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WHICH *TARGET* FOR MONETARY POLICY IN STAGE THREE? ISSUES IN THE SHAPING OF THE EUROPEAN PAYMENT SYSTEM

by Curzio Giannini (*) and Carlo Monticelli (*)

Abstract

We explore the inter-relationships between payment-system arrangements and the conduct of the single monetary policy in Stage Three of EMU against the background of TARGET - the project drafted by the European Monetary Institute with the aim of creating an EU-wide payment system through the interlinking of national Real Time Gross Settlement (RTGS) systems. In addition to the issues raised by the coexistence of gross and net settlement arrangements, the spread of RTGS systems is likely to involve an increase in the demand for intraday liquidity. We analyse the alternative options available to meet this demand, focusing on their monetary policy implications and drawing a number of policy prescriptions.

Contents

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1. Introduction[1]

The payment system and monetary policy are related in two distinct, but equally compelling ways. First, since the payment system is the backbone of any monetary system, its configuration intertwined with the choice of monetary policy instruments. Secondly, both monetary policy and the functioning of the payment system ultimately rest on the central bank's power to provide final money. Thus, it should come as no surprise that the payment system and the machinery of monetary policy have historically evolved hand in hand (Padoa-Schioppa, 1994).

The strong link between the payment system and monetary policy is recognised in the Maastricht Treaty which, in art. 105, entrusts the European System of Central Banks (ESCB) with the task of "promoting the smooth operation of payment systems" alongside of that of "defining and implementing the monetary policy of the Community". The importance assigned in the Treaty - and in the Statute of the ESCB - to payment system issues also reflects the awareness of the diversity and fragmentation of national payment systems in EU countries: at present there is no such thing as an integrated European payment system.

As it happens, the debate on EMU has coincided with a renewed international interest in payment-system questions, involving also other constituencies, such as the G-10. In

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particular, attention has focused on three general issues. The first is whether real time gross settlement systems (RTGS) should supplement or substitute netting systems; the second is whether, how, and on what terms the central banks should accompany the transition to RTGS with facilities designed to enhance the supply of liquidity; the third concerns the roles to be assigned to commercial banks and to central banks in the provision of payment services. Most of the discussion has been framed in terms of risk-reduction policies, while very little attention has been devoted to the monetary policy implications of alternative options.

The European Monetary Institute (EMI) has published a detailed project for the European payment system in Stage Three - labelled TARGET from Trans-European Automated Real-Time Gross Settlement Express Transfer - which has been recently endorsed, and thus launched at the operational level, by the EMI Council. The project aims at ensuring the minimal degree of integration and harmonisation of national payment systems necessary for the conduct of the single monetary policy, but leaves unprejudiced a number of important institutional and operational issues.

Against this background, the paper puts forward an analytical framework to assess TARGET from the point of view of the conduct of the single monetary policy, which is then employed to explore the monetary policy implications of alternative solutions to the open issues. The paper is organised as follows. Section 2 investigates the theoretical underpinnings of the relationship between payment-system arrangements and the conduct of the single monetary policy. Section 3 discusses the main features of the TARGET. Section 4 reviews the relative merits of RTGS systems, focusing on the tension between payment "finality" and market "liquidity", and addresses the "coexistence" issue which stems from the

contemporaneous presence of a variety of payment-system procedures. Section 5 evaluates the possible options for enhancing the overall liquidity of RTGS systems. Section 6 explores the monetary policy implications of TARGET, reaching a number of policy prescriptions. Section 7 concludes.

2. Payment systems and the singleness of monetary policy

The ability of central banks to run monetary policy, and hence to anchor the general price level and to influence economic activity, ultimately rests on their power to supply outside money, that is the only medium of exchange which has the privilege of extinguishing an obligation in a definitive way. The supply of central-bank money takes two forms: banknotes (and coins) - which are still the most widely used means to settle small-value transactions - and paperless liabilities exchanged among commercial banks to settle their reciprocal balances arising from the processing of payments which economic agents carry out by transferring inside money - that is commercial banks' liabilities.

