.[1] The international and Europe-internal crises of recent years in the realms of politics and economics clearly indicate how expensive it is to maintain this objective. Two prominent events of the recent past can be cited that may influence developments in the European Union.

The first goes back to 2008 and affects almost every aspect of EU economics and politics – what is called the financial crisis. Based on this crisis, Europe now sees itself exposed to the euro crisis, which is marked by three mutually connected aspects: "a government debt crisis, a bank crisis, and a macroeconomic crisis."[2]

The second event came on June 23, 2016 – the BREXIT.

In our digital age, these developments have been analyzed, critiqued and constantly discussed from every angle. Regarding the BREXIT, the Handelsblatt online bore the September 14, 2016, headline, "Juncker speaks of an 'existential crisis' in the EU."[3] Almost unnoticed in the shadows of this announcement, on the same day, there was a second article that directly questioned the euro as a currency and discussed gold as an alternative currency. Lastly, the media focused on the "Civil Defense Concept (KZV)" from the federal interior ministry of August 24, 2016.[4] Interestingly, almost all of these crisis debates miss the 2011 work of T. Petermann et all, "What happens during a blackout",[5] which analyzes the long-lasting, widespread effects of a power failure. And we may now stand before a new type of crisis – the data crisis. "Data crisis" means that over a certain period access to data is limited, hindered or not possible. The term "data crisis" takes in not only a collapse of the IT system, but also reduction of its operational capacity, in which the sheer amount of data and data sets exceeds the ability to access it.

In this study, we address this information and pose the central question of how much cash, and in what form, is necessary to overcome a data crisis situation of up to 10 days that limits cash procurement.

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1 Vgl. Bendiek A. (2016), p. 1.

2 Bofinger P. et. al. (2012), p. 1.

3 Cf. authorless (2016).

4 BMI (2016).

5 Petermann T. et. al. (2011).

III.- DEFINITIONS AND FRAMEWORK DATA

With regard to the defined objective of the study, we must first explain the terminology used. For this, we will go into more detail about digitization of data and explain the payment and data transmission system, because these are of essential importance to the cash supply.

1. Data digitization

Across all generations, and in all fields, today Internet content is called up through mobile end devices.[6] In the midst of that, we forget that the digital age didn't begin until between 2000 and 2002, and that the first smartphone (the iPhone) did not come out until 2007. At the same time, humanity saved about 94% of the world's information in digital form.[7]

2014 40% of the world's population was already online (75% of Europeans). In 2013, 98% of Germans aged 14 to 24 used the Internet.[8]

These statistics, and the speed with which digital data, its use and processing became established in everyday life, are impressive. At the same time, however, they make it clear how dependent we are on constant data availability, and that we were not yet aware of this fact.

6 Cf. Lemke, C. / Brenner, W. (2014), p. 11.

7 Cf. Hilbert, M. / Lopez, P. (2011), p. 1.

8 Cf. Lemke, C. / Brenner, W. (2014), p. 11

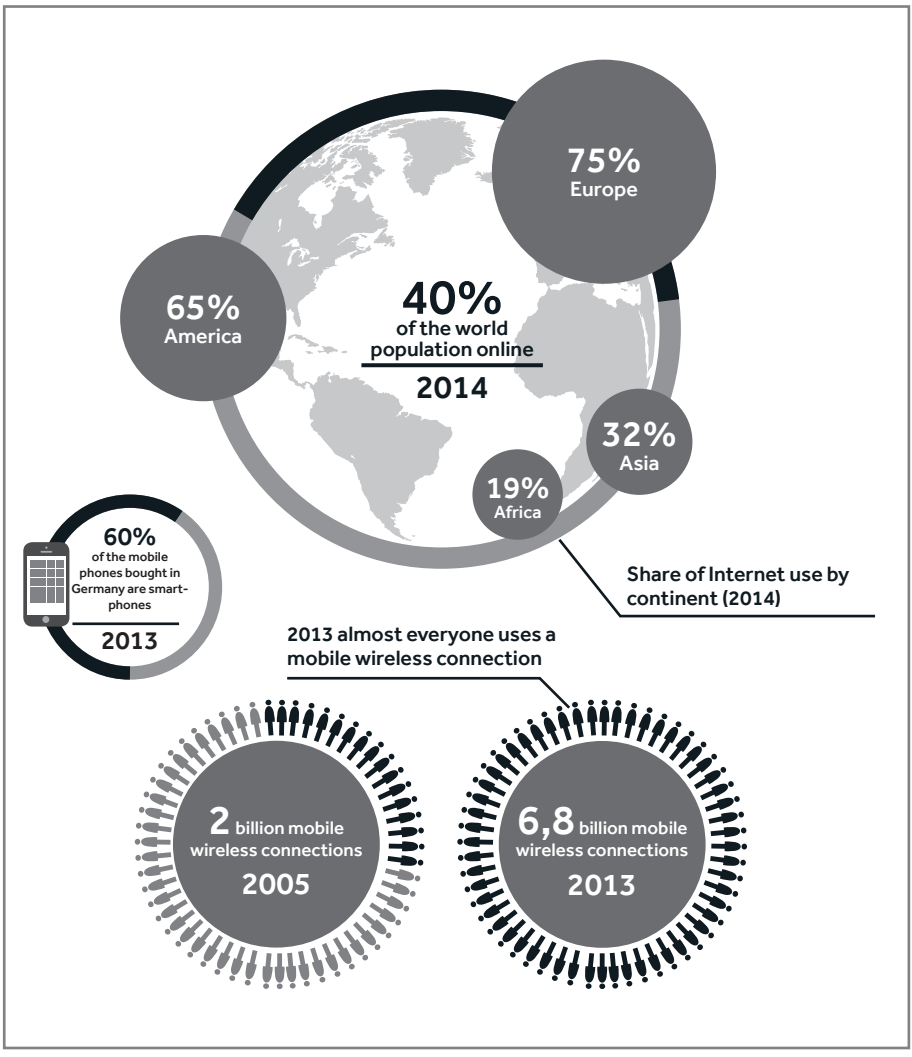

Figure 1

Facts and figures on the current status of the digital age
(source: Lemke, C. / Brenner, W. (2014), p. 32)

2. Payment and data transmission system

Ensuring the operational capacity of our financial services sector is a central everyday task. In regard to the objective of this study, the following briefly explains the system for public deposits and credit issuance (the banking system), the system for electronic payment transmission, and the associated elements (payment and data transmission system).[9]

The banking system handles payment traffic between employers, workers, banks and borrowers.

