

## Further Thoughts on the Cashless Society: A Reply to Dr. Shampine

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### Abstract

We address Allan Shampine's critiques of our study on the costs and benefits of payment instruments, and review the current state of the literature. We argue that a consensus seems to be emerging in which: (a) different payment instruments appear to be socially efficient at different transaction sizes; (b) cash appears to be efficient for small payments; and (c) debit cards appear to overtake cash as the socially optimal instrument as the transaction size increases. Except for the fact that in our study credit appears to overtake debit at large transaction sizes, our 2006 findings are consistent with the consensus.

## 1 Introduction

Allan Shampine's article in this issue of the *Review* continues the important debate over the costs and benefits of payment instruments. He takes as his starting point our earlier papers published in this journal in June 2006, "The Move Toward a Cashless Society: A Closer Look at Payment Instrument Economics" (hereafter GHL I), and "The Move Toward a Cashless Society: Calculating the Costs and Benefits" (hereafter GHL II). In this brief reply, we address Shampine's arguments, focusing on his main points and leaving aside the smaller details.<sup>1</sup> We conclude our comment with a short discussion of how the

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\* Contact Author. LECG Consulting, 33 West Monroe, Suite 2300, Chicago, IL 60603. E-mail: [alayne@lecg.com](mailto:alayne@lecg.com) All errors are our own. We are thankful to Kylie Canaday for excellent research support. This paper reflects the views of the authors and not necessarily those of their affiliated institutions. While Visa USA provided financial support for our original research, we received no funding for this reply. Neither the opinions expressed in GHL I – GHL II nor those expressed in this reply are necessarily those of Visa USA.

<sup>1</sup> Shampine discusses a number of particular calculations from our analysis. We agree with some of his assessments and disagree with others; yet others we see as equally plausible but also equally arbitrary. As we

literature on the costs and benefits of payment instruments has evolved in the last few years.

Before addressing the particular areas of analysis, we would like to emphasize the point with which Shampine begins: exercises such as this, with an accounting of cost and benefit estimates, are necessarily crude. As we noted in our original paper, they can be taken only as “suggestive” and “illustrative” and not definitive. We therefore fully agree with Shampine that competition authorities and policymakers should carefully consider the strengths and limitations of this approach.

## 2 Key assumptions and their application

Shampine starts his analysis by attempting to clarify three key assumptions underlying our calculations: the question being asked, the time frame, and the welfare standard. By and large, he offers different assumptions, not clarified versions of our framework. We address each of the three in turn.

In terms of the question being asked, the ideal approach would be to address heterogeneity directly. Consumers clearly differ in their preferences and payment behavior, so the costs and benefits associated with the use of a particular instrument are likely to differ across individuals. The ideal calculations would account for this diversity. Unfortunately, it was difficult to collect the data we used for our study; individual level, or even partially aggregated group level data were not available. Nor was information on truly “marginal” transactions. Thus, we discussed heterogeneity, acknowledged its importance,<sup>2</sup> and then made our calculations on the basis of an average incremental transaction.

We made a careful attempt to scale costs and benefits appropriately to match the populations incurring them (costs) or receiving them (benefits). To use Shampine’s analogy, if only 10 percent of consumers own a Ferrari, then we would multiply the estimated benefits of owning a Ferrari by 0.10 in an average incremental consumer calculation. To take an example from our paper, when including the benefit of obtaining cash back via checks and debit cards at a grocery store, we scaled by the percentage of consumers that typically request cash back at the grocery.

The transaction itself is the second important piece of the framework. We took a “conditional” approach, which assumed that “a transaction will take place with certainty at a given size and in a specific context”.<sup>3</sup> This approach does *not* assume that a transaction starts when the customer arrives at the cash register, however. At that time, the only payment options feasible are those already in the consumer’s wallet. If she has forgotten to stop by the ATM on that day or place her checkbook into her purse, she may not pay for her purchase with cash or check even if one of those methods would have been preferred. Instead, we place the starting point earlier, say at the start of the day when the consumer realizes that she is out of milk and bread and must stop at the grocery on her way home from work. This allows for considerably more flexibility in the payment options available,

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noted in our original paper, an exercise of this sort, by its very nature, involves making assumptions and taking a stand on one estimate over another. Here we focus on the larger issues, the ones with greater implications for understanding the conclusions of our study.

<sup>2</sup> See GH1 I, p.180.

<sup>3</sup> GH1 I, p.180.

avoids difficult questions about cash in hand or an empty checkbook and sidesteps the issue of whether the purchase will be made at all.<sup>4</sup>

Within his more restrictive framework, Shampine is correct in saying that the cost of obtaining cash, both in time and in ATM fees, is irrelevant. But it is entirely relevant within our framework, when the decision includes whether or not to get cash in order to buy bread and milk. Given that consumers must replenish their stock of cash in hand on a regular basis (the average ATM withdrawal was only \$60 dollars at the time when we made our original calculations), the cost of obtaining it strikes us as a reasonable incremental cost. Introspection suggests that the hassle and expense of acquiring cash is one of the primary drawbacks of using it.

