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Editorial

It is often argued that technology drives payment innovations. This statement would seem to be fairly self-evident. However, it remains uncertain whether the resulting payment options will be widely adopted by agents in different corners of society. The introduction of new payment channels presents challenges not only for payment providers but also for merchants and consumers. We could expect that merchants would not want to provide payment methods that consumers do not widely use, while consumers are not attracted to payment instruments that are not widely accepted by merchants. Research surveys and pilot tests are often used to estimate the likely acceptance and use of new payment media by consumers. In this context it is worth noting that such surveys and tests must be of sufficient size to assess the attractiveness of a payment instrument to consumers.

Although technology drives payment innovations, the success of emerging payment channels depends critically on consumers' choices. Instruments that do not meet certain critical requirements are quickly replaced with more suitable alternatives. Merchants are motivated to cater to their most frequent customers' preferred payment options, which may be related to the observation that many consumers are loyal to their choice of payment methods and are more willing to change merchants than change payment methods.

Does all this mean that cash usage is and will be decreasing? Perhaps, but cash transactions are hard to estimate, primarily because they are hard to track. Evidence from eg the United States on greater acceptance of credit and debit cards at traditionally cash-only merchants is not at odds with decreasing cash usage. This is particularly true where the number of total transactions has not increased to offset the substitution of cash by non-cash payments. There is also evidence that consumers are using payment cards instead of cash for a greater proportion of in-store purchases.

As regards the specific forces that drive the evolution of efficient payment mechanisms, expert opinions tend to emphasize innovations, incentives and regulation. Although numerous payment method innovations have emerged, many have not been successful in the marketplace because some payment participants have lacked sufficient incentives to change their payment behaviour. To gain critical mass in the marketplace, payment providers have to simultaneously convince a large number of participants of the benefits of a new mechanism. However, whether and how benefits and concerns regarding new payment mechanisms materialize in practice depends on their diffusion. We do not yet have a good understanding of what hampers the adoption of new financial innovations, due in part to a lack of systematic evidence. However, emerging research is seeking to quantify the effects of information provision and, in particular, consumer awareness on the diffusion of new payment mechanisms and, more generally, on the market for new payment media. These research efforts should be strongly encouraged.

Jouko Vilmunen

Capital deepening, ability to produce new technologies and economic growth: in search of generalities from data

Differences in growth performance across western industrialized countries are surprisingly large and persistent. Recent growth data suggests, interestingly, that these countries belong to different growth clubs, with the membership of each club being determined by a threshold requirement on a candidate country's growth rate. Differences in the growth rates of countries belonging to different clubs can be striking. For example, the data indicates that, for the ten year period 1995–2004, large European countries like Germany and Italy lagged well behind smaller countries like Ireland and the Nordic countries as well as the United States. More specifically, while growth rates in Germany and Italy have averaged around 2% during the last 20 years, the Nordic countries and, particularly, Ireland, with her growth of approximately 7%, have outperformed Germany and Italy by a surprisingly wide margin.

As a first pass, it seems natural to hypothesize that the large observed differences in country-specific growth rates principally reflect important differences in the basic institutions underlying the functioning of these economies. An argument along these lines rests nicely on modern growth theory and can find a fair amount of support from empirical research on the factors explaining growth.

Modern growth theory emphasizes policy and other relevant institutions as important or even critical preconditions for a country to be able to enjoy growth gains. On the other hand, the statistical as well as economic significance of institutional factors for a country's growth has been vindicated in numerous empirical studies. Even so, important as institutional factors are, reference to the lack of an appropriate institutional framework supporting growth in the large European economies may not be as plausible as it seems at first sight. The reason is that these countries have already undergone a series of structural reforms and the basic institutions that research has found important for growth are already in place in all European countries.

Naturally, a number of other country-specific factors besides institutions may have contributed to the observed differences in growth, such as size of country, demographics and availability of natural resources. However, as long as we are considering growth in the policy context, the fundamental problem with these factors is that it is very difficult to design effective growth policies that decision-makers could implement in order to stimulate growth. Therefore, if we wish to incorporate a nontrivial role for policy, it is natural, and in line with the empirical growth literature, to focus on those features that can be influenced by policy.

