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# Promoting efficient retail payments in Europe



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# Promoting Efficient Retail Payments in Europe\*

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## Abstract

In this article we first document the evidence showing how an efficient retail payment infrastructure enhances economic performance. We then review the policy tools available to promote efficient retail payments in Europe. We argue that while SEPA is an important policy initiative that harmonizes payment methods across the EU, it alone is not enough. Vigorous competition and consumer protection policies as well as direct interventions discouraging large value cash payments would be particularly attractive policy tools as they would put no strain on stretched government budgets.

JEL classification: G21, G28

Keywords: Retail payment, SEPA, competition, consumer protection, economic performance

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## **1. Introduction**

Making retail payments is an inherent part of most adults' daily life in Europe. The efficiency and performance of the retail payments system have also macroeconomic consequences; Schmiedel et al. (2012) estimate that the costs of providing and making retail payments are approximately 1% of the Gross Domestic Product (GDP) in the European Union (EU). This suggests that making retail payment infrastructure more efficient would directly boost GDP in Europe. And as in the case of other infrastructures, the effects of more efficient retail payment infrastructure are not limited to direct cost savings: there is evidence that such efficiency would also yield indirect benefits by improving the supply chain, facilitating trade, boosting consumption, and enhancing bank sector performance (Hasan et al. 2012, 2013). Furthermore, cash is an attractive method of paying in the shadow and underground economies (see, e.g., Drehmann et al. 2002, Schneider and Windischbauer 2008, and Schneider and Buehn 2010). Hence, the adoption of electronic payment methods might not only stimulate economic growth, but also might provide a direct means to improve public finances for indebted European economies. The goal of this article is to review the policy tools available to promote the adoption of efficient retail payment methods.

Despite that payment habits appear to be slowly converging within the EU, a significant cross-country variation of payment habits persists in Europe (Martikainen et al. 2013). As we document in the next section, there is a correlation between payment habits and recent economic fortunes in the EU. Therefore the payoffs to adoption of more efficient payment methods could be the largest in the crisis countries.

Single Euro Payment Area (SEPA) is an important policy initiative to harmonize payment methods in Europe. But SEPA alone is hardly enough. It does not automatically increase the speed of convergence of payment habits, nor does it ensure that such convergence would lead to an efficient payment frontier. It is also likely to further enhance the market power of international

payment card platforms such as MasterCard and Visa in the short run. Thus much more could be done to ensure the development of efficient retail payment infrastructure in Europe.

The policy tools to promote adoption of efficient payment methods are numerous, and each of them involves different benefits and costs. After reviewing the tools and tradeoffs involved, however, it appears that some tools would be particularly attractive since they would not require tapping into taxpayers' money. Such tools include competition and consumer protection policies focusing on removing entry barriers to payment industry and direct interventions that discourage large value cash payments.

The rest of the paper is organized as follows. In the next section we document the importance of the issues at stake. In Section 3 we review the policy tools and their costs and benefits. In the concluding Section 4 we draw policy recommendations on promoting the efficient retail payments in Europe.

## **2. Retail Payment Infrastructure and the Macroeconomy**

It is widely recognized that investments in information and communications technology (ICT) infrastructure are essential to promote growth (e.g., Röller and Waverman 2001, and Kretchmer 2012). Retail payment infrastructure, being an inherent part of the ICT infrastructure, is no different: A well-functioning payment infrastructure is crucial to enhance the efficiency of financial markets and the financial system as a whole, boost consumer confidence and facilitate economic interaction and trade both in goods and services (BIS 2003 and ECB 2010). Unsafe and inefficient payment systems may hamper the efficient transfer of funds among individuals and economic actors (Humphrey et al. 2006). For example, Hunt and Humphrey (2012) estimate that mere digitalization of clearance of cheques in the US enabled by the Check Clearing for the 21st Century Act of 2003 has resulted in substantial costs savings.