By the same logic, we included production costs when we thought that the number of transactions reasonably affected the rate of payment-instrument wear and tear. This includes credit cards that wear out with each swipe in a mag-stripe reader and cash that wears out with each handling, so that production costs therefore can be seen as incremental costs of use over a reasonably short period of time. We also counted processing costs – including those for credit, debit, cash and checks – because these costs are incurred each time a transaction takes place, therefore cannot be considered overhead. As part of the processing costs for credit cards, the incremental resource costs associated with recovering bad debt and assessing risk were included, since these assessments are conducted on a per consumer per transaction basis. In short, we included in our calculations all quantifiable costs (and revenues) that could reasonably be assumed to vary with the occurrence and/or size of a transaction, once the decision to conduct a transaction was made.

The third key part of our framework that Shampine discusses is the welfare standard. We took total or social welfare as our reference point, as we explained in our paper.<sup>5</sup> Thus, we considered all parties to a transaction, not just consumers or producers. We reiterated this point in each table by listing out all of the parties individually and by reporting social marginal costs and benefits in the bottom rows.

This is an important part of our analysis. We argue that looking at merchants alone, as some industry surveys have done, or at consumers alone, as some academic studies have done, will necessarily be misleading for the overall assessment of payment instruments. Because merchants, banks and consumers face different costs and benefits for each available instrument, social welfare that counts all parties together is the best measure in our view. In considering social welfare, however, we do not broach the question of whether any particular party should receive more weight than another. Rather, we equally weight a dollar's change in welfare to consumers, commercial banks, central governments and merchants.<sup>6</sup>

### **3 Flow analysis – Two underlying points of contention**

The three assumptions discussed above are, as noted, important aspects of our analysis. There is, however, one essential factor that Shampine does not address: transaction size.

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<sup>4</sup> These are, of course, all valid questions; they are just not the questions we asked.

<sup>5</sup> See the discussion beginning on p.176 in *GHL I*.

<sup>6</sup> We are certainly aware of the fact that the role of commercial banks here is controversial. See, for example, Rochet and Tirole (2006), especially the section on “welfare analysis,” pp.9-12.

One of the critical points of our analysis was the variation in costs and benefits – thus resulting in net social incremental costs – across transactions of different sizes.

This point has important implications for both our calculations and conclusions. First and foremost, it is not the case that cash is always the highest-cost and credit is always the lowest-cost payment method. For the average cash-sized purchase at grocery stores (\$11.52), for example, the net social incremental costs of cash and credit are, as far as we can measure them, roughly identical.<sup>7</sup> For this transaction size (and this particular retail venue), PIN (or online) debit appears to be the cheapest instrument and non-verified checks the most expensive. In contrast, at higher transaction sizes, such as the average check purchase at a grocery store (\$54.24), credit cards appear to have the lowest net social incremental cost, but non-verified checks are again the costliest, not cash.

Because of the importance of transaction size, no universal statements about the relative efficiency of one payment method over another can be made. Instead, we view our paper as supporting cost studies that find a “break even” point for electronic payment instruments. As far as our framework is concerned, at smaller transaction sizes, cash appears optimal; for mid-sized transactions, debit cards emerge as the most cost-effective instrument; at larger transaction sizes, finally, credit cards appear to be most efficient.<sup>8</sup> Along the same lines, it is worth clarifying that, contrary to what some interpretations of our papers have suggested, we never postulated that replacing all paper-based transactions with electronic ones would bring about immediate and substantial benefits for society.

The second fundamental point of disagreement with regards to the Shampine “flow analysis” concerns his treatment of small differences in numerical outcomes. While we agree with his contention that our estimates are not precise, he does not always apply this insight. For example, when Shampine reports our opportunity cost sensitivity results for cash and credit, he assigns rankings and draws conclusions on the basis of differences amounting to a few pennies.<sup>9</sup> In our original paper, we viewed that same data as equating the net social incremental cost of cash and credit – consistent with the findings presented in our main tables. In other words, we did not conclude that cash was more expensive than credit because the point-of-sale (POS) costs were, say, \$0.75 for credit and \$0.77 for cash. To the contrary, we viewed a 2-cent difference as within the band of plausible error, making the two numbers indistinguishable.<sup>10</sup>

When Shampine presents his own calculations, he again places a significant weight on relatively small differences. In fact, in his view “the exclusion of any one of these categories [of sensitivity analysis] will have a significant impact on the magnitudes and rankings of the estimates. Even a \$0.01 change is a 2.5% change in the difference between

<sup>7</sup> For this point and those that follow in this paragraph, see GHL I, Table 4, p.188.