A closely related issue that modern growth theory identifies as critical for growth relates to the role of knowledge or, in the more specific context of empirical measurement, to the role of education and research and development. A striking feature of the growth data is that, whereas it took roughly 60–70 years for countries to double their income levels in the 19th century, the best growth performers in the 20th century have shown that this can happen in approximately 15 years! Growth-supportive institutions are not enough to generate record growth rates. Knowledge and its rapid diffusion are both essential.

But modern growth theory also suggests that knowledge alone is not enough: it is the interaction between knowledge and growth-supportive institutions that underlies growth momentum. Hence, this approach puts much less emphasis on exogenous sources of technological progress, capital deepening and population growth as the main sources of economic growth, all factors which lie at the heart of growth thinking à la Solow.

The intriguing question now is what do fresh data say about the relative importance of each of these factors for growth? In a forthcoming Bank of Finland discussion paper, 'Why do growth rates differ? Evidence from cross-country data on private sector production', Juha Kilponen and Matti Virén approach the data in an attempt to provide an answer to this important question. As Kilponen and Virén rightly emphasize, one of the novel features of their analysis is the data. Specifically, they run regressions using annual data on business sector production, wages and R&D investment from 14 OECD countries covering the period 1960–2004. This is in contrast to most previous empirical work, which uses measures of aggregate output including public sector output. This implies, in particular, that Kilponen and Virén avoid all the complications emerging from the difficult measurement issues related to government output and capital stock as well as the productivity of government production. As pointed out by many economists engaged in empirical research on growth, these measurement problems alone may lead to highly misleading results concerning income shares and underlying production relationships. Furthermore, they tend to be more severe in the case of emerging economies.

The estimation results obtained by Kilponen and Virén suggest a set of interesting conclusions concerning the relative importance of the various sources of growth alluded to above. The authors start by estimating aggregate Cobb-Douglas production functions under the restriction that income shares are equal across countries but the rate of technical change can be country-specific. Using an earlier sample (1960–1994) for estimation, Kilponen and Virén then forecast GDP in-sample using actual data on capital and labour input for the period 1995–2004.

The surprising result is that the observed growth differences show up in the forecast errors from forecasting GDP for the period 1995–2004. Naturally, these forecast errors reflect not only different patterns of capital accumulation and employment growth, but also any other factors not taken into account in the estimation of the basic production function. However, when the authors decompose the forecast errors they find that approximately half of their variations across countries can be explained by R&D investment intensity, the ratio of R&D expenditure to business sector GDP. On the basis of this result alone, Kilponen and Virén tentatively conclude that the evidence puts some weight on the notion that R&D intensity has a role in separating good from bad growth performers.

The authors then proceed to explain the estimated variation in total factor productivity across countries. After extracting estimates of total factor productivity using a constant returns to scale Cobb-Douglas production function, Kilponen and Virén set up a statistical model for total factor productivity using a time trend, R&D intensity, openness of the economy and patents as well as cross terms of time, R&D intensity and patents as explanatory variables. To check for robustness, they also estimate an equation for labour productivity derived from profit maximization under a constant returns to scale production function using wages, a time trend and R&D intensity as explanatory variables.

One of the benefits of this latter specification comes from the fact that the authors need not assume that the elasticity of substitution between capital and labour is one. As far as the role of R&D intensity is concerned, the results do not seem to be particularly robust but are certainly interesting. If R&D intensity alone is included in the estimation equation, it enters in a statistically significant way. However, once additional controls are added, like openness of the economy, patents and a time trend possibly also allowing for cross terms, R&D looses its statistical significance.

In contrast, while R&D intensity becomes insignificant, openness of the economy and patents become highly significant factors. Kilponen and Virén interpret this as suggesting that R&D investments pay off once they produce useful innovations, ie patents. Interestingly, productivity enhancing patents seem to be more important in open economies, an observation supported by the estimated significance of the cross term of openness and patents. The authors obtain qualitatively similar results from estimating the labour productivity equation derived from profit maximization. In particular, R&D intensity as well as openness and patents retain their statistical significance even after allowing for time varying elasticity of substitution between capital and labour.