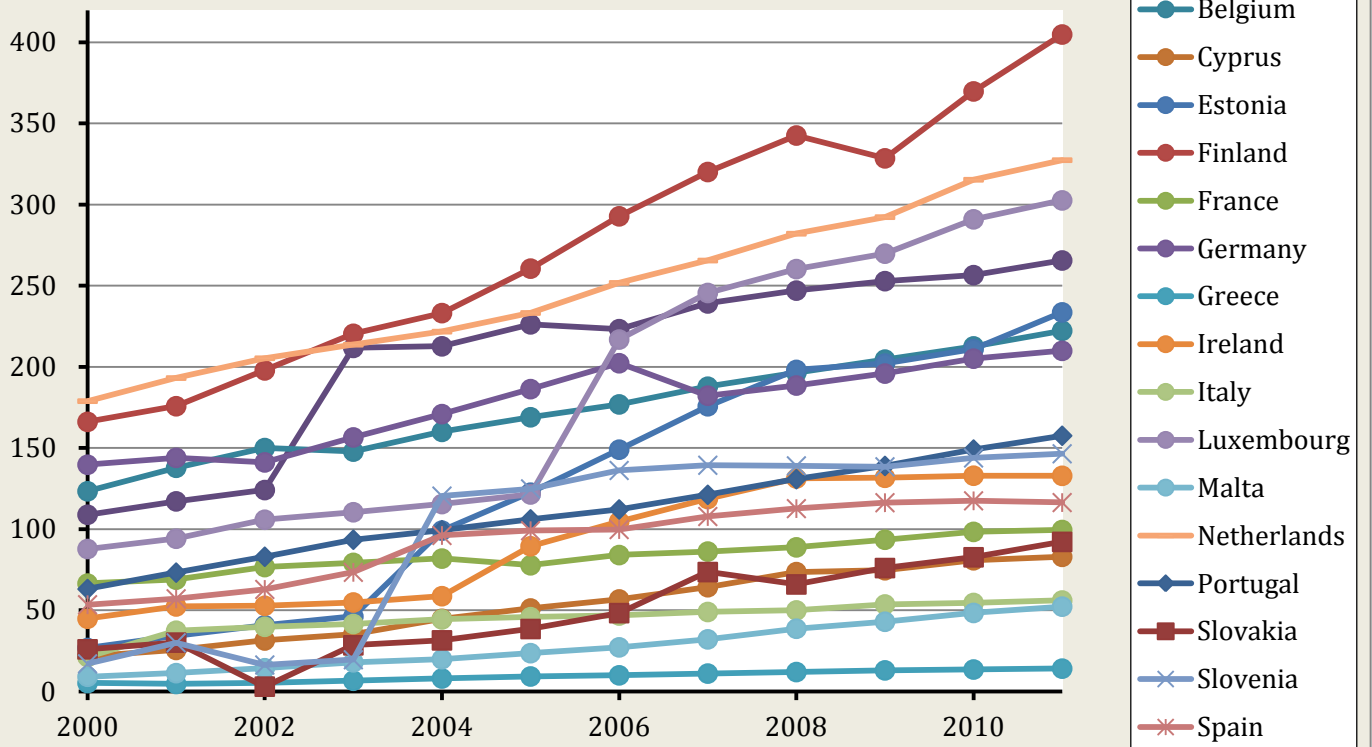
It is not, however, completely clear what are efficient payment instruments as each of the instruments has different social benefits and costs. There are some attempts to compare the various payment instruments from the welfare point of view. After surveying the literature, Humphrey et al. (2003) estimate that a country could save 1% of its GDP annually by shifting from a fully paper-based to a fully electronic-based system. Garcia-Swartz et al. (2006), who take into account benefits of a payment instrument use in addition to its costs, also find electronic payment methods generally superior to cash and cheques. Bolt and Humphrey (2007) argue that the introduction of SEPA will generate substantial cost efficiency gains because it promotes substitution of cash and cheques by payment cards and allows to reap scale economies in the processing of card payments across borders. The results by Hasan et al (2012, 2013) suggests that migration from paper to electronic retail payments has a positive impact on the banking sector performance and the real economy in the EU. In contrast, Schmiedel et al. (2012) find cash rather cost efficient means of payments if the volume of cash use is high. Nonetheless, a consensus appears to arise from the literature, suggesting that electronic forms of payment superior to paper based methods except perhaps for small value payments at the point of sale where cash remains an efficient alternative (see Shy and Tarkka 2002, for theoretical justifications of this view). The policy implications of our analysis are based on this consensus view.

