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Cashless Society: When will Merchants Stop Accepting Cash in Sweden - A Research Model

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Abstract. Over the past decades, we have witnessed changes into how individual's pay. In particular, there has been a drop in the use of cash as payment instrument both in terms of value and frequency. Consequently, the amount of outstanding cash is shrinking. For instance, in Sweden the level of cash is around 1.5% of Gross Domestic Product. This might be a tipping point for when cash is of practical use. In the paper, we present a research model that explores when merchants will stop accepting cash.

Keywords: Cashless society, Merchants, Cash Adoption.

1 Introduction

Payments are essential in the exchange of money for goods and services between sellers and buyers. The most used payment instruments in point of sales locations are cash and payment cards. Over the past decades, we have witnessed changes into how individual's pay. In particular, there has been a drop in the use of cash as payment instrument both in terms of value and frequency. Payment cards, such as charge, credit, and debit, and more recently new payment instruments, such as mobile payments and e-money, are replacing cash. These changes occur more or less in all economies and across the globe, but are particular evident in the Nordic countries, where you also can find a lively debate on the cashless society [3, 4, 8]. For instance, in Sweden there is a cash rebellion "Kontantuppror", where lobby groups in particular representing the cash-in-transit service industry and older people, demand that banks accept cash again (Note that most Swedish bank branch offices are cashless).

In parallel, payments are receiving increased attention from academic communities and span several disciplines, including information systems [11, 20], consumer research [10, 23, 25], marketing [17, 26], economics [6, 22], sociology [16], management science [2, 3, 24], and banking and finance [12, 15]. This has resulted in a variety of topics in the study of payments, including what money is [29], cost-benefit analysis of cash and payment cards [7, 27], competition [9], social

implications [18], choice and spending behavior [25, 27], payment framework [5], and adoption of mobile payments [1, 20, 31].

Despite the above, one aspect of payment research which has been largely ignored is merchant acceptance of payments, i.e. why do merchants accept or don't accept specific payment instruments. There are some exceptions, including the adoption of mobile payments by merchants [21] and the study of merchants point of sales data [26]. One finding is that cash payments are much more expensive than card payments [6] and we witness a "*…movement toward greater use of electronic payment methods, though gradual, is uniform and unmistakable, both across countries and over time*" [14, p. 936]. Schreft [28, p. 5] puts forward critic on existing research "*…is backward looking. It tells us what payment instruments were chosen in the past may not be a good indicator of what will be chosen [accepted] in the future*". In the realm of an emerging cashless society, we are in particular interested in when merchants stop accepting cash.

We assume that merchants are economic rationale in their decision making, i.e. merchants will stop accepting cash when it becomes more expensive to manage cash acceptance than the marginal profit on cash sales. It is important to note that Swedish merchants are not legally bound[1] to accept cash as a mean of payment but can decide themselves which payment services to accept. However, we acknowledge the existence of other factors influencing this choice, including the risk of being robbed.

Our work has the potential of contributing to the understanding of merchant's role towards a cashless society by developing a research model that explains the when merchants will stop accepting cash at point of sales.

2 Background

The context of this study is Sweden, since it is among the countries in the world with the lowest value in banknotes and coins in circulation compared with gross domestic product.

2.1 Retail payments in Sweden

One measure of cash use is the value of outstanding cash – bills and coins – compared with the gross domestic product (GDP), which varies between countries, as shown in Table 1. This measure provides an estimate of how dependent a payment system on cash, since many cash transactions are person to person (P2P) transactions and therefore not registered in any official statistics. The numbers for Sweden show a long-term downward trend when comparing outstanding cash to GDP. In 1950 this

[1] The Riksbank law states that cash is legal tender in Sweden and should therefore be accepted, but the freedom to enter contracts underpinning contractual and commercial law implies that a payer and a payee can enter an agreement that sets the Riksbank law aside. It should be noted that there are few court case rulings in this area and none in the highest court. This is not the case in Denmark or Norway, where central bank laws have superiority over contractual and commercial law.

number was nearly 10 percent but the last ten years it has been below three percent, and 1,8 percent in 2015, as shown in Table 2. The most recent statistics show that the number is around 1,5 percent in August, 2016. This long-term decline is, however, often the result of a process where GDP is increasing faster than the outstanding value of cash. A second, and quite extraordinary observation, is that the nominal outstanding value of cash has been declining since its peak in 2007. This is – to our knowledge – unique for Sweden and a strong indication of the transition towards a more or less cashless society in Sweden. According to data from the Riksbank, the decline is significant and fast also in 2016 where the nominal value of outstanding cash decreased over 12 percent in the period from January to July.[2]

Table 1. Outstanding cash in selected countries 2014, some selected countries

Countries / regions	Cash-in-circulation as share of GDP (M_0/GDP; %)
Malaysia	102,4
Chile	30,2
Bulgaria	12,2
Czech Republic	10,1
Euro-zone	*9,7*
Pakistan	8,8
USA*	7,1
UK	3,5
Denmark	3,0
Norway	2,0[3]
Sweden	2,0

Sources: European Central Bank (ECB), Norges Bank, Sveriges Riksbank and www.knoema.com. *The figures for the US is from the year 2010.