<sup>8</sup> Consider the following facts from GHL II. In terms of social marginal costs (that is, marginal costs for all parties involved without taking the quantifiable benefits into account), debit cards appear to be the most efficient instrument for most, if not all, of the transaction sizes we consider (Table 2-3, Table 2-4, Table 3-4, and Table 3-5; Table 4-4 and Table 4-5 are likely anomalies because of problems with the check data). In terms of net social marginal costs (that is, marginal costs and quantifiable marginal benefits for all parties involved), debit cards appear to be the most efficient instrument for middle-sized transactions (Table 2-5, Table 3-6), and credit cards appear to be the most efficient instrument for larger transactions (Table 2-6, Table 3-7, Table 4-6, Table 4-7). If we had had the data to calculate net marginal benefits at the smallest transaction sizes (say, less than \$10), it is very likely that we would have been able to identify cash as the most efficient instrument in that transaction range.

<sup>9</sup> Shampine, Section 4.

<sup>10</sup> See GHL II, p.224.

methods.”<sup>11</sup> While this is strictly true, it was never our intention to reach strong conclusions on the basis of very small cost (or net cost) differentials.

It is tempting, when calculating costs and benefits down to the penny, to get carried away with the results. In reality, however, very few of the cost or benefit estimates permit such precision. Will different assumptions and different data sources result in different numbers? Absolutely. And researchers can argue about which assumptions and sources are the most reliable. We would suggest that only “significant” differences should sway opinion because anything else is likely to be within the confidence interval around poorly measured point estimates.

## 4 Moving the debate forward

The literature on payment instruments has developed rapidly in recent years. In taking another look at these issues, a brief review of some of the studies that are relevant for the cost-benefit debate is a constructive note on which to end.

### 4.1 Recent empirical studies on the costs of payment instruments

In *GHL I*, we attempted to provide a review of the literature on the cost and benefits of payment instruments up to roughly 2003. In recent years, some additional studies have been published. To the best of our knowledge, most (if not all) of these studies quantify the social costs of payment instruments (that is, the costs to all parties involved in a transaction), but refrain from making an attempt at estimating social benefits. Within this framework, all of these studies suggest that different payment instruments are socially efficient at different transaction sizes.

Ten Raa and Shestalova (2004), for example, focus their study on transaction data for Dutch retailers. More specifically, they regress transaction costs on the number of transactions and the volume of transactions for currency and debit card payments. In other words, they attempt to recover a transaction cost function at the level of the firm.

They point out that the distinction driving payment-instrument choice is that between fixed and variable costs. Currency has low fixed costs and high variable costs – it is thus cost efficient for small payments. The opposite happens with electronic payment instruments: they have high fixed costs and low variable costs, and are therefore efficient for large payments. In their estimation, an additional currency transaction costs around 2 eurocents plus a quarter eurocent per euro; an additional debit transaction, on the other hand, costs around 6 eurocents plus a tenth of an eurocent per euro.

Their basic conclusion is that, from a private point of view, it is in the interest of retailers to discourage the use of debit cards for transactions under 30 euros. Taking the social costs of currency and debit cards into account, however, puts the “switching point” at 13 euros. In other words, from a social-cost perspective, cash is more efficient for transaction sizes smaller than, and debit cards are more efficient for transaction sizes larger than 13 euros.<sup>12</sup>

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<sup>11</sup> Shampine, Section 5.

<sup>12</sup> In their study, the transition from private costs to social costs involves essentially taking commercial banks and the central bank under consideration. The key bank-related cost of cash is the cost of ATM use, for which they use a Norwegian proxy. They conclude that the social cost of cash is about 47 percent higher than the private (retailer) cost.

Brits and Winder (2005) focus on the cost of POS payments in the Netherlands. Their study is based on a survey which attempted to quantify the social costs of generally used payment instruments, more specifically cash, the e-purse, debit cards and credit cards. The authors point out that the survey on which their study is based is particularly useful for a number of reasons. First, it covered the costs for the banking industry, the retail sector and the central bank; furthermore, unlike other studies, it included the cost of cash. Second, the central bank, the commercial banks and the merchants supplied the cost data for the study, and the assumptions underlying the conclusions were discussed with representatives from each sector. Third, the survey distinguishes clearly between fixed and variable costs; in addition, within variable costs, it distinguishes between costs that vary with the number of transactions and costs that depend on the size of the transaction.

The authors conclude that, from a social-cost perspective, the e-purse is the most efficient payment instrument at all transaction sizes. Leaving that aside, cash is the most efficient instrument for transaction sizes below 11.63 euros and debit cards are most economical for purchases larger than that amount. From a social-cost perspective, they add, credit cards should never be used.<sup>13</sup>

The focus of the Bergman, Guibourg and Segendorf (2007) study is estimating the costs of different payment instruments in Sweden. More precisely, they calculate the private and social costs of cash, debit card and credit card payments on the basis of 2002 data. The main difference between this study for Sweden and the Brits-Winder (2005) study for the Netherlands is that the latter takes only costs to banks and retailers into account, whereas Bergman, Guibourg and Segendorf (2007) consider consumer-related costs as well.