Within the Eurozone, electronic forms of payments are popular, and increasingly so in Finland, Netherlands, Estonia, Luxembourg, Germany, and Austria (see Martikainen et al 2013 and Figure 1). In contrast, they remain particularly little used in Greece, Italy, Malta, and Cyprus. According to the data of Martikainen et al (2013) this is because of popularity of cash payments in these countries.<sup>1</sup> As argued by Hasan and Takalo (2014), Figure 1 suggests a correlation between payment habits and recent economic fortunes, which we try to capture in Figure 2.

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<sup>1</sup> While data on cash transactions is not directly available, our calculations based on the data of Martikainen et al (2013) suggest that the number of cash transactions per inhabitant in the Eurozone have been the highest in Italy, Greece, Malta and Spain over the recent years despite the economic crisis.

**Figure 1**  
**Number of paperless payments per inhabitant, Eurozone**



Transactions made by debit cards, credit cards, direct debits, and credit transfers.

Source: ECB SDW

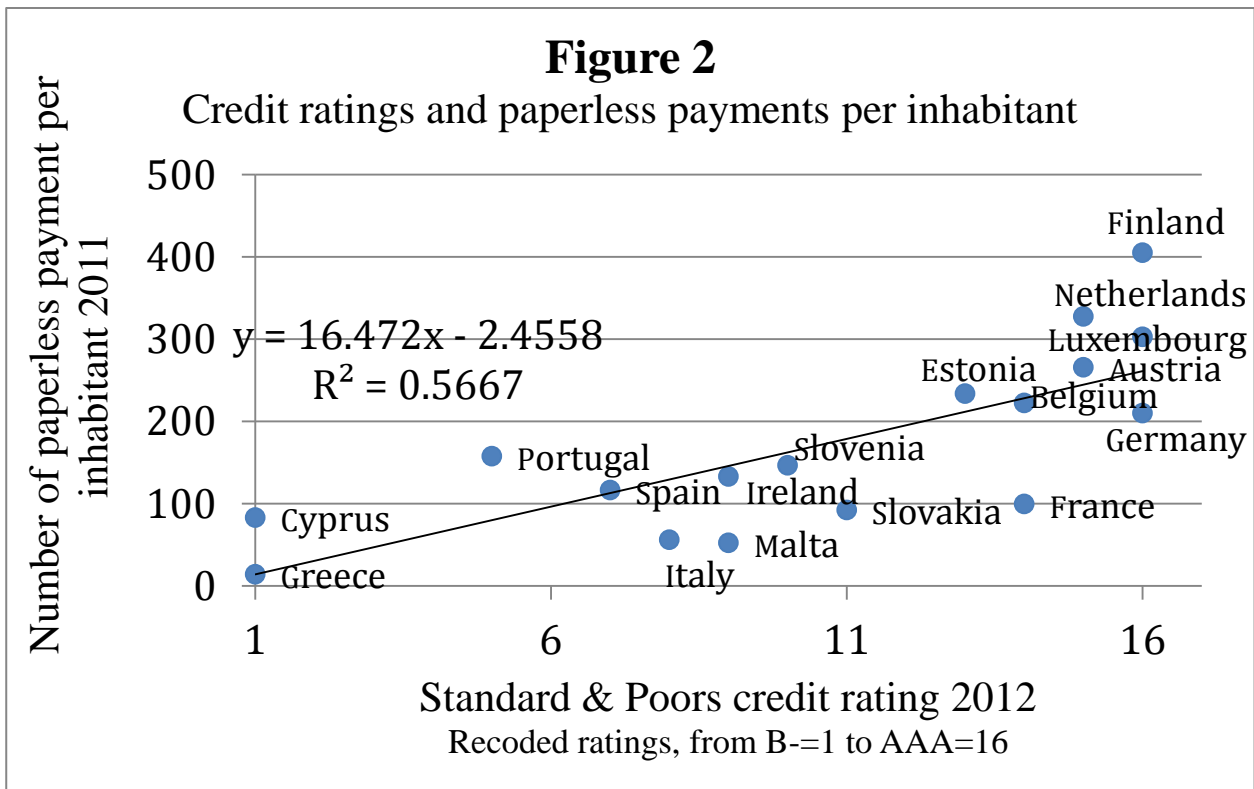


Figure 2 of course merely indicates a correlation. Hasan et al. (2013), however, argue that causality goes from payment methods to economic development, and not vice versa. Furthermore, some of the most exciting experimentation with new payment methods is currently taking place in the developing world, e.g., Kenya is a leading country in the adoption of mobile payments. While much more needs to be done to isolate the effects of retail payment methods on the real economy, the available evidence suggests that promotion of efficient retail payments should be incorporated into the agenda of structural reforms to cure public finances and boost growth in Europe. This does not only apply to crisis countries but also the countries that have fared relatively well until recently. For example, in Finland where the economic conditions have been deteriorating rapidly, the Government failed to follow the example of France, Spain and other countries to implement initiatives to curb the cash use.<sup>2</sup>

<sup>2</sup> The Finnish government set up a working group on 20 August 2013 to investigate the possibilities of restricting the use of cash. After consulting the various interest groups the working group recommended no restrictions on (large) cash payments nor mandatory requirements to companies to offer the option of paying

### **3. Policies for Promoting Efficient Retail Payments Methods**

There are numerous tools available to promote the adoption of more efficient retail payments. In this section we review some of the tools and discuss their advantages and disadvantages.

#### *3.1 Subsidies and Tax Credits*

Direct subsidies and tax credits are widely used to promote research and development investments, including those concerning new payment instruments and infrastructures. In principle, they could also be used to stimulate the adoption of existing instruments by individuals or corporations, e.g., adoption of EFTPOS terminals and mobile payment devices by smaller merchants could be subsidized. For example, Ferrari et al. (2010) show that the socially optimal number of ATM terminals can be obtained by subsidizing bank's ATM investments