Participants in the payment and data transmission system include payers, payees, banks, clearing organizations and central banks.

Nevertheless, there are a number of banks in the system, and not just one, as in the diagram above, supposedly spread the risks, thus minimizing the risk of this situation, because banks now fall back on clearing centers and centralized (but nonetheless secured) storage farms. The risk is both one of system overload (data quantity) or system failure (caused internally or externally).

The risk of a crisis is not necessarily that of a complete collapse of all systems. Rather, this risk should also be understood as that of an unexpected failure of individual (but important) components of the banking services and/or data transmission system.[10] This situation is extended by the reaction or preparation time for a crisis situation that either does not exist or conditionally exists for finance companies, providers, and last but not least the customers.

[9] We refer to the statements of Petermann, T., et al. (2011), p. 168 et seq

[10] A system failure can be caused by a power failure, for example. Here a widespread failure is completely possible, as the incident of November 4, 2006 shows. See Appendix 2.

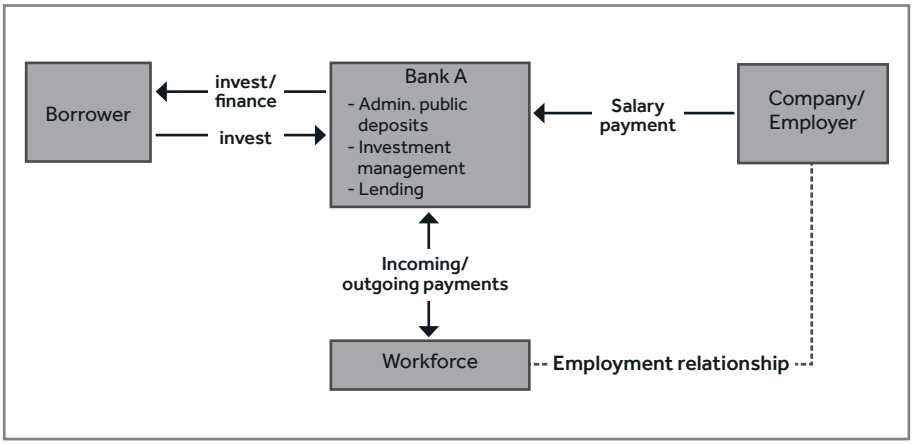

Figure 2

The banking system (source: T. Petermann et al (2011), p. 169)

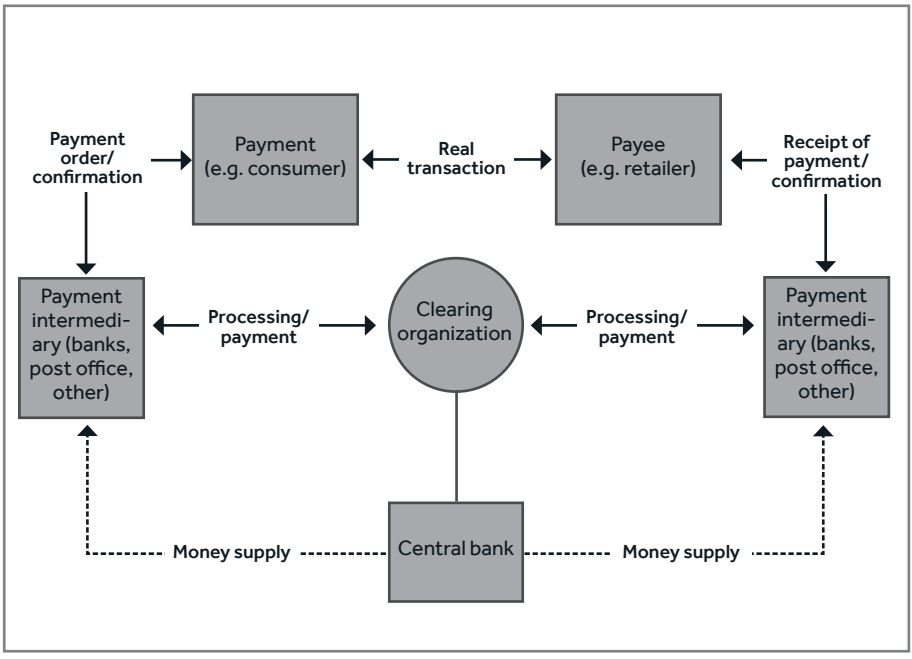

Figure 3

Payment and data transmission system (source: Petermann, T., et al (2011), p. 170)

3. Cash supply

The functional structures of the financial services sector, together with the use of modern, Internet-based technologies in our digital age give a clue as to these systems' dependence, and above all, their exposure to risk. With splendid logic, T. Petermann et al state that the "financial services sector" is largely dependent on a continuous, stable power supply. The reason is the electrical power-based information and communication infrastructures used for communication, data storage, monitoring and regulation of the flow of goods and money, and for payment and data traffic.

These are the sector's "nervous system". Failure of these infrastructures and the accompanying obstacles and hindrances to providing important financial services would have serious consequences for the economy and society.[11] Consequently, a failure of the systems or limitation of their operational capacity can be considered a data crisis or digital crisis.

In this sort of crisis, the concept of civil defense becomes relevant. It is therefore stated that, "The individual financial institutions..." must "...perform proper banking transactions or financial services under the Credit Services Act (KWG)..." "This includes payout of deposits. For this purpose, precautionary measures must be taken."[12] According to this concept, financial institutions independently determine how much must be critically demanded and verified with a view toward the 2008 financial crisis, the euro crisis and the associated cash supply to the Greek population in 2012.[13]

Considering this situation, we must look into the money supply of the German population. The net financial assets per private resident of Germany are €47,681.[14] This shows reasonable creditworthiness (compared to other countries) that supports the purchasing power to create demand. In contrast to the financial assets, cash assets are much smaller, €103 according to the German Federal Bank.[15] There is thus a considerable difference between total assets and cash. In the event of a data crisis, it can be assumed that, while creditworthiness remains intact, liquidity may be limited. Therefore, in the case of a data crisis, the dogma from financial textbooks – "liquidity follows creditworthiness – will not apply.