The establishment and maintenance of the confidence which underpins the use of fiat money which has no intrinsic value are at the heart of central banking, since they stand as preconditions for the management of monetary policy - i.e. for the regulation of the supply of outside money (Giannini, 1995). This perspective allows to understand why the supervision of the stability of the banking system and the oversight of the payment system to ensure its smooth functioning are typically entrusted to central banks (Angelini and Passacantando, 1993). It also motivates the numerous critiques which have been levelled to the Maastricht Treaty for failing to assign any compulsory role in supervision to the ESCB and for neglecting the lender-of-last-resort function

of central banks (Goodhart, 1991; Chiappori et al., 1992; Giovannini, 1993; Folkerts-Landau and Garber, 1992).

Through its essential role in the provision of the confidence which supports any monetary system based on a fiduciary means of exchange, the smooth working of the payment system plays a central role in the operation of monetary policy. The interconnection between the payment system and the market for banks' reserves - the paperless medium which gives finality to transfers of commercial banks' liabilities - at one time leads to the emergence of a well defined demand for outside money, distributes its supply among commercial banks and determines its price, the short-term interest rate controlled by the central bank.

As the stance of monetary policy can be ultimately traced to this price, its determination within a free, competitive market avoids distortions in the allocation of resources, permits the swift, efficient transmission of monetary measures, and renders the monetary stance uniform across the economic and financial system. The smooth functioning of the interbank market must be accompanied by an appropriate payment system in order to ensure the access to central bank liabilities to whoever demands them and is willing to pay the market price. At the same time, these conditions establish the concrete opportunity to carry out arbitrage operations whenever the price for the inherently-homogeneous good "central-bank money" tends to differ across market segments. Such arbitrage transactions - which from time to time grant some agents a profit without undertaking any risk - give operational content to the notion of market efficiency (Grossman and Stiglitz, 1980) and pin down the price of central-bank money at its unique market-clearing value.

The application of these arguments to the situation prevailing in Stage Three - when the constituency of the European System of Central Banks encompasses several countries, with potentially distinct markets - makes immediately clear that the establishment of an integrated market for central-bank money is an indispensable requirement for the conduct of the single monetary policy. The integration of the interbank market is necessary for the emergence of a single monetary stance, not fragmented into "local" interest rate conditions, which in turn allows monetary impulses to be quickly and uniformly transmitted throughout the Union.

Full integration of the market for central-bank money, however, can only be attained if it is supported by the integration of national payment systems which ensures that funds can be freely transferred across the Union within the same day. The swift mobility of liquid balances is needed for the execution of the arbitrage operations which are the only market mechanism capable of bringing about a single monetary stance. When idiosyncratic liquidity shocks (e.g. due to the operations of national Treasury) hit a particular national segment of the interbank market, they will put incipient pressure on the interest rate, which will tend to diverge from the level prevailing in other countries. This creates profitable trading opportunities which can be effectively exploited only if the payment system interlinkage ensures the transfer of funds within the same day.

These arbitrage transactions prevent "local" interest rates from emerging as a result of national liquidity shocks and thus warrant the setting of a single market price for central-bank money which efficiently reflects demand and supply conditions, irrespective of the location where the injection (withdrawal) of liquidity takes place.

In addition to the integration of the interbank market, the emergence of a single monetary stance throughout the Union requires the integration of the markets where central-bank money is exchanged with other financial instruments, that is the money market - defined here as the market where short-term funds are traded between banks and non-banks - and the capital market. Although these markets are already highly interlinked across EU countries, their complete integration not only requires the establishment of a EU-wide payment system - needed to support the second leg of the exchanges - but also other conditions, such as the harmonisation of access rules, operating hours and trading practices.[2]

These conditions[3] open sufficient arbitrage opportunities to bring about a single monetary stance in the Union, which will necessarily take the form of an identical price for central-bank money across national components of the integrated market. Indeed, the equality of the overnight interest rate lies at the heart of monetary Union, as it makes clear that central-bank money is actually homogeneous irrespective of the member of the ESCB issuing it.

At the very beginning of Stage Three, it cannot be ruled out that some market participants may have doubts about such homogeneity, possibly due to their scepticism about the irrevocability of the locking of the exchange rates of participating currencies, which is the first step in the establishment of the monetary Union. These doubts could in

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2. Another important issue concerns the efficient transfer and management of securities across the Union for trading and collateralisation.