In an ideal world where governments were omnipotent and benevolent, direct subsidies would be an efficient tool to provide correct incentives to invest in adoption and development of the payment instruments, as shown by Ferrari et al. (2010). A direct subsidy policy would involve screening of proposed projects to adopt or develop more efficient payment instruments. While such screening is costly to both the applicants and the government, it in return reveals information to policy makers who can then tailor the subsidies according to the policy objectives.

A practical weakness of subsidy policies is however that their effectiveness heavily hinge on the selection of projects into the subsidy program. In principle the public agency running the subsidy program should leave the evaluation of commercial potential of proposed projects to the market and concentrate merely on the evaluation of the social benefits of the projects. In this task

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by card, as has been done in regulatory decisions in some other EU countries (see the Ministry of Employment and the Economy, Finland 2014).



public servants could have a comparative advantage, but it is not clear whether this is the case in practice (see Takalo et al. 2013 for estimation of social returns of R&D subsidies).

Being discretionary and monetary, subsidies are also particularly vulnerable to misappropriation both by recipients and public servants. To mitigate moral hazard temptations, subsidy policies are typically accompanied by extensive safeguards against misappropriation. But such safe-guards are costly and reduce the social rate of return of subsidies.

Tax credits avoid some of the problems of direct subsidies (see Takalo 2012 for comparison of tax credits and subsidies as innovation policy tools). The goal of tax credits is to reduce the marginal cost of investments so the firms are likely to invest more than they would do without tax credits. There is less room of behavioral additionality of encouraging particularly socially valuable projects than in the case of direct subsidies, since firms decide what projects to undertake themselves and the tax credit percent typically does not vary over projects. Nonetheless, this full decentralization of decision making is a virtue compared with direct subsidies.

Like direct subsidies, tax credits are vulnerable to misuse by the firms and protections against this, e.g., special auditing and accounting schemes, are costly. Tax schemes tend to become complex over time and are also subject to change. Indeed, there is an argument that ideal corporate and individual taxation should have a broad base with a low tax rate (rather than vice versa), be simple and fair.

Even if it is plausible to think that well designed special tax credit or subsidy programs targeted to the development and adoption of efficient payment instruments would generate a positive social rate of return net of the opportunity costs of public funds, including the distortionary effects of taxation, such programs would put a burden on distressed public finances. It should also be noted subsidization of existing payment instruments might be against the Article 107 of Treaty on the Functioning of the European Union, which allows subsidization of research and development projects concerning e.g. new payment instruments, but prevents many other types of industrial aid.