The authors estimate that if we focus on the instrument-specific average transaction size, cash is socially the most expensive instrument (at 0.52 euros) and credit cards follow (at 0.50 euros). Debit cards, they point out, are socially the most efficient instrument (at 0.34 euros).

In their view, it is more appropriate, however, to take fixed and variable costs into account, just as Ten Raa and Shestalova (2004) and Brits and Winder (2005) do. From this perspective, cash is more cost-efficient than debit cards for low-value payments – they estimate the break-even point at 7.8 euros. In other words, cash is socially efficient for transaction sizes below and debit cards are socially efficient for transaction sizes above 7.8 euros. In addition, the authors calculate that cash is socially more efficient than credit cards for transaction sizes below 17.6 euros and credit cards are socially more efficient than cash for transactions sizes larger than this amount. To the best of our understanding, even though credit cards appear more efficient than cash at relatively large transaction sizes, debit cards are more efficient than credit cards for all transaction sizes according to this study.

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<sup>13</sup> In an otherwise excellent study, the authors make a reference to our papers and seem to imply that GHL I and GHL II literally advocate a “cashless society”. In other words, according to their interpretation of our papers, we allegedly postulate that the immediate replacement of all cash and check transactions with electronic-payment transactions would generate substantial benefits for society. But this is clearly a misinterpretation of our core argument. Our point was never that all paper-based transactions should be replaced with electronic-instrument transactions; it was rather that different payment instruments are socially efficient at different transaction sizes. We personally tend to use cash in a wide variety of (usually small) payments and have the impression that many others do as well – it is far from clear to us that we would all be better off if we were forced to use an electronic payment instrument in those situations. To the best of our recollection, we never advocated the immediate and unconditional abolition of cash as a payment instrument.

A few general conclusions emerge from this brief summary of these cost studies. First, no single payment instrument is socially efficient for all transaction sizes. Put differently, statements about the social efficiency of payment instruments can only be made conditional on transaction size. Secondly, cash always emerges as the most socially efficient instrument at small transaction sizes; as the transaction amount increases, there is a switching point at which debit cards become more efficient than cash. Third, once consumer costs are taken into account, credit cards may emerge as more efficient than cash for large transaction sizes – this is precisely the difference between the Bergman, Guibourg and Segendorf (2007) study and the Brits and Winder (2005) analysis. From a pure social-cost perspective, however, the European studies indicate that debit cards are always more efficient than credit cards regardless of transaction size.

Our earlier research is generally consistent with the preceding studies. Considering the costs to all parties but ignoring quantifiable benefits, our studies suggest that cash is optimal at small transaction sizes and once the transaction amount reaches the break-even point, debit cards become the most efficient payment instrument. Once we include quantifiable benefits, the situation changes slightly – in particular, credit cards appear to be the most efficient instrument at reasonably large transaction sizes.

## **4.2 Have we left out some benefits and costs of electronic payment instruments?**

Since we have repeatedly emphasized that our calculations are only illustrative, at this stage, it must be obvious to the reader that the answer to this question must be “yes”: it is almost certain that we have been unable to quantify some benefits and costs not only of electronic payment instruments but also of the paper-based ones. Here, we focus on some benefits and costs of electronic instruments that the literature has highlighted and that would be worth exploring in future analyses.

### **4.2.1 Payment cards and merchants**

Guerin-Calvert and Ordover (2005) point out that, even though there is an extensive empirical literature on the net benefits that consumers receive from payment-card systems, there is little empirical research on the way in which the provision of “network services” benefits merchants. In other words, the literature on the costs and benefits of payment instruments – GHL I and GHL II included – focus somewhat narrowly on the explicit costs to merchants of card acceptance but disregard a more complete assessment of merchant benefits beyond those that can be (imperfectly) quantified (as cost differentials) at the transaction level.

Guerin-Calvert and Ordover attempt to develop a general empirical framework for quantifying the benefits that merchants reap from the supply of network services. Their study develops two key themes. First, they argue, the network services that credit card networks supply to merchants are subject to significant economies of scale and scope, therefore, can be provided more efficiently by networks than by either the merchants themselves or other third-party providers. Secondly, they add, credit card networks services lower merchant costs in a number of ways – or example, by reducing bad debt, personnel and bookkeeping costs, and costs related to payment-instrument processing.<sup>14</sup>

Guerin-Calvert and Ordover (2005, pp.394ff) focus their study on the evaluation of three types of services: (a) authorization of credit card transactions and credit/fraud risk

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<sup>14</sup> Guerin-Calvert and Ordover (2005), p.392.

management; (b) billing/payment processing, dispute resolution and collection of payments; and (c) financing or provision of credit to the merchants' customers. For each one of these functions, they conduct an analysis of how much it would cost the merchants to provide the service themselves or to contract with third parties (other than credit-card networks) for its provision. Generally, they conclude that, once these alternative costs are taken into account, merchants seem to be better off by contracting with credit-card networks for the supply of all these services (and potentially others that have similar, scale-and scope-related characteristics).