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11 Petermann, T., et al (2011), p. 168.

12 BMI (2016), p. 50.

13 Further aggravating this in Greece was that an exit from the EU was feared.

14 Statista (2016a).

15 Cf. Deutsche Bundesbank (2014), p. 15.

It is reassuring that "the Central Bank" "according to Section 3 of the German Central Bank Act (BBankG) sees to proper payment flow among banks in Germany." "It is responsible for providing the necessary or receiving the delivered funds at the counters of its 35 regional branches."[16] However, at this point it would be legitimate to ask about implementation of the cash supply for 40.77 million private households[17] in Germany (as of 2015) through 35 federal bank branches. In the Civil Defense Concept, it is stated this way: "It is not possible to provide the full population with cash through the federal bank itself – for example, the current 35 branches of the German Central Bank, compared to a current total of about 50,000 automatic teller machines in addition to 30,000 bank branches would be inadequate."[18]

[16] BMI (2016), p. 51.

[17] Cf. Statista (2016).

[18] BMI (2016), p. 51.

4. Alternative payment methods

According to the definition of the German Central Bank a "...legal tender..." is described as "tender" "that no one can refuse for meeting a financial obligation without suffering legal disadvantage. In the euro zone, cash in euros is the legal tender."

An alternative means of payment, in light of the definition above, can include cash or a cash substitute that no one would refuse for settlement of a financial obligation. In this study, we adopt this accepted definition. Whether an alternative means of payment is used depends on the confidence and the purchasing power of a payment instrument. During a crisis of confidence in the legal tender, various inflation scenarios in the past have shown the reactions evoked in the population.

Possible scenarios are:

1. Use a different (alternative) currency which there is still confidence (historically the US dollar, Swiss franc or the British pound)
2. Use of valuables (jewelry, stamps, paintings)
3. Use of precious metals (gold, silver) or diamonds
4. Use of substitute goods (black market)

IIn the further course of this study, however, only points 1 and 3 will play a role (points 2 and 4 are beyond the limits of this study). Here, identifying an alternative currency is fraught with risks. Therefore the British pound was one of the world's reserve currencies for a long time. Whether it will remain a reserve currency or main currency after the BREXIT is complete is hard to estimate. Which alternative currency will find general acceptance in a tight cash market is hard to predict. This decision must therefore be made individually.

Gold is a chemical element listed in the Periodic Table of Elements in the same group as silver, copper and roentgenium.[19] "Gold has been used for millennia for ritual objects and jewelry, and in the 6th century before Christ as a means of payment in the form of gold coins."[20] Gold and other precious metals (sometimes even diamonds) have been shown empirically and historically to hold their value and therefore their characteristic as a means of exchange in times of uncertainty. Its implicit problem has been in its "divisibility" and identifiability in small quantities. In crises, it is reasonable to assume that gold vouchers or gold assets (deposited) at banks are not accepted in bank exchange. The smallest "reasonable" trading unit is 1 gram. (In free trade about 70 US dollars as of September 23, 2016). One ounce allows the probable purity to be determined using the test of Archimedes.

[19] Wikipedia (2016)

[20] https://de.wikipedia.org/wiki/Gold

IV.- SIMULATION ANALYSIS OF A PAYMENT DEFAULT

In our analysis, we simulate a situation in which a technically driven default of payment systems arises, resulting in a cash supply problem.

1. Conditions and assumptions

Citizens of Germany hold an average of €103 in cash per household.[21] In our analysis, we simulate a cash supply system failure of up to 10 days. At the same time, we focus on the food supply during this period. Healthcare is assumed to be guaranteed.

In regard to the food supply, we suppose that the logistics no longer function and that the only the existing retail food inventories are available.[22] In the simulation, this situation is shown in the fact that prices can rise according to the available quantities of food.

The input parameters for the simulation are the price increase, represented by price elasticity, the existing amount of food, average daily per capita food expenditures, and the duration of the cash supply failure. Since this is a multi-dimensional model, we will assign the analyses to the output size of the cumulative amount of euros and compare this to the cash amount of €103. The input parameters are correspondingly brought into proportion. At the same time, we will deal only with specific scenarios, because a complete depiction of all possible situations would lead to an amount of data too large to be considered clearly or intelligibly. Fundamentally, we are analyzing 9,100 possible situations that can be shown from a combination of decreasing quantities of goods and increasing price elasticity.

[21] Cf. Deutsche Bundesbank (2016), p. 15. For this also see Petermann, T., et al. (2011), p. 40. The author refers to a 2009 study by the German Central Bank. Boehringer, S., et al (2012), on the other hand, cites a cash reserve of €65.

[22] For the detailed effects of a power outage on this sector, see T. Petermann et al. (2011) and Appendix 1.

Change in the price of food

The price increase is recursively derived from the price elasticity:

$$\eta_{Q,P} = \frac{\frac{(Q_2 - Q_1)}{Q_1}}{\frac{(P_2 - P_1)}{P_1}} \qquad P_2 = \left[\frac{\frac{(Q_2 - Q_1)}{Q_1}}{\eta_{Q,P}} \right] * P_1 + P_1$$

Where

$\eta_{Q,P}$ Price elasticity

P represents the price of food on respective days; P_2 follows on P_1

Q Available quantity of food

The price elasticity assumes values from -100 to (a very low rate of price change) to -1 (A very high rate of price change). In addition, in selected situations, the loss of trust in the currency is shown through the very high rate of price change with elasticity of -1.[23]

Available quantity of food

The available amount of food is considered in its trend from a level of 100% to a level of 1%. The number 100% indicates a situation where the population can be continuously supplied with food equivalent to required daily calories. Reduction of this number does not primarily mean that the number of calories is reduced, but first shows a situation where the food shortage is increasing with time. Therefore a food quantity of 1% means that within the analysis we are working with a short period or a small group of people, or in the second instance a reduced number of calories. The amount of food is therefore affected by the elasticity of the level of food prices. A decrease in the food supply leads to an increase in prices.