### *3.2. Standardization and Regulation*

Payment industry is heavily regulated. Setting aside price regulations (which will be discussed in the next section), regulations are often driven by safety and standardization concerns. The retail payment market is a prime example of a two-sided market with strong network externalities (Rochet and Tirole 2003). For example, the benefit of having a payment card depends on how many retailers accept it, which in turn depends on how many people use the card. A well-known feature of such network goods is that the market needs to reach a minimum size to achieve a sustainable equilibrium. In such a market standardization is essential to reap network benefits and economies of scale. An important example of standardization is the Single Euro Payments Area (SEPA) project, which aims at achieving a fully integrated retail payments market within the EU and thereby increasing network compatibility and economies of scale (Bolt and Schmiedel 2013).

As will be discussed in more detail in the next subsection, however, standardization raises competition policy concerns. For example, it eliminates competition for the market – hence some scholars such as Shy (2001) argue that compatibility is inherently anticompetitive. Yet in the case of SEPA that concern is less relevant since the standardization imposed by SEPA deals with mature forms of payments, leaving room for entirely new forms of payments to enter. Although SEPA eliminated some well functioning national schemes and national competitors of large international payment card platforms such as MasterCard and Visa, it should in a longer run intensify competition within the market, since it should make European-wide operations easier for different types of payment operators and platforms.

Direct regulatory interventions also arise from safety concerns. Arguably the most important feature of any payment instrument is its credibility as a medium of exchange. Confidence on cash is backed by its status as a legal tender and the central banks credibility on fighting inflation. Electronic payment methods in turn should work fast and not be vulnerable to fraud.

However, heavy regulation makes entry and innovation difficult. Incumbents protected from entry have little incentive to introduce new payment methods, as this would cannibalize their existing products (as already pointed out by Arrow 1962). Especially in Europe there would be a need to remove entry barriers to both new service providers and new payment methods, such as e-money and mobile money. But the recent financial crisis is only increasing the regulatory burden on banks, although the payment system functioned remarkably well throughout the crisis. While ensuring safety and stability of new forms of payments is obviously important, it is the nature of regulators to err on the safe side and to remain skeptical about new payment methods, especially after the crisis.

Direct regulations could also be used to discourage the use of inefficient instruments or encourage the use of efficient ones. For example, large value cash transactions should be discouraged. Some countries have already implemented restrictions on large value cash transactions (e.g., cash transactions above 3000 and 2500 euros are not permitted in France and Spain). Others should follow. The European monetary authorities should also reassess the costs and benefits of issuing large value euro banknotes (as already emphasized by Drehmann et al. 2002).

In some countries it has also been made mandatory to offer an alternative electronic payment method to cash. While the goal of the regulation is laudable, imposing such mandatory requirements (without compensating subsidies) would unnecessarily discourage entrepreneurship - electronic payment methods are still often either too costly or practically infeasible for the smallest firms. Instead of mandatory rules increasing the costs of small businesses it would be more desirable to seek and implement “enabling” rules that would allow firms to reduce the costs of processing payments as, e.g., the Check Clearing for the 21st Century Act of 2003 in the U.S.

### *3.3. Competition Policy*

In the payment markets, interoperability and standard setting may involve a trade-off between efficiency and competition. An integrated European market and standards for retail

payments makes it possible for the payment providers to compete across national borders and to reach necessary economies of scale, as discussed in the previous section. However, interoperability and standardization involve co-operation among competitors which – as famously observed by Adam Smith (1776) – can facilitate another type of co-operation that aims at restricting competition. The potential anti-competitive effects of co-operative arrangements and standardization in the payment industry would be especially harmful if they deterred or delayed the introduction of payment innovations, such as mobile payments or online payments.

Complex competition policy problems associated with standardization of retail payments are illustrated in the antitrust investigation launched by the European Commission in 2011 against the European Payments Council (EPC), which is the co-ordination and decision-making body of the European banking and payment industry in relation to payments. The Commission was especially interested in the question of whether standardization process excludes new entrants and non-bank entities from the market for e-payments, thus limiting market entry and innovation. In response to the investigation the EPC announced that it ceases the development of the e-payments framework. Such an outcome is hardly conducive for innovation either.