Finally, the authors check for time variation, in particular potential increases in the elasticity of substitution between capital and labour. There is a proposition in the reference literature on growth showing that when countries start at the same level of income, the one with higher elasticity of substitution will end up growing faster. This alone makes testing for increases in the elasticity of substitution particularly interesting.

In this respect, the results are somewhat disappointing. First of all, the estimated elasticity of substitution is fairly low, around 0.5. It seems to be slowly increasing, but not as fast as we could expect from previous results concerning the size of the elasticity. A further complication in interpreting these results comes from the fact that the elasticity of substitution is estimated very imprecisely, an outcome that has plagued much of the research on estimating production functions. Nevertheless, one of the profound lessons is that, although the results obtained by Kilponen and Virén are encouraging, there are still loose ends and much to be learned from investing research effort in this area. This is not the right time to stop digging deeper into the mysteries of economic growth.

Is it about being informed? Quantifying the effects of consumer awareness on the use of payment media

Successful technological innovations and the regulatory reforms of past decades have brought payment media to the forefront of business, social and political interest. More extensive use of debit and credit cards and, arguably, decreasing use of cash suggest a thoroughgoing change in methods of payment for goods and services. Innovation has generated new payment instruments, such as smart cards and those embedded in mobile phones, which are entering commercial use and making money more digital and less tangible. The new payment media also seem to be spreading to all sections of society and hold the promise of enhancing the access of the poorest to basic financial services. This feature of the new payment channels is especially visible in emerging economies.

However, these specific trends in financial innovation have raised new concerns, particularly among regulatory authorities and central banks. As money has become less tangible, consumer protection authorities are becoming increasingly concerned that people are spending and borrowing too much, while for central banks there is the concern that conventional instruments of monetary policy may become less effective and that fundamental changes in the transmission of monetary policy are taking place. There is also some evidence that the increased concentration in the payment card industry has not gone unnoticed by the competition authorities, who have begun to scrutinize practices in respect of card platforms.

As far as the potential benefits and concerns regarding the digitalization of money are concerned, the diffusion of new payment technologies will critically affect both the ways in which and the likelihood that these will materialize in practice. We have examples from monetary history to show that new payment media do not necessarily gain popularity among users overnight, but can in fact take off only slowly, or not at all.

Research has provided new ideas and models, but we still do not fully understand what hampers the adoption of these financial innovations. One fundamental problem has been, and to some extent still is, the lack of systematic (quantitative) evidence. This does not mean that there is no evidence, only that more often than not the evidence is qualitative and selective and, hence, not fully systematic. It can be particularly difficult to obtain consumer-level data on early birds, ie those consumers who are first in line to adopt emerging payment media.

In their paper 'Consumer awareness and the use of payment media: Evidence from young Finnish consumers', published as Bank of Finland Discussion Paper 2/2008, Ari Hyytinen and Tuomas Takalo approach the issue of the diffusion of new payment technologies by taking advantage of a special feature of the payment media market, namely that some consumers use only one payment channel, while others are active users of several at once. As the authors rightly point out, such payment behaviour essentially reflects the diffusion of new payment media, because even the most recent innovations are used alongside previously established media, a feature that well characterizes the history of these technologies.

Hyytinen and Takalo focus on the role of consumer awareness in the use of multiple payment media. Existing research indicates that demographic and financial characteristics of consumers such as age, education, income and home-ownership status as well as localized feedback loops between consumers and merchants significantly affect the rate of adoption of new payment methods. On the other hand, if consumer characteristics and merchant acceptance are held constant, pricing and information provision are the main instruments that policy-makers and issuers can adopt to boost consumer use of modern payment media.

A growing body of evidence suggests that consumers react strongly to the placing of an explicit price tag on paying, whereas we are much less informed on the quantitative importance of consumer awareness in the market for payment media. We are almost equally uninformed about how sensitive consumers' payment behaviour is to information provision about new payment channels. One weak point in the available evidence on the importance of consumer awareness in the market for payment media is that it is either indirect or qualitative.