3. The important legal and economic problems involved in the attainment of adequate safety standards in payments systems and in the cross-border transfers of securities are not discussed in this paper.

principle lead to pressures for the emergence of a discount in the market price of central-bank money - that is a higher interest rate - issued by some national central banks (NCBs) and/or denominated in some of the participating currencies, if monetary policy operations were not conducted in ECUs from the inception of Stage Three. Yet, these pressures would open up arbitrage opportunities which would be immediately seized by some market participants through the exploitation of the commitment of the ESCB to maintain the exchange rate between outside money (irrespective of the member of the ESCB issuing it) and inside money fixed to one. These arbitrage operations - which, it is worth stressing again, can only take place if EU payment systems are perfectly integrated - will ensure the uniqueness of the price of central-bank money and hence the singleness of the ESCB monetary policy.

The equality of the price for central-bank money across the Union does not imply the equality of interest rates for each point of the maturity spectrum simply because - as it happens for any currency denomination - interest rates include a component (default risk premium) related to the perceived creditworthiness of the borrower, which obviously will persist in Stage Three. Indeed, the disappearance of risk premia due to differentiated exchange rate and inflation risks as well as the credibility of the "no-bail-out" clause can be expected to enhance the markets' scrutiny of the creditworthiness of borrowers, including sovereign ones.

Another unwarranted implication of the uniqueness of the price of central-bank money across the Union is the equality of costs (and subsidies) actually involved in its use. Explicit costs - interest rates and other charges - are only one component of actual total costs. Also rules and procedures for the access to the payment systems as well as to central bank direct - through standing facilities - or indirect credit

- through open market operations - imply costs (and benefits). Unless these are perfectly harmonised, remaining differences might make the resort to some NCBs significantly more profitable for commercial banks. If this were the case, there would be incentives for shifts in the localisation of banking activity and/or the re-routing of cross-border payments.

These financial shifts would have detrimental effects for the conduct of monetary policy on two scores. First, they would increase the noise associated with monetary and financial developments, exacerbating the signal extraction problem faced by the ESCB in a situation already difficult because of the regime change involved by the inception of Stage Three. Secondly, there is a risk that a regulatory competition between NCBs to attract financial activity might take place, interfering with the efficiency of the conduct of monetary policy.[4] The so-called remote access - that is the possibility for commercial banks to carry out operations with (foreign) NCBs - could amplify the effects of regulatory competition, facilitating intermediaries' resort to "cheaper" NCBs.[5] An ex-ante harmonisation which is thorough enough to lead to the equalisation of actual total costs in the use of central-bank money is certainly a very ambitious objective to attain in the short time to the beginning of Stage Three. Yet, the concrete risk that regulatory arbitrage on the part of commercial banks could imply financial flows so sizeable as to create difficulties in the management of liquidity conditions should provide a powerful stimulus to make rapid

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4. Passacantando (1991) and Mélitz (1993) explore the possible implications of regulatory competition between NCBs.

5. On the other hand, remote access could be seen as a disciplinary device to avoid that the inefficiency of some NCBs imposes unnecessary costs on the financial intermediaries located in their constituency.

progress in the harmonisation of monetary policy instruments and procedures.

3. The TARGET system

The arguments presented in the previous Section make clear that the integration and harmonisation of national payment systems is a necessary condition for the efficient conduct of the single monetary policy. The fulfilment of this requirement is by no means an easy task because of the marked heterogeneity of national payment systems, documented, for example, in Borio and Van der Bergh (1993) and CEPS (1994). Indeed, Padoa-Schioppa and Saccomanni (1991) concluded that the only common elements across payment systems in EU countries were the supply of settlement services by the central bank and the restriction to certain financial institutions of the access to the clearing system. In all other respects - from hours of business to risk-control measures and pricing policies - national arrangements differed widely.