[23] Elasticity of -1 is accompanied by high inflation. Inflation is connected with a loss of trust in the currency and the economy. See Döring, T. (2015), p. 300.

Average daily per capita expenditure on food

The average per capital daily expenditure on food is set at €6.47[24]. According to the information given, a two-person household is considered, which includes a married couple or cohabiting residents, including same-sex couples, without children. These households' monthly expenditures for food, beverages and tobacco are about €388. Considering a 30-day month and the breakdown to each person results in a rounded sum of €6.47 per day. It can be assumed that households with children have higher expenditures.

Time window for the cash supply

The time window considered is set at up to 10 days. Additionally, the cumulative euro amount is formulated as a time variable that is required through the analyzed time window.

[24] calculating on the basis of
http://www.musterhaushalt.de/durchschnitt/einkommen-und-ausgaben/2- personen-haushalt/

2. Simulation results

As part of the model depiction, to consider the situation with the price elasticity, the quantity of goods, the price level, the time interval of up to 10 days, and the cumulative euro amount, we must have a five-dimensional system that generates a large number of possible results dependent on the situation occurring.
Therefore, in further consideration, focus is placed on the target size of the necessary cumulative euro amount, which arises from the price elasticity and the amount of available goods. We will consider only three situations related to the time window. Three, five and ten days are used as the basis for the three possible future scenarios.

Total necessary liquidity accumulated over 3 days in the event of a data crisis

The simulation results show that, depending on the situation, the existing cash liquidity will not be sufficient for supplying German citizens with food over a specific period. When considering the results in relation to a payment default of three days, the situation is as follows: If goods decrease to 19% and elasticity is -1, a cumulative amount of €108 is needed for three days. In only 10 of 9,100 scenarios are cash reserves of €103 inadequate.

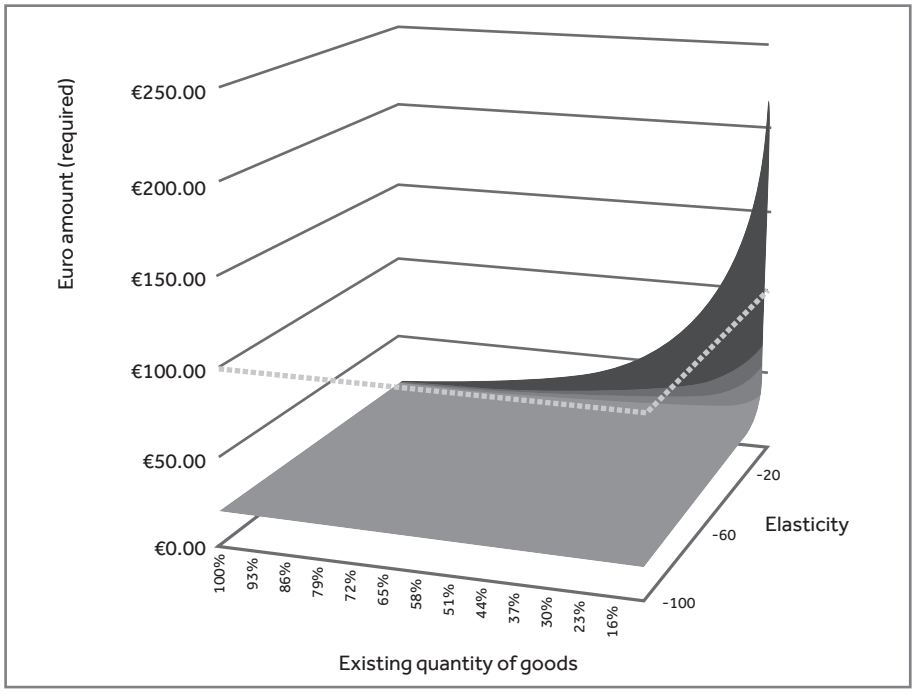

Figure 4

Required total liquidity accumulated over 3 days
(assumption: food price on the first day depends on price elasticity)

Total necessary liquidity accumulated over 5 days in the event of a data crisis

Even in the case of five days, the simulation results show a similar trend for the surface of required cumulative euro amounts as in the case of three days. However, the cumulative euro amount level is higher.

Below, the situation considered for five days is shown in profile view, where the individual curves depict the price elasticities. The dotted line at €103 shows that only in certain extreme situations (27 cases of 9,100) existing liquidity cannot cover the requirement of €103 over five days.

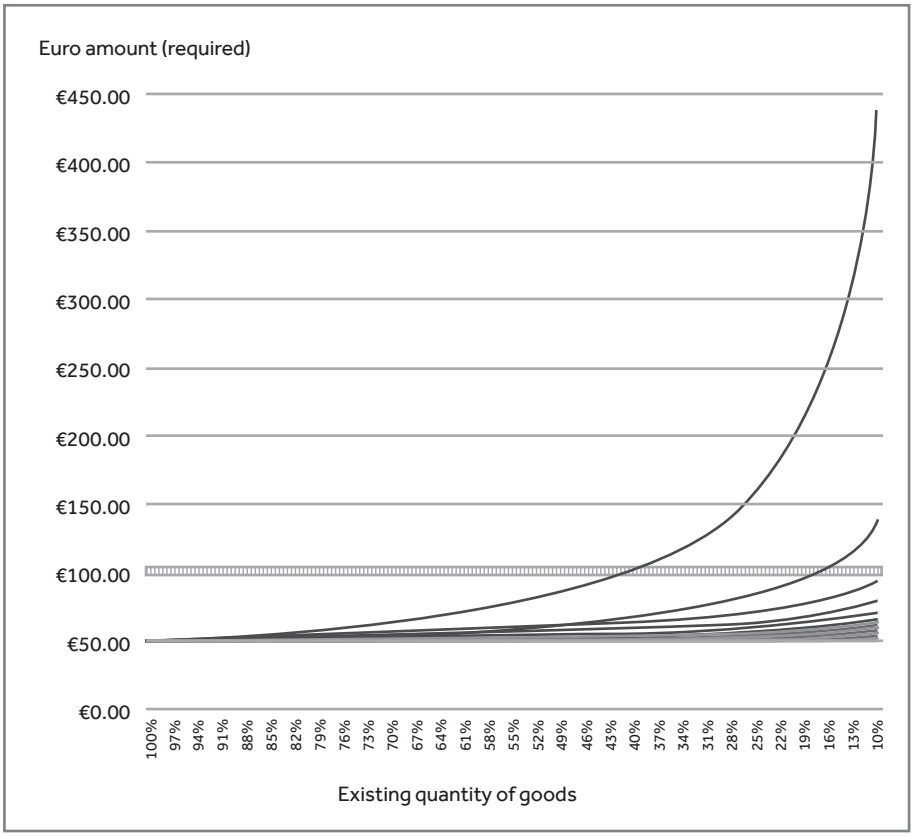

Figure 5

Required total liquidity accumulated over 5 days
(assumption: food price on the first day depends on price elasticity)