Critics of this approach would likely argue that at least some, and perhaps most, of the benefits that Guerin-Calvert (2005) highlight in their study are indeed captured, in one way or another, in the typical merchant-cost study that the FMI and others publish from time to time. The Food Marketing Institute (1998) analysis, for example, does have a category labeled "other costs", which includes miscellaneous costs associated with each type of payment, including check losses and collection fees and credit card losses, among other cost items. These critics would point out that, in a sense, most of the merchant benefits that Guerin-Calvert and Ordovery (2005) identify can be interpreted as costs differentials among payment instruments at the transaction level. Guerin-Calvert and Ordovery (2005) would clearly disagree, since at the core of their argument is the idea that the merchant benefits that they discuss cannot be fully captured in a simple cost-comparison at the level of the individual transaction. This is an open issue that requires further exploration – as far as our previous work is concerned, *GHL I* and *GHL II* did not make an effort to evaluate merchant benefits other than those that could be quantified as transaction-specific cost differences across instruments.

#### **4.2.2 Payment cards and consumers**

In the last decade and a half or so, a literature has developed that suggests that (a) the time preferences of consumers sometimes depart from at least some of the assumptions embedded in the neo-classical discounted-utility framework, and (b) this has implications for the way they use (and potentially misuse) payment instruments. One specific claim in this literature is that at least some consumers most of the time have self-control problems, therefore, spend more on their credit cards than they "should".<sup>15</sup> Put differently, they embark on consumption paths that are unsustainable in the long run.<sup>16</sup> From the

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<sup>15</sup> The idea that credit cards lead to "overspending" (or "excessive spending") is certainly not new – it has been around since the time when general-purpose credit cards were invented. See, for example, Nocera (1994), especially chapter 5. It is our impression that in the popular-press controversy around the "overspending" issue, different parties to the debate work with different assumptions about what "excessive spending" actually means. Some seem to imply that every purchase that exceeds the consumer's capacity to pay for it with the resources she has in hand today is "excessive". Others assume that "overspending" takes place only if the consumer makes a purchase that exceeds her capacity to pay for it with the resources she has available today plus those that she reasonably expects to have available in the future. Yet others seem to associate "excessive spending" with the idea that the consumer's willingness to pay for something may be higher if she uses a credit card for payment than if she uses, say, cash. In any case, to our knowledge, it is only in the last 15 years or so that the idea of potential overspending on credit cards has been analysed within the context of more formal economic models that in one way or another depart from the traditional discounted-expected-utility framework.

<sup>16</sup> This literature is complex and multifaceted, although of course only a portion of it deals specifically with credit cards. For a comprehensive summary of some of the main issues in the various branches of this literature, see Frederick, Loewenstein and O'Donoghue (2002). On hyperbolic discounting generally see, among others, Laibson (1997) and (1998). On mental-accounting models see, for example, Prelec and Loewenstein (1998) and Thaler (1999). In some of these models, people have various degrees of awareness

perspective of this literature, GHL I and GHL II would be counting the benefits of credit cards to consumers – what we call the “option value” of credit – but not the potential costs – the possibility of credit-card overuse with its negative consequences.

As far as the costs and benefits of payment instruments are concerned, this literature raises at least two issues, both of them controversial. The first one is the relationship between credit card use and bankruptcy. The connection to the costs and benefits of payment instruments arises, of course, because bankruptcy is costly, both privately and socially. The second issue is the possibility that some consumers with self-control problems (who know that they have such problems) may prefer debit to credit, precisely because debit cards offer some of the convenience benefits of credit cards while at the same time functioning as “commitment devices” (that is, commitment not to overspend). We focus on each one in turn.<sup>17</sup>

The literature on the relationship between credit card use and bankruptcy grew exponentially a few years ago when debates surrounding bankruptcy law reform raged in the Congress. Broadly speaking, economists have modeled the bankruptcy decision as a rational one within an optimizing framework. Non-economists, on the other hand, have tended to interpret bankruptcy as the outcome of an unexpected shock (illness, unemployment, divorce), which sometimes exerts a devastating impact upon individuals (or households) that have borrowed more than they “should” on their credit cards.<sup>18</sup>

To the best of our knowledge, Sullivan, Warren and Westbrook (2000) have carried out the most comprehensive empirical analysis of bankruptcy to date. As part of their investigation, debtors were asked to explain why they were in bankruptcy (multiple responses were allowed). 67.5 percent of bankruptcy filers reported being bankrupt because of job problems (for example, layoffs and firings), 22.1 percent identified family problems (for example, divorce), 19.3 percent identified medical problems and 13.6 percent named creditor problems.<sup>19</sup> More recently, Warren and Tyagi (2003) reported that, on the basis of data from the 2001 Consumer Bankruptcy Project, 87 percent of families

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that their preferences are time-inconsistent. People who are “sophisticated” will show a desire to make commitments (to counteract the strength of “temptation” in the future, say). For examples of commitment see Wertenbroch, Soman and Nunes (2001) and Ariely and Wertenbroch (2002).

