

How to measure the number of cash payments?

A pilot study of 7 possible methodologies

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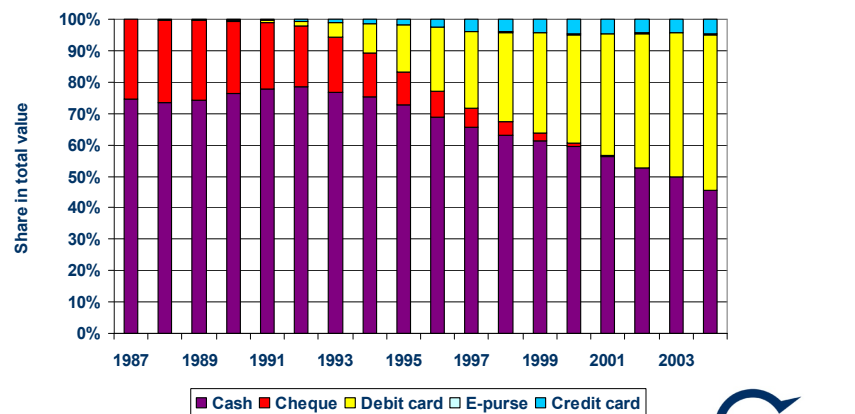
Outline

- Introduction
- Previous cash studies
- Research question
- Consumer vs. retailer approach
- Potential sources of measurement error
- Pilot design
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Introduction (1)

The development of the Dutch POS payment system



Introduction (2)

Cash payments:

- are not centrally registered
- occur at a wide variety of points of sale
- and P2P

Introduction (3)

Relevance for DNB of knowing the number of cash payments:

- Responsibility for banknote circulation
- Monitoring substitution process cash – payment cards
- Essential information for estimating cost efficiency of the payment system



Previous cash studies (1)

	Estimated number of cash transactions	Cash share
Retailer approach:		
Kippers ('98)	-	85%
HBD ('01)	4.2 bln	85%
Brits & Winder ('02)	7.9 bln	85%
EIM ('06)	5.5 bln	75%
Consumer approach:		
Boeschoten ('90)	-	64%
GfK/ Currence ('03)	2.7 bln	67%
TNS Nipo ('03)	7.6 bln	-
GfK/ Currence ('06)	3.2 bln	65%



Previous cash studies (2)

Results vary a lot ... just like their designs:

General differences:

- Scope of transactions
- Research period
- Research population

Differences between consumer approaches:

- Method of transaction registration: diary vs. questionnaire
- Length of reporting period
- Type of questionnaire: online vs. telephone
- Method of sample selection



Research question

What is the best methodology to measure the number of cash payments?



Consumer vs. retailer approach (1)

Retailer approach:

- + high number of observations
- + availability of 'true' transaction records
- difficult to draw a representative sample of all points of sale
- availability of 'true' transaction records biased
- exclusion of P2P transactions



Consumer vs. retailer approach (2)

Consumer approach:

- + inclusion of P2P transactions
- + less difficult to draw a representative sample
- measurement error



Potential sources of measurement error

- Omission
 - Salience
 - Diary fatigue
 - Diary exhaustion
 - Social desirability
- Telescoping
 - Salience
- Frame error
- Behavioural changes



Pilot design (1)

7 pilot studies, each one distinguishing itself by one different feature

Common features:

- Period: 30 August - 29 September 2007
- Scope of transactions: all point of sale transactions plus P2P
- Research population: Dutch consumers aged 12 to 75 years



Pilot design (2)

Features analysed:

- Diary vs. questionnaire
- 1-day vs. 1-week diary
- 1-week diary with vs. without interim reminder
- 1-day diary with vs. without additional questionnaire
- Online vs. telephone questionnaire
- Online panel vs. regular database



Pilot design (3)

	Pilot 1	Pilot 2	Pilot 3	Pilot 4	Pilot 5	Pilot 6	Pilot 7
1-day diary							
1-week diary							
Internet survey							
Telephone survey (Internet panel)							
Telephone survey (Regular database)							
Interim reminder							
Number of respondents	845	1017	638	1077	831	499	494

Results (1) Cash estimates retail trade September 2007

	External data	Pilot 1	Pilot 2	Pilot 3	Pilot 4	Pilot 5	Pilot 6	Pilot 7
Total cash trx. (mln)	246	- 13%	- 17%	- 38%	- 3%	- 11%	- 31%	- 27%
Avg. cash value (EUR)	9.60	+ 28%	+ 18%	+ 51%	+ 20%	+ 1%	+ 31%	+ 52%

- All pilots underestimate the total number of cash payments
- Especially the 1-week diary pilots and the questionnaire-only pilot
- All pilots overestimate the average cash transaction value



Results (2) Debit card estimates total NL September 2007

	External data	Pilot 1	Pilot 2	Pilot 3	Pilot 4	Pilot 5	Pilot 6	Pilot 7
Total debit card trx. (mln)	129	+ 25%	+ 36%	+ 58%	+ 19%	+ 7%	- 2%	- 9%
Avg. debit card value (EUR)	44.23	- 16%	- 10%	- 13%	- 17%	- 9%	- 11%	- 16%