Total necessary liquidity accumulated over 10 days in the event of a data crisis

In the event of a payment default of 10 days, we have a total of 133 scenarios in which the reserved cash is not adequate.

The simulation results do not consider a situation in which confidence in the currency is lost. Let us assume now that not only the price trend but the amount of food products can be simulated through price elasticity, but also the loss of confidence, the simulations achieve a higher cumulative result, or expressed otherwise, the cash reserves hold out less often. The example, for a failure lasting 10 days, the probability increases to 64%, which means that in 5,800 possible scenarios out of 9,100, the existing cash is not enough in amount and quality to ensure the food supply.3. Empfehlungen

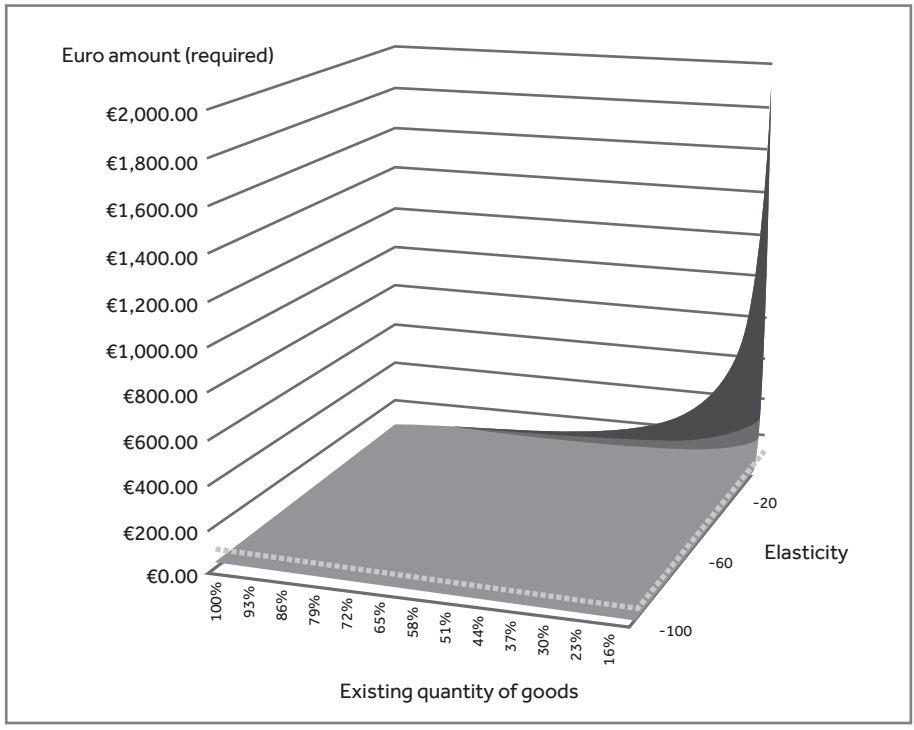

Figure 6

Required total liquidity accumulated over 10 days
(assumption: food price on the first day depends on price elasticity)

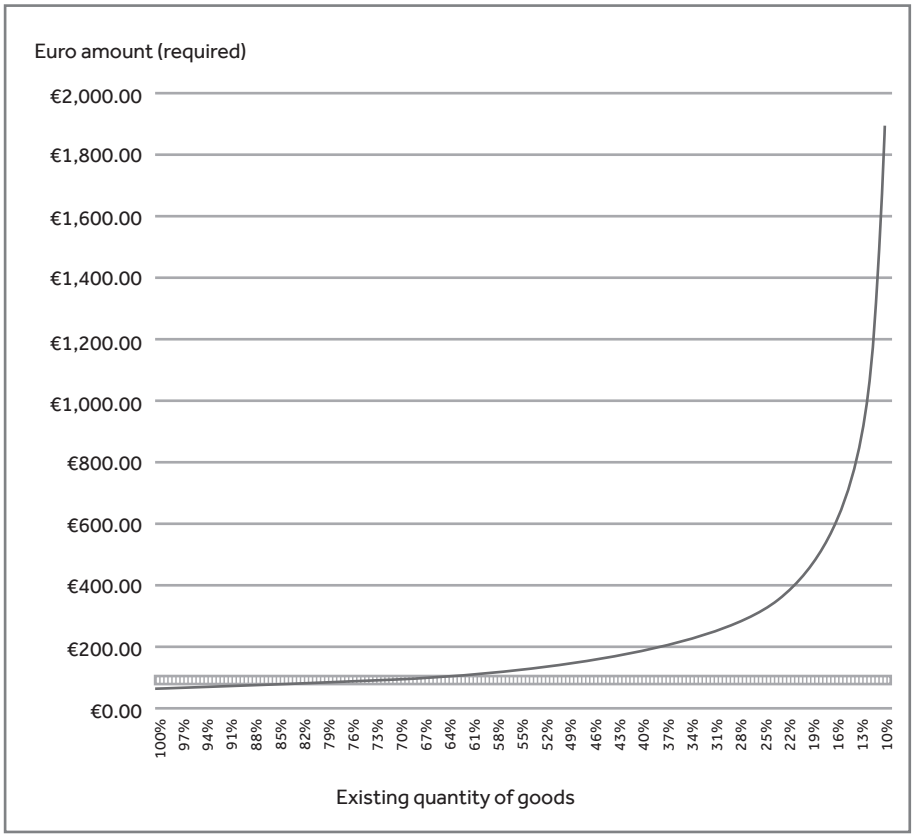

Figure 7

Required total liquidity accumulated over 10 days
(assumption: loss of confidence in currency shown through price elasticity)