<sup>17</sup> The other side of the coin of the argument that consumers spend “too much” on credit cards is that they save “too little”. Browning and Lusardi (1996) provide a comprehensive literature review of saving behavior among US households. A portion of their study focuses on the decline in the saving rate in the US that started in the 1980s. They analyze 11 different possible explanations that the literature has considered: changes in the age structure of the population; changes in saving propensity across cohorts; changes in the structure of the household; increased provision of government insurance; changes in the distribution of income; the decline in aggregate growth; capital gains on housing; capital gains on stocks; the increased annuitization of wealth; cash payouts by firms to shareholders; and the development of financial markets (including the widespread use of credit cards). In their view, none of these explanations is sufficient, in and of itself, to account for the decline in the saving rate. More recently, Parker (1999) assesses a number of factors that may have contributed to explain the decline in the saving rate. Among other factors he considers “financial innovations and increases in debt”. He concludes: “financial innovations are not able to account for a large increase in consumption”. More specifically, “if the increase in the debt ratio were entirely caused by an exogenous increase in households’ ability to borrow, then financial innovation could explain at most thirty percent of the increase in consumption to income to date” (Parker, 1999, pp.12-13).

<sup>18</sup> For a treatment of the bankruptcy decision within an optimizing framework see, for example, White (2006). For the distinction between the “economic” and the “sociological” view of bankruptcy see White (2006), pp.257-258. For a detailed analysis of the evolution of credit and debit card ownership and use over time, see Bertaut and Haliassos (2006).

<sup>19</sup> Sullivan, Warren and Westbrook (2000), chapter 1, especially Figure 1.2.

with children who had filed for bankruptcy reported having done so because of a job loss, a medical problem or a divorce/separation. All the other reasons combined, including credit card overspending, accounted for 13 percent of families with children that had filed for bankruptcy.<sup>20</sup> Mann (2006), on the other hand, takes a completely different approach: rather than focusing on micro-data on bankrupt individuals (or households), he assembles a macro panel dataset on credit card use, credit card debt, consumer debt and bankruptcy filings. In a model estimated for five countries and roughly a dozen years of data, he finds that an increase of \$100 in lagged per capita credit card debt is associated with a statistically significant increase of 165 current bankruptcy filings per million.<sup>21</sup>

Even though we know much more today about individuals who file for bankruptcy than we did, say, two decades ago, the connection between the use of credit cards and bankruptcy continues to be a controversial issue. One of the reasons for the controversy is that different individuals (or households) that have roughly the same amount of credit card debt at the time of filing for bankruptcy may have used their cards in radically different ways prior to bankruptcy. Consider the following three individuals. Individual A has self-control problems (and is unaware that she has them). She uses credit cards to finance a consumption path that is unsustainable in the long run and ends up in bankruptcy. Individual B uses personal credit cards to finance business-related expenditures in the early phase of a new business venture; the enterprise turns out to be unsuccessful in the long run and she files for bankruptcy. Individual C uses her credit cards responsibly until she loses her job, or until she faces unexpectedly high medical bills for an uninsured surgical procedure. After the shock she uses her credit cards for basic survival purchases and as an attempt to avoid bankruptcy, which is ultimately unsuccessful. Individuals A, B and C may be observationally equivalent in terms of the amount of credit card debt they have at the time of filing but the relationship between credit card use and the bankruptcy filing is certainly not the same in the three cases.<sup>22</sup>

The issue of debit cards as “commitment devices” is equally controversial.<sup>23</sup> The basic idea is that, a priori, consumers should naturally prefer credit cards to debit cards simply because both types of cards provide convenience benefits (over paper, including cash and checks) but credit cards, in addition, supply the benefit of float. In fact, however,

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<sup>20</sup> Warren and Tyagi (2003), chapter 4, especially Figure 4.1.

<sup>21</sup> Mann (2006), chapter 5, especially pp.64-67. He cautions that his results should not be interpreted as definitive.

<sup>22</sup> Of course, other scenarios are also possible. It has been suggested that, on some occasions, overspending on credit cards does not lead people directly into bankruptcy but rather prevents them from saving as much as they would otherwise. When the negative shock arrives, they do not have a stock of savings to rely on. On the other hand, credit card use may have allowed some individuals to avoid filing for bankruptcy altogether after a negative shock to health or employment. This is the case for those who, say, rely on credit cards to survive until they are able to find a new job and once they do, are able to repay their debts. Individuals like these would naturally not show up among the bankruptcy filers. See also Mann (2006), chapter 5.