Some economists argue that awareness is needed for widespread acceptance of stored value cards. Others conjecture that eg Visa's massive advertising campaigns to foster consumer awareness of its debit products in the 1990s have contributed to the rise of signature debit in the United States. Marketing and industrial economics literature suggests that providing information on any new product should foster its diffusion, especially if the adoption is held back by non-monetary costs, such as the costs arising from imperfect consumer information, and learning and searching costs. However, there is virtually no quantitative evidence on the effects of information provision on the adoption of new payment media prior to the study by Hyytinen and Takalo.

As the authors note, there is a link from their study to various strands of the literature focusing on the market for payment media, eg multihoming and determinants of the discrete choice of one payment medium over another at point of sale, as well as the literature addressing the question of the *family's* use of multiple payment media. The distinguishing feature of Hyytinen and Takalo's analysis is their focus on the underlying determinants of the *number* of different payment methods used and on the dependence of this payment behaviour on consumer awareness.

In studying the relationship, if any, between the use of multiple payment channels and consumer awareness in the market for payment media, Hyytinen and Takalo use survey data on young Finnish consumers gathered by the Finnish Bankers' Association between 21 February and 5 March 2002. This data incorporates information on the consumption habits of young Finns and their views on banking as well as financial products and services. A random sample of 1,004 young adults aged 15 to 28 is drawn from the underlying age group, which amounts to about 0.1% of the entire target population.

As the authors argue, the data have some unique features that they are able to exploit in their study. More specifically, by concentrating on young consumers they catch the most likely early adopters of new payment media. On the other hand, the data contain direct measurements of the point-of-sale payment habits of individual consumers. These allow the authors to generate a dependent variable at the level of individual consumers that distinguishes point-of-sale payment from settling invoices and actual use of payment media from having passive access to them.

As Hyytinen and Takalo observe, consumer awareness is an elusive concept in financial services. To enable the authors to quantify it, the data include a series of questions designed to capture consumers' exposure to the provision of information about financial services and payment media. The data provides the authors with access to instruments to control for the potential endogeneity of consumer awareness.

Finally, the consumer-level data contains extensive demographic and socio-economic information and is rich in detail on consumers' banking relationships. Consequently, a long list of consumer characteristics is available to the authors, which, in terms of available control variables, puts them in a good position relative to most previous studies in this field.

Hyytinen and Takalo derive some very interesting results from their estimation exercise. First of all, they discover that more than half the young Finnish customers in the sample use more than one payment medium when paying at point of sale, and that this use of multiple payment media is closely related to the decision to use the debit card in addition to cash. However, while an informed consumer is more likely to use multiple payment channels, the causal link from awareness to debit use turns out to be subtle. Those who use only one payment method use cash regardless of their awareness. On the other hand, while awareness induces a shift towards multiple payment methods, the shift materializes as one where some choose to use debit as their *primary* payment channel, whereas others begin to use it as their *secondary* method. The quantitative effect of awareness on the probability of using multiple payment media is large, especially if the potential endogeneity of consumer awareness is controlled for.

Hyytinen and Takalo also show that their estimation results on the effects of consumer awareness on use of multiple payment media are statistically robust. These are very interesting and important results and provide strong support for the view that the line of research pursued by the authors should be continued. Robust policy conclusions still require more research, and it will be interesting to see how the nature of the market for payment media as an example of a two-sided market will shape these policy conclusions, particularly those concerning optimal regulation of this market.

Jouko Vilmunen

Russian banking sector evolving differently from those in other transition economies

It is clear that the functioning and efficiency of an economy's financial sector has an impact on economic development. Several studies suggest that a broadly-based and efficient financial sector enhances an economy's long-term growth potential. In a number of poorer countries, the banking system plays a very important role in financial intermediation, which further highlights the importance of banks to economic progress. In transition economies, the evolution of the banking system has been of particular significance, since under the pre-transition system they differed greatly from those in market economies.

For these reasons, considerable effort has been devoted to analysing the banking systems of transition economies (eg Bonin et al, 2005 provides a thorough overview of the related literature). Studies have been conducted at both macro and micro level, depending on the choice of approach. However, when focusing on issues related to individual banks, the availability of relevant research data has often posed problems. Therefore, relatively little research has been done on the Russian banking system, which still comprises more than 1,000 banks.