2. Recommendations

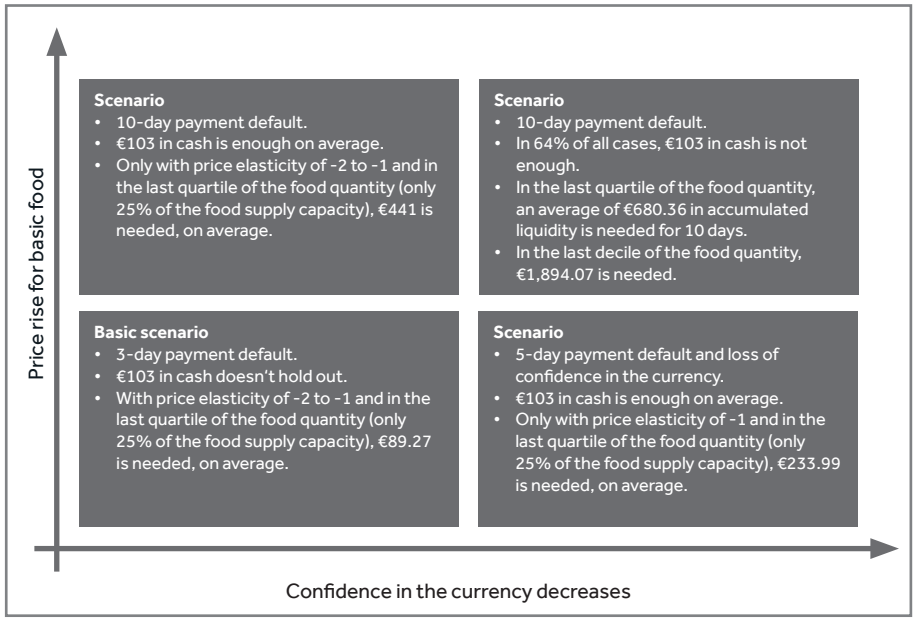

Figure 8

Price-Confidence-Matrix

The results of the simulations are summarized above. No dedicated recommendation can be provided as part of a study. Only the following neutral statements can be made:

If there is a foreseeable, finite data crisis that does not shake confidence in the currency, the current cash reserves should suffice.

However, if the author considers the developments of recent years and analyzes not only quantitatively, but also includes estimates, under some circumstances it would be prudent to reserve higher inventories of cash. If there were loss of confidence in the local currency, it might be a good idea to reserve one or more different currencies. Since there may be changes in the estimate, it is difficult to say which currencies should be reserved. To minimize this risk, if necessary, a provision could be made to reserve precious metals (see appendix).

The study makes it clear that about 4% of a German's average assets (€47,681) are at risk if a crisis occurs in the upper right quadrant. The further risk is not to have this sum of €1,894 available.

V.- CONCLUSION

During the 2008 financial crisis, the German government gave, for the first time, a state guarantee of all private savings deposits, which subsequently became part of the deposit safety act.[25] The aim was to minimize the run on banks and prevent uncontrolled withdrawal of cash.

In 2016, we are faced with new challenges. The financial sector is very highly dependent on the operational capacity of IT systems. An IT blackout would collapse the financial sector. The central question about the currency supply in Germany has not been definitively answered yet.

This study pursued and analyzed the question of how much tender and in what form should be available per person in a German household depending on the length of the IT blackout.

The results show that in certain extreme cases, the currently available average sum of €103 in cash is not enough. Additionally, we are extending the current recommendations to hold other means of payment as part of cash reserves. Thus, in addition to cash in euros, another internationally accepted currency that is seen as secure should also be kept available, such as US dollars and precious metals, such as gold and/or silver (in small denominations). The recommended amount strongly depends on the length of the IT blackout. However, it is recommended that, for a period of up to 10 days, the equivalent of €2,000 should be held. The distribution into individual forms of tender can follow a universal distribution function. This means that each of the three centrally recommended currencies – the euro, a stable currency outside the euro zone, and precious metals – should each be available in thirds.

However, it can be just as strongly claimed that depending on the source of the crisis, loss of confidence in other currencies cannot be ruled out. This would speak for a higher portion of precious metals in small tradable denominations.

It would certainly be interesting to investigate which precious metals should be held, in which denominations, in relation to a person's net assets.

[25] Cf. authorless (2008) and the EinSiG.

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VII.- APPENDICES

Listed here are quotes that BIFID deems interesting and that extend the topic, but would only have lengthened the study.

1. Excerpts from the study by Petermann et al

Source: Also see the bibliography:

https://www.tab-beim-bundestag.de/de/pdf/publikationen/buecher/petermann-etal- 2011-141.pdf Page data relate to the printed version.

"The sector's Achilles heel is the lack of electronic payment options and the population's waning cash supply. For this reason, the population's insecurity is growing: People are worried that they will no longer be able to supply food and other daily necessities." (p. 21)

"The German Central Bank has the task [...] of ensuring at least a rudimentary supply of cash for the population." (p. 21)

"An expanded security concept must also be developed, because it is questionable whether private security services could adequately secure the increased deliveries of cash." (p. 22)

"Constant availability of cash is one of the most important financial services. If it is not available in a crisis situation, the existing uncertainty of the affected populace will increase still more. The demand for cash may increase quickly in a crisis situation – on average, a resident of Germany should carry €118 (German Central Bank 2009b, p. 40). It is to be expected that during a prolonged power failure, the distribution of cash by banks and private money transport companies will not be guaranteed for the entire time. However, the Central Bank indicates that to "overcome an emergency or catastrophe...special precautions" must be taken "within a crisis management organization (BBK 2008a, p. 120)." (p. 173 et seq.)

"[...] Cash is very important in Germany – 65% of retail payments are made in cash (BBK 2008a, p. 119). The German Central Bank brings cash into the economic cycle. For this purpose, it maintains a distributed network of branches throughout Germany, in which it also holds the central strategic reserves (cash stockpiles). Through its own measures, the Central Bank ensures that the branch network will remain functional even in the event of a severe crisis. This means that they can issue cash at any time in the volumes the banks require (BBK 2008a, p. 119). The large-scale distribution of banknotes (transport of cash from the Central Bank branches to the banks) is the job of the credit industry, i.e. the banks and the private cash transport companies with which they contract (Fabritius 2009). The cash provided by the Central Bank branches is transported to the individual banks by specialized transport companies.