Table 2. Value of banknotes and coins in circulation (annual averages; banks' holdings excluded)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Value in billion SEK	96,5	97,0	96,7	96,5	95,5	90,7	86,8	84,4	78,2	74,9
Value as share of GDP	3,1	2,9	2,9	2,9	2,7	2,5	2,4	2,2	2,0	1,8

Source: The Swedish Financial Market 2015, The Riksbank (www.riksbank.se/en/) and Statistics Sweden

The statistics on the usage of payment instruments in Sweden show that cash is rapidly declining. There several explanations for this. The first explanation is the long-term increase in the use of card payments in Sweden. Card payment schemas were launched in a greater scale during the 1990s and merchants as well as consumers

[2] It should be mentioned that Sweden is currently replacing all banknotes and most coins with new ones. The direct short-term impact of this on the value of currency in circulation is ambiguous but it does not affect the strong long-term negative trend.

[3] This number is based on Norway's main-land GDP, i.e. excluding the off-shore oil sector.

have adopted card payments as the most important payment instrument in retail point of sales (POS) locations. The number of card transactions at POS and the value of these transaction have been growing steadily during the last ten years. In addition, the number of ATM withdrawals and value of such withdrawals have been declining over that last ten years (Table 3). Finally, survey undertaken by Sveriges Riksbank indicates that the use of cash at the point of sale in terms of volume of payments has fallen from close to 40 per cent to close to 20 per cent between 2010 and 2014. A recent, however not yet published, study by the Riksbank indicates that the number is down to around 15 per cent in 2016.

Table 3. Card transactions in payment terminals (POS) and ATM withdrawals

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
ATMs										
No. of ATMs	2816	3085	3236	3319	3351	3566	3416	3237	3231	3285
Transactions (millions)	313	320	295	269	241	221	210	183	167	154
Value (SEK billion)	270	240	239	232	225	206	190	174	171	153
Payment card terminals										
Terminals (thousands)	184,6	187,3	194,8	217,8	203,1	209,6	198,4	195,8	197,0	183,8
Transactions (millions)	1000	1154	1358	1490	1646	1799	2048	2329	2423	2501
Value (SEK billion)	423	463	488	496	557	598	654	722	754	747

Source: The Swedish Financial Market 2015, The Riksbank (www.riksbank.se/en/)

A second explanation is the recent is the introduction of a mobile payment service that enables real-time clearing and settlement and therefore provide similar functionality as cash, i.e. the value in the transaction is transferred in real-time from the payer to the payee. Much in analogy with the passing of a bill from one hand to the other. This service – which is called Swish – was launched by banks in 2012 and has become very popular for person-to-person payments. The growth was high in both 2014 and 2015. By the end of August 2016, the service was used by 4,7 million Swedes and transactions worth 8,2 billion SEK were made during August 2016[4]. This service has, however, not yet been adopted at a large scale by merchants.

2.2 Merchants' choice of payment services

Merchants in Sweden can decide to not accept cash but are at the same time not allowed to issue a surcharge to consumers related to which payment service that are used, which in essence means that merchants' choice of ideal payment service primarily is based on the direct costs and revenues related to each specific payment service. But research also shows that other factors play an important role as well.

[4] See www.getswish.se

A study by Loke [19] of which factors that determine a merchant's decision to participate in a card scheme identified the following factors as important explanatory variables:

- Merchant's background (including age, number of personal credit cards held[5], and use of computers[6])
- Merchant's business characteristics (including business sector, total value of transactions per month, average value of transaction, profit margin, location of business)
- Effects of other players' decision via merchant's perception (including merchant's perception of customers' use of cards and competitors' participation in the card scheme)

The study (ibid) arrived at two main conclusions. The quantitative analysis related to the factors above showed that the statistically significant explanatory variables were: age of the merchant which had a negative relation to the probability of accepting card payments; number of cards held by merchant (positive relation); business sector (where surprisingly enough non-technical stores were more positive to accepting cards); total value of transactions (positive relation); merchants' perception of customers' use of cards (positive relation); and competitors' acceptance of card payments (positive relation). When discussing these results, the study concluded that the demand from customers was the most important factor while the merchants' wish to boost sales related to acceptance of card payments was the second most important factor.

Other studies [12, 13, 30] highlight the importance of different characteristics of merchants, characteristics of payers or consumers and a number of other factors. Regarding the characteristics and decision factors of merchants this includes: industry, location, margins or profitability, type of products sold, type of customers, price of payment services, amount of revenue connected to payment service, inter-operability of the service, as well as other factors such as, for instance, risks, employees' opinions and work environment issues. Regarding the characteristics and decision factors of payers this includes: socio-demographic characteristics (age, gender, education, income), transaction frequency and value, speed and ease of use of services, need for integrity, technology interest, trust in services and in the payment system in general, costs of payment and banking services, as well as other factors.