Yet, as indicated in the previous section, there are reasons to believe that competition policy focusing on eliminating artificial barriers to entry of non-traditional payment providers would foster payment innovation in Europe. Consider, for example, mobile payments, which have been a success in some developing countries in a striking contrast with the EU. Many successful innovations, e.g. the M-PESA in Kenya, have been brought to the markets by non-bank institutions, such as ICT and telecommunication companies. Although some reasons behind the success of mobile money in the emerging world are specific to the developing country environment, non-banks could also be crucial in introducing mobile payments in Europe. According to Hyytinen and Takalo (2009a), most active innovators of mobile payments have been established European and North American ICT firms whereas the involvement of financial intermediaries has been small.

Much of the antitrust activity related to payment industry around the world has centered on the setting of multilateral interchange fees (MIFs). The extensive theoretical literature on two sided markets suggests that unregulated setting of MIFs by payment card platforms hardly yields socially optimal outcome (see, e.g., Börestam and Schmiedel 2011 and Verdier 2011 for surveys of the literature). But depending on various indirect network effects and price elasticities of supply and demand of payment cards, unregulated fees can be too high or too small from the welfare point of view, rendering the optimal regulation of MIFs challenging. Nonetheless, the authorities in Europe, as elsewhere, have taken steps to push the MIFs downwards. For example, the European Commission issued a decision in 2007 prohibiting MasterCard from setting a fallback MIF as this in effect determined a minimum merchant discount fee for payments made by MasterCard branded cards (COMP/34.579, 2007). More recently the Commission found the MIFs adopted by VISA harming competition and raising the costs of card transactions (COMP/39398, 2014). As a result, VISA committed to capping the MIFs and increasing transparency in its pricing practices.

In its Green Paper (European Commission 2012), the Commission notes that in addition to restricting price competition, price floors for MIFs can deter the entry of low-cost card schemes and e-payments. In 2013, the European Parliament agreed on capping the interchange fee for payment card transactions. The decision suggests that the market for card payments remains sufficiently fractured so that the policymakers consider regulatory intervention more efficient than ex post enforcement. The decision can be interpreted as a move towards more regulation and less market-based approach.

### *3.4. Consumer Choice and Protection*

To promote the use of more efficient payment instruments we need to understand what drives the choice of different payment methods by consumers at the point of sale, apart from the supply and availability of different payment methods. The extensive literature on consumer

payment method choice suggests that consumers rationally care about pecuniary charges and convenience (for a survey, see Rysman 2010). But some determinants of payment method choice are ones that are frequently cited in the behavioral economics literature. For example, Fusaro (2013) demonstrates that consumers use debit cards as a means to restrict overspending.

While the drivers of payment method choice are well understood, the effects of consumer choice and protection policies on the adoption of payment methods are much less studied. Enhancing consumer awareness may look an obvious, yet inefficient, policy, but it appears to work: Hyttinen and Takalo (2009b) show that an increase in consumer awareness was a major force behind the spread of electronic payments in Finland. According to Figure 1, in Finland such payment forms are the most popular in the Eurozone. Also, policies designed to steer consumer behavior based on behavioral economics (“nudging”) could prove to be effective.

An often raised issue potentially affecting consumers’ choice of payment instruments is the transparency of prices related to different payment instruments. For example, Leinonen (2010) argues that the lack of transparency and cross-subsidization in pricing limits price competition, obscures the costs related to different payment methods, limits the realization of economies of scale, leads to wrong incentives and makes entry and innovation more difficult. This argument overlooks the well-known problem of price transparency: enhanced price transparency tends to soften price competition and facilitate collusion (see, e.g., Ivaldi et al 2003). Nonetheless, it seems that this concern of price transparency is less relevant in the payment industry because market participants are already quite well informed about rival prices whereas consumers lack this information.