The banks, in turn, provide cash to their customers through automatic teller machines or over staffed counters. Because this process also needs to function in times of crisis, in addition to general emergency plans, there are also precautions to secure this transaction process, which can bridge the power failure for a certain time (EBP 2010, p. 44)." (p. 174)

"Zero to two hours: [...] enough cash is available. Cash transports still reach their destination[.] (p. 174 et seq.)

"Large parts of the population [...] no longer have the possibility to withdraw money from automatic teller machines [...] As a result, customers stand at the counters of their banks to withdraw cash, because in the meantime it has become evident that electronic payment with debit or credit cards is no longer possible in the stores." (p. 175)

"Two to eight hours [...]: Cash is sufficiently available and cash transports are still being made. Customers occasionally express discontent." (p. 175) "There is greater demand especially for issuance of cash, but also, concerned questions about loan payments, transfers and similar matters must be answered. At banks whose personnel are not adequately prepared and/or issuance of cash does not work properly, chaotic scenarios may play out. At some places, police must be deployed. These banks decide to close early [...]" (p. 176)

"Eight to 24 hours [...] The counters are staffed at larger banks and cash can still be issued. Money can still also be transported. More and more people want to withdraw cash, because purchases can only be made with cash." (p. 177)

"Issuance of cash at the counters is practically no longer possible, because money transports from the Central Bank branches to private bank branches no longer reach their destinations in the necessary numbers. In fact, the Central Bank takes the actions provided for in such a situation (distribution of banknotes independent of privately run money transport) after it becomes evident that the power failure will last an extended time. They are assisted in this by other government authorities (such as the police) (BBK 2008a, p. 119). However, given the size of the affected area, cash remains scarce. An aggravating factor is that due to transport problems and panic buying, the prices for food and other basic commodities are increasing.

The population has become very insecure, because it is becoming increasingly clear that the power failure will persist (EBP 2010, p. 51 et seq.). (p. 178)

"A look at week 2 [...] At [...] banks [...] most managers must decide in the second week to close the counters [...] [resulting in] a lack of cash [...] Banks that store valuables in safe deposit boxes are exposed to higher risk of break-ins and must be guarded by private security firms or the police.

The Central Bank will be able to keep the population supplied with cash only with difficulty." (p. 179 et seq.)

"Zero to 2 hours [...]: Purchases can now be made only with cash." (p. 181)
"24 hours to one week [...]: In the first days, cash can still be supplied to the population at the open counters at banks, and the demand for cash is still moderate, because most people assume the power failure will end soon. Errands are put off for later. As soon as it is communicated that an end to the power failure is not in sight, the people's concern about supply bottlenecks increases, mainly because of a lack of payment options. At some banks and retail stores, chaotic scenes sometimes play out, because people try to get to cash or daily necessities." (p. 182)

"A look at week 2 [...] The Central Bank's actions to supply the population with cash only partially take hold, because the stores have been emptied and the prices for high-demand goods are spiraling. In addition, there will be an increase in the number of mobile traders selling everyday necessities at highly inflated prices. People who had cash on hand or have received it through the actions of the Central Bank use it to buy from farmers and other food suppliers (some black market traders). Exchange of valuables in return for commodities and food still remains the exception (EBP 2010, p. 65)." (S182)

"The demand for cash could therefore rise quickly, even because residents of Germany carry an average of €118 with them (German Central Bank 2009b, p. 40). The immediate failure of the cash supply through ATMs and later at the bank counters, as well as the collapse of cashless payments, lead to a phase of easygoingness in stores and banks, and with time to discontented murmurings and to some aggressive arguments. As soon as it is clear that the power failure will continue still longer, the population's insecurity greatly increases. People are worried that they will no longer be able to supply food and other daily necessities, because they have no more cash or cashless payment options. In part, this leads to violent arguments, theft and burglary. At times, the police must intervene. In addition, individual transactions must be guarded as the power failure persists. Sales collapse in stores. It can also not be ruled out that prices for everyday commodities for sale would already rise in the first week. Information to the customer and appropriate risk communication in coordination with the disaster authorities therefore become ever more important. The focus turns to supplying the population with cash. According to the Central Bank, to "overcome an emergency or catastrophe...special precautions" must be taken "within a crisis management organization" (BBK 2008a, p. 120). However, if cash can be transported continuously by money transport companies in a large area, distributed and issued by the banks, this seems doubtful." (p. 221 et seq.)

"The cash supply to the population has proven to be a special weak point in the follow-up analyses. Therefore, the German Central Bank has the task, in cooperation with other organizations, civil defense emergency personnel and the banks to ensure at least a rudimentary cash supply to the population (EBP 2010, p. 79)." (p. 222)

2. Press release of the Federal Network Agency on February 27, 2007: Final report on the blackout of November 4, 2006

Kurth: "Transmission system operators must ensure (n-1) security". Today the Federal Network Agency has published its final report on the power failure of November 4, 2006. A central conclusion after completion of the investigation is that at all German transmission system

operators, an automatic inspection of (n-1) security must take place every 15 minutes. In addition, the report says, cooperation and communication must be improved, and especially the transmission system operators' data exchange.

On the evening of November 4, 2006, E.ON Netz GmbH turned off a high-tension line over the Ems river, in Germany, to allow a cruise ship to pass safely. As a result, the line connecting the networks of E.ON Netz GmbH and RWE Transportnetz Strom GmbH failed due to overload. This caused other lines to fail and a breakdown of the integrated European grid into three sub-grids of various frequencies. About 15 million people were affected by this power failure.

Immediately after the power failure, the Federal Network Agency began their investigation. They requested comprehensive documents and reports from the transmission system operators and obtained information at network control stations on the network routing possibilities. They also evaluated the reports of the European Regulators Group for Electricity and Gas (ERGEG) and the UCTE network operator association on the power failure of November 4, 2006.