With comprehensive statistical data on Russian banks' balance sheets and profit and loss accounts now available, the Bank of Finland's Institute for Economies in Transition (BOFIT) is hosting a number of research projects on the activities of Russian banks. BOFIT researchers Zuzana Fungacova and Laura Solanko have examined Russian banks' risk-taking. Banks' rapid lending growth in the last 6–7 years has led to a decline in their equity to total assets ratios. Different risk measures indicate, however, that the risk level of Russian banks is lower than that of banks in central and eastern Europe, for instance. It would indeed seem that foreign banks are more inclined to take risks than Russian-owned banks. This naturally stems from their better access to international capital markets. It also seems that banks operating in the Russian regions are more prepared to increase their risks than banks operating in Moscow.

A study by Alexei Karas, Koen Schoors and Laurent Weill on the efficiency of Russian banks and how this is affected by ownership structure has been published in the BOFIT discussion paper series (BOFIT DP 3/2008). According to this study, foreign banks are more efficient than private Russian banks. Surprisingly, private banks are not more efficient than publicly owned banks. These results are not affected by banks' choices of production process, operating environment, management risk preferences, activity mix, size or the econometric approach used. It even appears that publicly owned banks are more efficient than private banks, and the efficiency gap has not narrowed since 2004, when deposit insurance was introduced in Russia. This may be due to increased switching costs or to the moral hazard effects of deposit insurance.

In this respect, the findings of this study differ greatly from those on other transition economies. Publicly owned banks in the new EU member states in central and eastern Europe, in particular, have almost without exception been the most inefficient, while foreign banks in those countries, too, have usually been the most efficient. It is, in fact, hard to say why publicly owned banks in Russia appear to operate so efficiently. It is, of course, worth bearing in mind that they also have private ownership and senior managers may be important shareholders, which naturally has an impact on incentives in running the bank.

The policy conclusion is that the efficiency of the Russian banking system may benefit more from increased levels of competition and greater access for foreign banks than from privatisation of the remaining public banks. As foreign banks are also ready to accept higher risks, foreign banks' market entry would boost economic growth further still.

Literature
Bonin, JP – Hasan, I – Wachtel, P (2005). Bank performance, efficiency and ownership in transition countries. Journal of Banking and Finance, 29, 31–53.

Iikka Korhonen

Conferences and seminars

The annual Bank of Finland Research and CEPR (Centre for Economic Policy Research) conference, this time arranged jointly with the Federal Reserve Bank of Philadelphia, will be held in October. The topic is 'Innovation and Intellectual Property in Financial Services'. The call for papers is open until 1 June and is available on the conference site http://www.bof.fi/en/tutkimus/konferenssit/tulevat_konferenssit/.

In May, a workshop for invited participants will be held on financial markets in DSGE models, arranged jointly with Simon Gilchrist (Boston University). The workshop planned for August, focussing on frequency domain methods in macroeconomic analysis, has been rescheduled for next year. The workshop will be arranged jointly with Patrick Crowley (Texas A&M University).

The following seminars are open to all interested parties.

Bank of Finland Research Seminars:

Thur, 8 May 2008,13.30–15.00. Prof. Charles M. Kahn, University of Illinois at Urbana-Champaign & Bank of England. Endogenous Financial Fragility.

Thur, 4 Sept 2008, 13.30–15.00. Ass. Prof. Antonella Trigari, Bocconi University.

Thur, 2 Oct 2008,13.30–15.00. Ph.D. Gyöngyi Lóránth, University of Cambridge.

Please register in advance via Marjut Salovuori at seminars@bof.fi. For further information visit the seminar site http://www.bof.fi/en/tutkimus/konferenssit/tutkimusseminaarit/.

BOFIT seminars:

Tues, 6 May 2008, 10.30. Sheraz Ahmed. Svenska Handelshöskolan & BOFIT. Corporate ownership, country characteristics and informativeness of earnings in transitional Europe.