#### **4. Conclusion**

As documented in this article, an efficient retail payment infrastructure is crucial for the real economy. Yet, promotion of efficient retail payments appears to be overlooked in the policy

agendas to revive economic growth in Europe. In this article we review the major policy tools available to enhance the efficiency of retail payment infrastructure. Given the distressed state of public finances in Europe we advocate the tools that put no burden on public budgets. Such tools include in particular competition and consumer protection policies focusing on removing entry barriers to both new service providers and new payment methods, such as e-money and mobile money. Furthermore, there should be direct interventions that discourage cash use. For example, large value cash transactions should be made void in the EU, and the European Central Bank should reassess the need to have 200 and 500 euro banknotes.

Developing an efficient regulatory framework for new forms of payments is, however, challenging. The regulatory structure is fragmented, calling for cross-border cooperation among competition policy authorities, and banking, internet, and telecommunication regulators. Nor is removing entry barriers and old rules easy. The costs from existing regulations are dispersed but benefits concentrated: those few who benefit from the status quo are ready to fight back.

Despite these challenges – or perhaps because of them – it would be vitally important for European policy makers to tackle the vested interests and ensure the adoption of existing electronic forms of payments across the continent and to speed up the spread of new payment media. SEPA is a step in the right direction, but is not nearly enough.

## References

- Arrow, K. J. 1962. "Economic Welfare and the Allocation of Resources for Invention", in R. Nelson (ed.) *The Rate and Direction of Economic Activities: Economic and Social Factors*, 609-626, Princeton, NJ: Princeton University Press.
- Bank for International Settlements (2003) "The role of central bank money in payment systems", Committee on Payment and Settlement Systems, August 2003.
- Bolt, W. and Humphrey, D. (2007), "Payment network scale economies, SEPA, and cash replacement", *Review of Network Economics* 6, 453-473.
- Bolt, W. and Schmiedel, H. (2013), "Pricing of payment cards, competition, and efficiency: A possible guide for SEPA", *Annals of Finance* 9, 5-25.
- Börestam, A. and Schmiedel, H. (2011) "Interchange fees in card payments", Occasional Paper Series No 131, European Central Bank.
- Drehmann, M., Goodhart, C., and Krueger, M. (2002) "The challenges facing currency usage: will the traditional transaction medium be able to resist competition from the new technologies?", *Economic Policy* 17, 195-227.
- European Central Bank (2010) "*The Payment system - Payments, Securities and Derivatives, and the Role of the Eurosystem*", [www.ecb.europa.eu/pub/pdf/other/paymentsystem201009en.pdf](http://www.ecb.europa.eu/pub/pdf/other/paymentsystem201009en.pdf), accessed 7 July.
- European Commission (2007) "COMP/34.579", [http://ec.europa.eu/competition/elojade/isef/case\\_details.cfm?proc\\_code=1\\_34579](http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=1_34579), accessed 15 June ,2014.
- European Commission (2012) "Green Paper: Towards an integrated European market for card, internet and mobile payments", <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52011DC0941>, accessed 20 June, 2014.
- European Commission (2014) "COMP/39398", [http://ec.europa.eu/competition/elojade/isef/case\\_details.cfm?proc\\_code=1\\_39398](http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=1_39398), accessed 15 June, 2014.
- Ferrari, S., Verboven, F., and Degryse, H. (2010) "Investment and usage of new technologies: Evidence from a shared ATM network", *American Economic Review* 100, 1046-1079.
- Fusaro, M. A. (2013) "Why do people use debit cards: Evidence from checking", *Economic Inquiry* 51, 1986–2001.