The transmission system operators have committed themselves to operating their power grids with (n-1) safety. This means that operation must continue securely if a single component, such as a cable, fails. The Federal Network Agency's demand for cyclical, automatic inspection of (n-1) safety resulted in application of this instrument at various German transmission system operators.

E.ON Netz GmbH had not conducted any (n-1) inspection in connection with the shutdown of the high-tension line. The network safety calculations were supposed to be triggered manually, which had not been done. "A cyclical, automatic (n-1) calculation can assist personnel and allow safe grid control," explained Matthias Kurth, chairman of the Federal Network Agency, regarding the investigation.

The Federal Network Agency also sees improvement called for in the transmission system operators' communication and coordination. "It requires early communication of information about expected bottlenecks, a comparison of the security settings of connection lines with neighboring transmission system operators, as well as expanded exchange of real-time data," Kurth stressed.

The obligation of the grid operator to operate a grid safely follows directly from Section 11 paragraph 1, page 1 of the Energy Economy Law (EnWG). The Federal Network Agency performs monitoring and supervisory duties to support operation of a secure power grid and therefore a reliable power supply without releasing the grid operators from their legal obligations. The range of tasks includes careful, critical evaluation of the reports and messages to be conveyed to the grid operators, intensive dialog with grid operators and association and, if necessary, commands and actions if the EnWG has been breached.

The Federal Network Agency's supply security activities are not limited to the national level. The power failure of November 4, 2006, made it clear that there must be cooperation at the level of the European regulation authorities. The Federal Network Agency works actively on implementing the recommendations from the ERGEG final report. A need to shift competence of the national regulatory authorities to the European level did not result from treatment of the incident of November 4, 2006. Nonetheless, the Federal Network Agency is receptive to considerations of assigning a certain scope of implementation of ERGEG.

The ERGEG and UCTE investigations determined gaps in regard to the (n-1) security and to cooperation and communication on the part of transmission system operators and see a need for action in this regard.

ERGEG dictates that the Federal Network Agency make a cyclical (n-1) calculation of each transmission system operator. The UCTE wishes to use the incident as an opportunity to make

the operation handbook clearer on the (n-1) criterion. The final reports of the ERGEG and the UCTE also contain recommendations for improved coordination and communication among grid operators.

The Federal Network Agency's final report is on the Internet at www.bundesnetzagentur.de.

3. Excerpt from the Civil Defense Concept (KZV)

7.4 Emergency food supply

Regular food supplies are provided through a wide range of food producers and sellers without special minimum standards. The supply operates as long as possible through the privately organized food economy on the free market.

If the federal government determines that the population is not guaranteed a basic supply through the free market, the population is supplied with essential food through ordered production and distribution of the food through sovereign management of food production and distribution. Along the food supply chain, the federal government can issue statutory orders for availability limits and tax liabilities in regard to cultivation, processing, distribution and sale of food. Moreover, the responsible implementation authorities should grant temporary intervention powers up to issuance of appropriate statutory orders. The legal bases for state emergency food supply must be adjusted appropriately.

To ensure the basic supply of food, the federal government can hold a food reserve.

Finally, the population should be protected through stronger state measures. The population is stopped from holding an individual stock of food for a period of 10 days in order to support the state measures through appropriate personal provision. (p. 47)

7.7 Cash supply

The individual financial institutions must perform proper banking transactions or financial services under the Credit Services Act (KWG)." "This includes payout of deposits. For this purpose, precautionary measures must be taken. Currently, each institute determines on its own which risks it considers critical in what scope (see Section 25a paragraph 1 sentence 4 and 5 of KWG). If a financial institution classifies problems providing its customers with cash within the critical range, it must have an appropriate plan for emergencies and crises. According to Section 25a paragraph 2 of KWG, this also applies to outsourced fields of business, such as filling of ATMs by money transporters. There is no obligation to have a company-wide emergency plan for a crisis to contribute to maintaining or restoring all cash transactions.

According to Section 3 of the German Central Bank Act (BBankG), the Central Bank ensures banks' processing of payment traffic in Germany. It is responsible for providing or receiving the necessary money at the counters of its 35 regional branches. For this purpose, the Central Bank holds cash reserves in all denominations for its account holders (financial institutions, authorities, payment service providers, personnel). Moreover, there are strategic cash reserves at the Euro system level.

In the area of cash supply, the Central Bank has established very comprehensive risk provision measures and crisis management plans and business continuity plans. These plans mainly aim at ad hoc measures during shorter crises (one to five days) and therefore create lead time for taking measures during longer crises.

It is not possible to provide the full population with cash through the federal bank itself (for example, the current 35 branches of the German Central Bank – compared to a current total of about 50,000 automatic teller machines in addition to 30,000 bank branches – would be completely inadequate; there is no settlement or loading capability in regard to the individual citizen). Therefore, a functional logistics infrastructure (which is not in the Central Bank's range of influence and takes in the financial institution and money transport companies) is necessary for orderly supply of cash to the population.

Cash is distributed to the population through the financial institutions, which regularly rely on money transport companies. Due to increased automation (such as automated teller safes in bank branches or ATMs), dispensing options may be impaired during a crisis. Ensuring IT availability and energy to the financial institutions and money transporters is therefore indispensable. The requirements described in Section 7.2 apply.

Against this background, involvement of all private participants in the cash cycle (the financial industry and money transporters) in the general crisis supply is necessary, as is their obligation to participate in a crisis concept that covers overall cash supply and receipt (cash transactions). (p. 50 to 52)

4. Excerpts from The Private Recue Parachute: Because in the event of a crisis, the government and banks will not...

[...] the cash reserve [...] comprises the budget for several weeks, better for about three months

On average, have just over 65 euros available.

[...] [...] they deposit it at home. [...] exchange a third of cash for a solid foreign currency. This could be the Swiss franc or the Norwegian krone.

Many historical sources indicate that in early times a person could feed a family with an amount equivalent to the value of an ounce of silver.

[...] In 2012, sold for a price of about €30, and no four-person family could ever get by on this amount.

[...] to be secure for a months, each household should therefore own at least 120 ounces of silver.

Recommendation [...] of 120 to 500 ounces [...], a quarter of this in small units of half an ounce.

[...] of one third gold and two thirds silver.

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