<sup>23</sup> Although, strictly speaking, they did not postulate that the growth of debit cards was due to their role as “commitment devices”, Prelec and Loewenstein (1998) did lay out a general framework within which debit cards can be interpreted precisely in that way. They postulated a “double-entry” mental accounting model in which consumers keep track of the net utility of consumption (after subtracting the disutility derived from the associated payments), on the one hand, and of the net disutility of payments (after subtracting the utility derived from the associated consumption), on the other. One of the main predictions of their model is a strong aversion to (planned) debt among consumers. In this context they write: “(...) debit cards (...) offer no fundamental advantage over credit cards except that they eliminate the feeling of being even briefly in debt”.

consumers use debit cards frequently. Moreover, over the last few years, debit card use seems to have been growing at a faster pace than credit card use on a worldwide basis.<sup>24</sup>

The explanation that the literature has started to explore is that debit card use precludes overspending among consumers that have self-control problems (and who are aware that they have them). From this perspective, individuals with these characteristics use debit rather than credit on purpose, precisely because they know that the temptation to spend more than they “should” would be too strong if they were to use credit. It is well-known that, if a consumer uses PIN debit, the purchase amount is debited from her checking account immediately; if she uses signature debit, the purchase amount is debited within a couple of days (and sometimes a hold is put on her account for the purchase amount in the interim).<sup>25</sup>

Zinman (2005) has explored the idea of debit cards as commitment devices econometrically. He does not find strong support for the “commitment device” theory, but acknowledges that the data he uses are not particularly suitable for testing the explanatory power of “behavioral” explanations.<sup>26</sup> The Zinman (2005) study suggests that there may be other (“canonical”) reasons why consumers use debit cards so often. The author explores particularly three of them: credit card users who revolve balances pay interest to charge purchases on the margin; some individuals simply do not have access to a credit card; and finally, some individuals face binding credit-limit constraints. Fusaro (2006), on the other hand, reports finding evidence that people use debit cards as a form of spending control. He also reports that debit users make more frequent and smaller ATM withdrawals, which he interprets as another self-control tactic. As far as we can tell, the issue of debit cards as commitment devices remains an open one.

#### **4.2.3 Electronic instruments and electronic commerce**

Of course, critics of our “conditional” approach could argue that, precisely because GH1 I and GH1 II estimate costs and benefits conditional on a transaction taking place at a given location and size, we miss most of the action. These critics would point out that some of the main benefits of electronic payment instruments (privately to consumers and to society more generally) arise from the fact that they make electronic commerce feasible.

A couple of clarifications are in order in this regard. The first one is the obvious point that both electronic payment instruments and the commercial Internet are necessary but not sufficient conditions for the existence of electronic commerce. In other words, the combination of the Internet network structure and the electronic payment methods makes electronic commerce feasible; neither one of them in isolation does. The second point is that, even though we usually associate online purchasing activities with credit cards, no electronic payment instrument can claim exclusivity in terms of facilitating electronic commerce. There is a wide variety of electronic payment methods that facilitate e-

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<sup>24</sup> See, for example, Visa (2005), especially pp.26-27.

<sup>25</sup> See, for example, Hayashi, Sullivan, and Weiner (2003).

<sup>26</sup> In a more recent version of his study, Zinman (2007) points out that his findings cast doubts on one plausible form of bounded rationality, namely the idea that consumers choose payment methods randomly; he also adds, however, that his tests cannot reject models based on mental accounting and other explanations related to spending control.

commerce beyond credit cards and it is likely that many more are currently being conceived and implemented.<sup>27</sup>

The proposition that e-commerce, which electronic payment methods make feasible, brings benefits to consumers, and more generally to society, seems, as a first approximation, beyond debate. It seems true at least for a certain range of goods and services. Consider a simple scenario in which costs and benefits are calculated conditional on the precise identity and price of the good to be acquired. The consumer can either make a trip to a store and purchase the good there, or go to a web site and acquire the good at an online store without leaving her home. If she purchases the good online, she may need to wait a day or two for the good to arrive, and she may have to pay a small shipping and handling fee. But, even under these circumstances, she may still be better off than if she had taken a trip to the physical store.

We are, of course, simplifying the comparison. The consumer cannot be certain that the good will be available at the physical store, so that in fact the trip to the physical store may turn out to be a pure waste.<sup>28</sup> If the consumer is in fact convinced that she wants to acquire precisely the good in question, she may have to physically visit several stores until she finds it. At the end of the day, she may not find it at all. She may have to settle for a good that is just a poor approximation to what she was searching for. The Internet, on the other hand, dramatically lowers search costs – it is considerably less expensive to jump from web site to web site than to drive from store to store. Through the network, the consumer can make sure that the good in question is in fact available at a given online store without leaving her home. The fact that online search costs are considerably lower suggests that the consumer is more likely to find the good through an online connection than through physical inspection of stores.