- Garcia-Swartz, D., Hahn, R., and Layne-Farrar, A. (2006) "The move toward a cashless society: A closer look at payment instrument economics", *Review of Network Economics* 5, 175-98.
- Hasan, I., Schmiedel, H., and Song, L. (2012) "Return from retail banking and payments", *Journal of Financial Services Research* 41, 163-195.
- Hasan, I., De Renzis, T., and Schmiedel, H. (2013) "Retail payments and the real economy", European Central Bank Working Papers, No. 1572.
- Hasan, I. and Takalo, T. (2014) "Efficient retail payments: An untapped source for reviving growth in Europe?" *VOXEU Column*, January 24, 2014", [www.voxeu.org/article/efficient-retail-payments-and-growth-europe](http://www.voxeu.org/article/efficient-retail-payments-and-growth-europe), accessed 7 July, 2014.
- Humphrey, D. B., Bergendahl, G., Lindblom, T., and Willeson, M. (2003) "What does it cost to make a payment?" *Review of Network Economics* 2, 159-174.
- Humphrey D., B., Willeson M., Bergendahl G., and Lindblom T. (2006) "Benefits from a changing payment technology in European Banking", *Journal of Banking and Finance* 30, 1631-1652.
- Hunt, R. M. and Humphrey, D. B. (2012) "Getting rid of paper: Savings from implementing Check 21", *Journal of Money, Credit and Banking* 45, 1415-30.
- Hyytinen, A. and Takalo, T. (2009a) "Who owns mobile money?" *Lydian Payments Journal* 1, <http://www.pymnts.com/business-wire/2009/who-owns-mobile-money/#.U8URj7EWeCh>, accessed 12 June, 2014.
- Hyytinen, A. and Takalo, T. (2009b) "Consumer awareness and the use of payment media: Evidence from young Finnish consumers", *Review of Network Economics* 8, 164-188.
- Ivaldi, M., Juillien, B., Rey, P., Seabright, P., Tirole, J. (2003) "The economics of tacit collusion", Final Report for DG Competition, European Commission, [http://ec.europa.eu/competition/mergers/studies\\_reports/the\\_economics\\_of\\_tacit\\_collusion\\_en.pdf](http://ec.europa.eu/competition/mergers/studies_reports/the_economics_of_tacit_collusion_en.pdf), accessed 29 June, 2014.
- Kretschmer, T. (2012) "Information and communication technologies and productivity growth: A survey of the literature", OECD Digital Economy Papers 195, OECD Publishing.
- Leinonen, H. (2010) "Transparent price competition or two-sided subsidisation in card payments? Is there a need for a more efficient business model for the card industry?", *Journal of Payments Strategy & Systems* 4, 102 –115.
- Martikainen, E., Schmiedel, H., and Takalo, T (2013) "Convergence in European retail payments", Occasional Paper Series No 147, European Central Bank.
- Ministry of Employment and the Economy, Finland (2014) "Shadow economy and cash use restrictions in commercial transactions: Working group's report (in Finnish)", Ministry of Employment and the Economy Reports 2/2014.

[http://www.tem.fi/files/38454/TEMrap\\_2\\_2014\\_web\\_09012014.pdf](http://www.tem.fi/files/38454/TEMrap_2_2014_web_09012014.pdf), accessed 15 July, 2014.

- Rysman, M. (2010) "Consumer payment choice: Measurement topics." In *The Changing Retail Payments Landscape: What Role for Central Banks? An International Payment Policy Conference*, 61–81, Federal Reserve Bank of Kansas City.
- Rochet J.-C. and Tirole, J. (2003) "Platform competition in two-sided markets", *Journal of European Economic Association* 1, 990–1029.
- Röller, L.-H. and Waverman, L. (2001) "Telecommunications infrastructure and economic development: A simultaneous approach", *American Economic Review* 91, 909-923.
- Schmiedel, H., and Kostova, G. and Ruttenberg, W. (2012) "The social and private costs of retail payment instruments: A European perspective", Occasional Paper Series No 137, European Central Bank.
- Schneider, F. and Buehn, A. (2010) "New estimates for the shadow economies all over the world", *International Economic Journal* 24, 443-461.
- Schneider, F. and Windischbauer, U. (2008) "Money laundering: some facts", *European Journal of Law and Economics* 26, 387-404.
- Shy, O. (2001) *"The Economics of Network Industries"*, Cambridge: Cambridge University Press.
- Shy, O. and Tarkka, J. (2002) "The Market for Electronic Cash Cards", *Journal of Money, Credit and Banking* 34, 299-314.
- Smith, A. (1776) *"An Inquiry into the Nature and Causes of the Wealth of Nations"*, London: W. Strahan.
- Takalo, T. (2012), "Rationales and instruments for public innovation policies", *Journal of Reviews on Global Economics* 1, 157-167.
- Takalo, T., Tanayama, T., and Toivanen, O. (2013), "Estimating the benefits of targeted R&D subsidies", *Review of Economics and Statistics* 95, 255-262.
- Verdier, M. (2011) "Interchange fees in payment card systems: A review of the literature", *Journal of Economic Surveys* 25, 273-297.

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