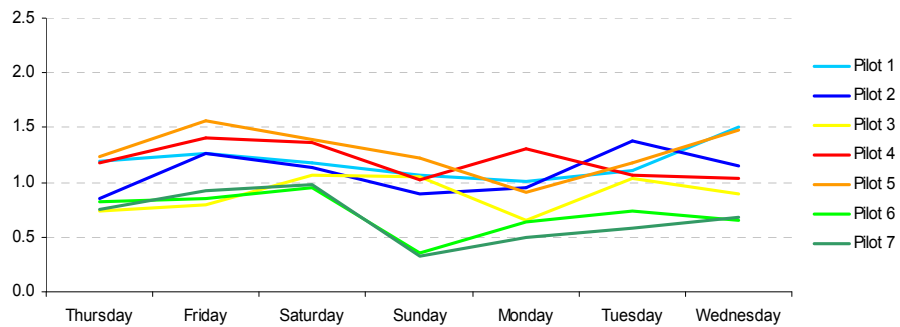
- 1-day diary pilots overestimate the number of debit card transactions
- 1-week diary pilots underestimate the number of debit card transactions
- All pilots underestimate the average debit card transaction value



Results (3) Underestimation of cash usage

Distribution of payments by day of the week

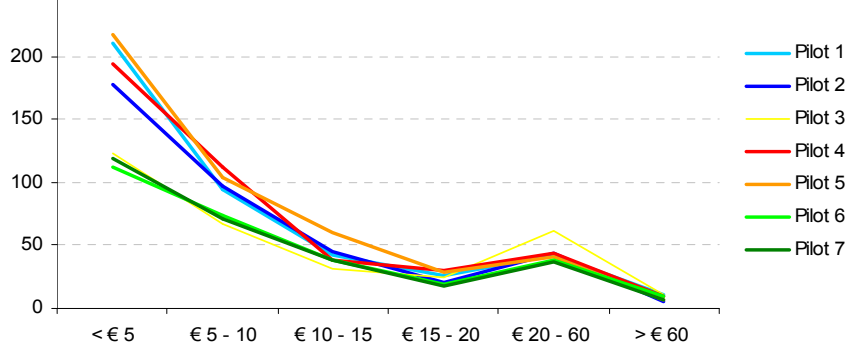
Average number of cash payments per capita per day



Results (4) Underestimation of cash usage

Distribution of payments by transaction amount

Total number of cash payments by transaction amount (mln)



Results (5) Hypotheses testing

1. The diary method reduces omission of payments compared to an end-of-day questionnaire

- No. transactions pilot 4 > pilot 3 √
- Share cash transactions pilot 4 > pilot 3 √
- Mean cash trx. value pilot 4 < pilot 3 √
- Median cash trx. value pilot 4 < pilot 3 √

2. The diary method affects debit card usage

- No. debit card trx. pilot 4 > pilot 3 X
- Share debit card trx. pilot 4 > pilot 3 X



Results (6) Hypotheses testing

3. Omission of payments increases with length of diary

- No. transactions pilot 4 > pilot 7 √
- Share cash transactions pilot 4 > pilot 7 √
- Mean cash trx. value 4 < pilot 7 √
- Median cash trx. value 4 < pilot 7 √

4. Omission decreases with an interim reminder

- No. transactions pilot 6 > pilot 7 √
- Share cash transactions pilot 6 > pilot 7 √
- Mean cash trx. value pilot 6 < pilot 7 √
- Median cash trx. value pilot 6 < pilot 7 ≈



Results (7) Hypotheses testing

5. An additional reflection moment reduces omission

- No. transactions pilot 1 > pilot 4 \approx
- Share cash transactions pilot 1 > pilot 4 **X**
- Mean cash trx. value pilot 1 < pilot 4 \checkmark
- Median cash trx. value pilot 1 < pilot 4 \checkmark

6. A telephone survey performs better than an online survey

- No. transactions pilot 2 > pilot 1 **X**
- Share cash transactions pilot 2 > pilot 1 **X**
- Mean cash trx. value pilot 2 < pilot 1 \checkmark
- Median cash trx. value pilot 2 < pilot 1 \approx



Results (8) Hypotheses testing

8. Online panels generate an electronic bias

- No. debit card trx. pilot 2 > pilot 5 \checkmark
- Share debit card trx. pilot 2 > pilot 5 \checkmark
- Mean cash trx. value pilot 2 < pilot 5 \checkmark
- Median cash trx. value pilot 2 < pilot 5 \checkmark



Conclusion

Research design matters a lot!

- Most important measurement error is omission of small cash trx.
- The omission is smallest with a 1-day diary ...
- ... and highest with a questionnaire or a 1-week diary
- An interim reminder partly reduces omission with a 1-week diary
- Internet panels may introduce 'electronic' biases



Thank you for your attention