3 Research Model

Based on the review of retail payments in Sweden our research model is therefore rather straightforward. We ask ourselves if and under which circumstance merchants will stop accepting cash and instead accept only card payments, and base the analysis on business factors such as revenues and costs related to cash and revenues and costs related to card payments. Our model is based on the following features:

[5] A proxy for experience with cards
[6] A proxy for familiarity with new technologies

Let θ be a set of payment methods that can be used at the point of sale. For simplicity, assume that there is only two such methods a and b. One may think of a as cash and b as cards. Each merchant chose whether to accept cash (a=1) and cards (b=1). If he does not accept cash (cards) then a=0 (b=0).

Let the continuous function $r_i:\theta \rightarrow \mathbb{R}_+$

denote the revenue merchant *i* makes depending on his choice of payment methods. In particular, let $r_i((0,0)=0$. Accepting no payment methods can be interpreted as a decision to exit the market. Here, for simplicity, we will initially assume the specific functional form $r_i(a,b)=r^a_i*a+r^b_i*b$, i.e. the revenue generated from card payments does not change if merchant also accept cash and vice versa.

Let πi denote the profit of the merchant, cj the fixed cost and vj the variable cost for each merchant of accepting payment methods j=a, b. With variable cost, we mean the cost as a function of the size of the revenue generated by the payment method in question. We also assume that all merchants have access to the same technology for receiving payments. In Sweden, this can be motivated by nearly all points of sale have to use cash registers that are approved by the tax authority, i.e. the tax authority limits the merchants' choice to a narrow and clearly defined set of technologies.

Let $x \epsilon (0,1)$ denote the revenue margin, i.e. the share of the revenue that exceeds the cost of the good sold. The merchants profit maximization problem is thus to maximize π_i over θ.

$$Max\ \pi_i(a,b)=a*r^a_i(x- v_a) + b*r^b_i(x- v_b) - c_a *a - c_b *b$$

In the general case this means that the merchant will accept cash if $r^a_i(x- v_a) - c_a \geq 0$ *for b=0* or *1* or both. In the following we will restrict ourselves to the case where merchants already accept cards (*b=1*). The first reason for this is that it allows us to focus on the question of when does a merchant abandon cash and still remains on the market. The second reason is that in Sweden cards are nearly universally accepted.
To answer our research question, we have to estimate x, v_a and c_a which will allow us to find the critical revenue threshold

$$r^a* = c_a/(x-v_a)$$

which the merchant accepts cash and below which he does not.

3.1 Selected survey items and points for discussion:

Data collection will be carried out by the three big trade associations, covering retailing and restaurants. The unit of data collection is a store (location) in 2016.

- What is the total turnover incl. VAT in 2016 of your store_____?
  Total value in cash_____? And share of total transactions (%)____?
  Total value in card_____? And share of total transactions (%)____?

- What is the shares of **transactions size** related to value (%) 1-19 SEK____? 20-99 SEK____? 100-499 SEK___? And 500-higher SEK____?
- What is the distribution of your costumers in **age** in percent? Children (0-11 years old)____Youth (12-17 years old)____ Adults (18-65 years old)____Retired (over 65 years old)____
- How large is your **profit margin** in percent? (We will use industry averages.)
- Do you **accept cash**? ____ (Yes / No)

Cost for Accepting Cash.

- What is the **average hourly labour cost** per hour per employee at your business (We will use industry averages)? ____
- Estimate your **total costs** in 2016 that are related to cash handling?____
- What was the **cost of cash** due to, for instance incorrect change, theft, forged cash, robberies, etc. that was not covered by insurance?____
- Try to estimate how much time per day the **employees devote to count cash**. Provide an estimate of a daily average____hours and____minutes per day?
- Estimate the **costs of cash storage** (depreciation of safety vaults, fees to baks and cash depots, etc.) ____SEK in storage fees 2016?

Substitution effect.

- How much did your company **pay the bank / card company** on average on top of the fixed costs? Per transaction (on average) or fee + _____% of the amount

Background questions.

- Do you have employees that sometimes work **alone** in a store? ____(Yes/No)
- Do you consider **stop accepting** cash? ____(Yes/No)
- Would your **sales decrease** if you stopped accepting cash?____(Yes/No)
- Would your **profits decrease** if you stopped accepting cash?___(Yes/No)
- Which year do you think you will **stop accepting** cash? ____
- Has your business suffered from **robberies** during the last five (or ten) years?____(Yes/No)
- Do you know if any other store that is close to your stores suffered from **robberies** during the last five (or ten) years? _____(Yes/No)
- Is it common for companies in your industry to **pay under the table**?____(Yes/No)

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