The heterogeneity of national payment systems was deemed unwieldy not only in view of EMU but also with reference to rapidly increasing economic and financial integration. EU central banks thus began in earnest to collaborate in this field and, in January 1991, established an Ad Hoc Working Group on EC Payment Systems. In May 1992 the Group submitted the Report "Issues of Common Concern to EC Central Banks in the Field of Payment Systems", which was approved by the Committee of Governors and published in September 1992. The Report identified four key areas for joint work: i) the harmonisation of the main features of domestic payment systems; ii) the cooperative oversight of cross-border participation in national payment systems; iii) the

preparation of the payment system for Stage Three of EMU; iv) the oversight of the ECU Clearing and Settlement System.

In the wake of this report, the Maastricht Treaty entrusted the EMI with the task of carrying on the work on payment systems. Article 109f(3) provides that the EMI should "prepare the instruments and procedures necessary for carrying out a single monetary policy in the Third Stage" and "promote the efficiency of cross-border payments". In November 1994 the EMI set forth the following guidelines for further action:

- new payment arrangements are to be established to support the single monetary policy;
- these will be based on linkages between domestic RTGS systems;
- settlement accounts will be held at NCBs;
- the system will be devoted, almost exclusively, to large-value payments.

These guidelines were given operational content in the TARGET project, which has been endorsed by the EMI Council - and published in May 1995 - in the pursuit of two objectives: "to serve the needs of the single monetary policy in Stage Three" and "to increase the safety of payment systems". The general architecture of TARGET consists of one RTGS system in each EU country; a number of technical links and procedures (the "Interlinking" network) to allow payment orders to be transferred from one RTGS system to another; decentralised settlement accounts at the NCBs. TARGET envisages that the ECB will not hold settlement accounts, and that it will carry out its own payments through the Interlinking network: the

bulk of payments will be processed by domestic RTGS systems and exchanged, after settlement, between NCBs.[6]

The project revolves around three principles. The market principle - enshrined in art. 102a of the Treaty - implies that NCBs' involvement will be restricted to functions which cannot be adequately performed by the private sector. The use of TARGET will thus not be compulsory, except for payments directly related to the implementation of monetary policy. Therefore, the decision as to whether individual payments are routed through RTGS or net settlement procedures will be left to market participants.[7]

The decentralisation principle has led TARGET to opt for retaining existing national infrastructures and procedures, rather than proceeding to the creation of a new fund-transfer system centralised at the ECB. As a result of this strategic choice, the Interlinking network is the key of the whole project.

In view of the short time to the start of Stage Three, the third principle rules that the construction of a European payment system will follow a minimum approach. Harmonisation of existing national procedures and practices will be sought only to the extent necessary to avoid impediments to the efficient conduct of the single monetary policy and/or

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6. TARGET has been designed to operate in ECUs. Since it cannot be ruled out that payments could continue to be denominated in national currencies for some time after the start of Stage Three, the Interlinking network might have to resort to conversion devices at the irrevocably-locked exchange rates.

7. However, it has to be noticed that the choice of the settlement system is often dictated by the rules of organised markets.

distortions in the competition between banks, irrespective of their location within the Union.

The choice in favour of decentralisation raises the issue of the respective roles of the ECB and NCBs within the system. The project hinges on the assumption that the ECB will not hold settlement accounts for commercial banks, even though its general features are fully compatible with the opening of settlement accounts at ECB if the efficient conduct of the single monetary policy were to require so. The ECB will anyway participate in the Interlinking network, ensuring smooth transfers between the NCBs and the ECB according to the multilateral correspondent-banking model. Payment messages will be exchanged on a bilateral basis between the participants in the Interlinking network, with reciprocal accounts being debited and credited each time a payment order is transferred from one NCB - or the ECB - to another.

The implementation of TARGET requires the solution of a number of important issues, left open at this stage. These include the decision on the instruments and procedures for the supply of intraday liquidity, the operating hours, the pricing policies, the access requirements, the availability of queuing facilities for temporarily unfunded payment messages. Some degree of harmonisation is necessary in these areas.[8]

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8. In addressing this issue, the TARGET project focuses on two areas: pricing policies - which will have to be designed so as to avoid competitive distortions - and access criteria - which will continue to rely on national approaches, provided they comply with the guidelines set out in the Report "Minimum Common Features for Domestic Payment Systems".