Tues, 27 May 2008, 10.30. Iikka Korhonen, BOFIT. China in the world economy: Dynamic correlation analysis of business cycles.

Tues, 3 June 2008, 10.30. Laurent Weill, Université Robert Schuman & BOFIT. Is corruption an efficient grease? A cross-country aggregate analysis.

Wed, 11 June 2008, 10.30. Elena Fedorova and Mika Vaihekoski, Lappeenranta University of Technology, Global and local sources of risk in Eastern European emerging stock markets.

Tues, 17 June 2008. 10.30. Tuuli Koivu, BOFIT. Credit channel in China.

Please register in advance via Liisa Mannila (firstname.lastname@bof.fi, + 358 10 8312268). For further information visit the seminar site http://www.bof.fi/bofit_en/tutkimus/seminaarit/tiistai/seminaarit.htm.

Recent Bank of Finland research publications

Bank of Finland Discussion Papers

Marko Melolinna: Using financial markets information to identify oil supply shocks in a restricted VAR, BOF DP 9/2008.
Essi Eerola – Niku Määttänen: On the importance of borrowing constraints for house price dynamics, BOF DP 8/2008.
Tuomas Takalo – Tanja Tanayama – Otto Toivanen: Evaluating innovation policy: a

structural treatment effect model of R&D subsidies, BOF DP 7/2008.
Mikael Juselius: Cointegration implications of linear rational expectation models, BOF DP 6/2008.
Heli Huhtala: Along but beyond mean-variance: Utility maximization in a semimartingale model, BOF DP 5/2008.
József Molnár: Market power and merger simulation in retail banking, BOF DP 4/2008.
Patrick M Crowley: One Money, Several Cycles? Evaluation of European business cycles using model-based cluster analysis, BOF DP 3/2008.
Ari Hyytinen – Tuomas Takalo: Consumer awareness and the use of payment media: evidence from young Finnish consumers, BOF DP2/2008.
Peik Granlund: Regulatory choices in global financial markets – restoring the role of aggregate utility in the shaping of market supervision, BOF DP 1/2008.

BOFIT Discussion Papers

Tomasz Koźluk : Global and Regional Links between Stock Markets – the Case of Russia and China, BOFIT DP 4/2008.
Alexei Karas – Koen Schoors – Laurent Weill: Are private banks more efficient than public banks? Evidence from Russia, BOFIT DP 3/2008.
Aaron Mehrotra – José R. Sánchez-Fung: Forecasting Inflation in China, BOFIT DP 2/2008.
Tuuli Koivu: Has the Chinese economy become more sensitive to interest rates? Studying credit demand in China, BOFIT DP 1/2008.
Xiaoqiang Cheng – Hans Degryse: The Impact of Banks and Non-Bank Financial Institutions on Local Economic Growth in China, BOFIT DP 22/2007.

Forthcoming publications

Bank of Finland Discussion Papers

L Becchetti – R Ciciretti – Iftekhar Hasan: Corporate social responsibility and shareholder's value: An empirical analysis.
Juha Kilponen – Matti Viren: Why do growth rates differ? Evidence from cross-country data on private sector production.
Kari Takala – Matti Viren: Efficiency and costs of payments: Some new evidence from Finland.
Bill B Francis – Iftekhar Hasan – Delroy M Hunter: Can hedging tell the full story? Reconciling differences in US aggregate- and industry-level exchange rate risk premium.
Bill B Francis – Iftekhar Hasan – Xian Sun: The signaling hypothesis revisited: evidence from foreign IPOs.
Jukka Topi: Bank runs, liquidity and credit risk.
L Becchetti – A Castelli – Iftekhar Hasan: Investment-Cash Flow Sensitivities, Credit Rationing and Financing Constraints.

BOFIT Discussion Papers

Tomasz Koźluk – Aaron Mehrotra: The Impact of Chinese Monetary Policy Shocks on East Asia.
Rajeev K. Goel – Michael A. Nelson: Causes of Corruption: History, Geography, and Government.
Jarko Fidrmuc – Iikka Korhonen – Ivana Bátorová: China in the World Economy: Dynamic Correlation Analysis of Business Cycles.

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