In this analysis, it is sometimes difficult to disentangle the gains to consumers (and society) that come from the use of electronic payment instruments from those that come from the existence of a network like the Internet. The consumer could still lower search costs dramatically by conducting an online search of physical stores and checking which one of them actually has the desired good in stock. After conducting the online search, she could still take a trip to the physical store and purchase the good there – this, however, would no longer be e-commerce but rather online search. The fact remains, however, that having the possibility of acquiring the good from home through point-and-click as opposed to visiting the store has to bring about important gains both for consumers and for society.

Critics of this view would suggest that the combination of point-and-click with the ease of payment that electronic methods afford makes overspending too easy in an online environment. In fact, several papers have pointed out that electronic instruments in general (regardless of whether they are used online or at a physical store) lack “salience” (that is, they provide consumers with a weaker awareness of how much things actually cost) in comparison with paper instruments, therefore they may lead people to spend more than

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<sup>27</sup> It is unclear to us, however, whether electronic payment instruments that are not associated with the credit-card networks provide safeguards against fraud and credit risk that are as rigorous as those that the credit-card networks supply. Guerin-Calvert and Ordovery (2005, pp.397-398) would probably argue that they do not.

<sup>28</sup> The trip to the store may turn out to be a pure waste unless the consumer derives some enjoyment from making the trip even if she does not find what she is looking for. Some would argue that a consumer may derive some utility from carrying out a shopping safari with, say, relatives and/or friends, even if at the end of the day they end up purchasing little or nothing – the utility would arise from spending time together and socializing.

they thought they would.<sup>29</sup> Here, we can only hint at the essence of these controversies – the complexity of the issues involved ensures that they will continue to be debated for years to come.<sup>30</sup>

## 5 Conclusions

Alan Shampine's critique of our papers on the costs and benefits of payment instruments has given us the opportunity here to briefly discuss some of the issues we omitted from our original analyses, many of which are highly controversial. At the same time, it has provided us with the opportunity to clarify some misunderstandings that arose in connection with the interpretation of our earlier findings. It has also allowed us to compare our findings with the results of the more recent social-cost studies.<sup>31</sup>

As far as the social costs of the most commonly used payment instruments are concerned, the consensus that seems to be emerging now can be summarized as follows. First, no universal statements can be made about one payment instrument being socially the most efficient one. Second, different payment instruments appear to be socially efficient at different transaction sizes. Third, leaving aside the e-purse (which has yet to catch on in the U.S.), cash appears to be optimal at small transaction sizes. Fourth, as the transaction size increases, a switching point is reached starting at which debit cards appear to become the socially optimal payment instrument. This consensus is perfectly consistent with our findings in *GHL I* and *GHL II*. The main difference between our earlier papers and the more recent literature reviewed here is that we made an attempt at quantifying as many benefits of payment instruments as we could. In our cost-benefit framework, we found that there appear to be not one but two switching points – one at which debit cards become the optimal payment instrument overtaking cash and a second one at which credit cards become efficient overtaking debit cards.

It is worth emphasizing one last time that regardless of our choice of titles, *GHL I* and *GHL II* did not advocate the immediate and unconditional replacement of certain payment instruments with others. In fact, if one recommendation could indeed be derived from our original studies, it was that more (and more comprehensive) cost-benefit studies should be conducted before introducing policy measures that affect the distribution of payment

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<sup>29</sup> There is a literature on the issue of payment-instrument use and willingness to pay; see, for example, Soman (2001) and Jay, Jiang and Soman (2004).

<sup>30</sup> A priori the idea that, say, a debit card has less "salience" than a check seems plausible. When paying with a check, the consumer has to actually write the amount of the purchase on the paper instrument. When paying with a debit card, on the other hand, she only has to swipe her card and enter her PIN (or sign the receipt). From this perspective, it is indeed plausible that at the time when the transaction is conducted, the consumer is more aware of the price of the good if she pays with a check than with a debit card. A responsible consumer who pays with a debit card will keep the receipt, however, and will balance her checkbook. Therefore, at the time of balancing the checkbook, she will recall the price that she paid for the good and will have the opportunity to become "aware" one more time of how much she paid, assuming she did not pay attention at the time of the purchase.

<sup>31</sup> For reasons of space, we have not discussed alternative approaches to addressing the question of the optimal mix of payment instruments in the population of transactions. Rochet and Tirole (2007), for example, have devised a test, the so-called "tourist test", that essentially poses the question: Would the merchant want to refuse a card payment when a non-repeat customer with enough cash in her pocket is about to pay at the cash register? To the best of our knowledge, nobody has attempted an empirical implementation of a test of this nature.

instruments in the population of transactions. We maintain that this recommendation is still valid and it is particularly so in light of the highly complex and controversial issues currently under debate in the literature.

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