4. The switch to RTGS: rationale and implications

As illustrated in the previous Section, the TARGET project hinges on the interlinking of national RTGS systems rather than of netting schemes. This choice reflects both the purpose of reducing systemic risk - an issue not addressed in this paper - and the objective of accommodating the secular trend[9] in the reduction of the settlement lag, which has been particularly pronounced with reference to financial transactions. In order to appreciate the economic forces underpinning such a trend, it is necessary to abandon the assumption - typically maintained in economic analysis (see Hicks, 1989, for a critique) - that all transactions are spot.

Economic transactions typically consist of three parts: the contract - i.e. a promise to deliver and a promise to pay - actual delivery, and actual payment. Only small-value transactions are, in general, executed by the spot method, i.e. actual delivery against actual payment. As the value of the transaction becomes larger, convenience, safety, and opportunity-cost considerations shift the balance towards the deferred method of payment. If actual delivery takes place before actual payment, or settlement, then a credit element - together with the credit risk it entails - is involved. On the other hand, deferring settlements can reduce the number of transfers between accounts and, more importantly, the overall amount of money needed to sustain a given volume of trade thanks to the resort to the clearing mechanism involved in netting schemes.

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9. Settlement lags have declined from the few months of the exchange fairs in the late Renaissance, to one or two weeks last century, to one day in recent decades for some markets.

Consider the choice of a payor - e.g. a bank - which has the option of issuing provisional payments, that is payments that become binding and final only upon settlement (see Angelini and Giannini, 1994, for a formal analysis). Provisional payments are subject to default risk, which increases with settlement lag, given that, as the chain of provisional payments expands, the probability that some untrustworthy payer gets into the chain increases (Garber and Weisbrod, 1990; Gelfand and Lindsey, 1989). However, the bank bears settlement-related costs, which mainly derive from the holding of excess liquidity and thus decrease with the settlement lag, as a result of the higher probability that out-payments can be funded with the proceeds of in-payments. In other words, postponing final settlement reduces settlement-related costs but increases risk-related costs. The optimal settlement lag results from the trade-off between these conflicting effects.

These two kinds of cost are not constant over time but are influenced by several factors. Technical progress reduces the expected settlement costs by improving information flows as payment messages can be sent in real time. Unit transaction costs are reduced too. Risk-related costs, on the contrary, tend to rise with technological progress as a result both of the higher volume of provisional payments per unit of time and of the lengthening of the transaction chain (in turn due to the possibility of sending payments more rapidly) which brings about a greater risk of running into some untrustworthy payer.

By enhancing competition and facilitating the entry of new operators, financial liberalisation can be expected to raise risk-related costs for any given settlement lag, while reducing transaction costs as a result of improved efficiency. Also international integration raises risk-related costs as a result of the difference in legal and institutional environments. Further, the use of two units of account in

foreign exchange transactions may give rise to the so-called "Herstatt risk", which occurs when the two legs of a transaction become final at different times (Borio and Van den Bergh, 1993).

All these forces have been particularly strong during the last fifteen years, leading to an exponential growth in payment volumes and to a marked increase in the demand for payment finality. Nowhere has this been more evident than in derivative markets, whose smooth functioning requires the payment system to deliver "good funds" (i.e. final payments) on an intraday basis: high leveraging may entail large gains and losses during the trading day and hence the need for intraday settlement of margin calls (Folkerts-Landau, 1994).[10]

The higher demand for finality can in principle be met without reducing the settlement lag, as in net settlement systems that embody so-called "finality rules". Under such rules, all payments are considered "final" (and therefore binding for the payor) even if they are not accompanied by a simultaneous transfer of base money. The effectiveness of this mechanism in reducing settlement risk hinges on the willingness of system participants to honour, on a loss-sharing basis, the "final" payments in case of the payor's default at settlement. The best known net settlement system in the world, the New York-based CHIPS, has in fact been reformed along these lines.[11] There are, however, two

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10. It is not surprising, therefore, that the demand for payment finality has been particularly strong in countries where financial markets are sophisticated and very active, such as the United States, the United Kingdom, and Japan.

11. In the event of a participant's default, each CHIPS participant is required to pay an additional settlement obligation (ASO) based on its maximum exposure to the

problems with finality rules. First, they require a highly cooperative attitude among participants in the systems which may be undermined by the very forces - increasing competition and entry of new participants - ultimately motivating the higher demand for finality. Secondly, it is not clear how finality rules would work if default concerned two or more participants.

These arguments motivate the preference for RTGS systems - i.e. for systems where the settlement lag is brought to zero - which can thus be viewed as the response to the increased demand for payment finality brought about by the growth of both domestic and cross-border financial transactions, particularly in derivative finance. Greater payment finality, however, entails higher settlement-related costs, not so much in terms of transaction costs - which now are actually minimal as a result of enhanced competition and efficient technology - but rather in terms of larger liquid balances needed to support a given volume of transactions.

When the netting scheme is replaced by RTGS, higher settlement costs in terms of larger liquid balances fall on economic agents, which react by economising on costly reserves and/or delaying payments. In doing so, however, they will typically not take into account the externalities involved in their reserve management behaviour (Angelini, 1994). An example may illustrate this kind of externalities. Suppose that bank A has to send a payment to bank B and that in turn bank B must send a payment to a third bank. If A has sufficient reserves and makes its final payment to B, the

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failed institution on the day the failure occurs. Each participant is asked to pre-post collateral up to its largest potential ASO. The system is thus designed to ensure settlement even if the default concerns the participant with the single largest net debit position (New York Clearing House Association, 1995).

latter needs less reserves than it would without A's incoming final payment. Since holding reserves is costly, B has an incentive to wait for A to settle its transaction; if A settles, B benefits from a positive externality.

As is well known from the analysis of public goods, competitive markets generally do not take into account positive externalities, leading to an underprovision of the good which produces externalities. In the absence of a system of incentives sustaining a cooperative equilibrium which "internalises" externalities, agents will tend to hold a lower level of reserves than socially optimal. This argument suggests that the switch from netting to RGTS is not likely to be accompanied by an adequate increase in voluntary reserve balances, as individual banks may well prefer to delay payments rather than bear the additional liquidity cost. Therefore, when considering the implications of RTGS, the payment pattern cannot be taken as exogenously given: a structurally low level of reserves may hamper the smooth working of payment systems, with detrimental consequences on the efficiency of the conduct of the single monetary policy. Moreover, the good functioning of developed financial markets relies on the availability of sufficient liquidity. As Folkerts-Landau (1994, p. 588) put it, "liquidity is the life blood of derivative finance".

However, RTGS and net settlement schemes are not mutually exclusive options and indeed, as discussed in Section 3, the use of TARGET will not be compulsory except for payments directly stemming from the execution of monetary policy operations. Thus, gross and net settlement systems can be expected to coexist (in Stage Three, too) giving rise to two major concerns.

The first regards the systemic-risk implications of coexistence, given that intraday payments originating in different kinds of settlement procedures will have a different degree of finality and/or revocability, possibly increasing the degree of systemic risk (Angelini and Giannini, 1994; Monticelli and Viñals, 1993).

This problem may be exacerbated when, as envisaged for the EU, RTGS and net settlement systems do not operate under a single set of rules nor share common infrastructures. Therefore, the introduction of RTGS should not be regarded as a substitute for risk-reduction policies within those net settlement systems that will continue to operate. On the contrary, the safety concerns stemming from coexistence should be viewed as a further stimulus to speed up the implementation of the "Lamfalussy standards" across Europe (see Bank for International Settlements, 1990).[12]

The second concern raised by the coexistence of gross and net settlement systems stems from the risk that an insufficient number of payments be actually executed through RTGS systems, leading to an insufficient overall degree of payment finality and possibly hampering the emergence of a single monetary stance throughout the Union. Since net systems implicitly provide intraday liquidity at no cost, "spontaneous" market forces need not lead to the widespread use of RTGS systems, which instead require the availability of (costly) intraday money balances. In the two countries where RTGS systems are well developed - the United States and

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12. The 1993 Report on "Minimum Common Features for Domestic Payment Systems" correctly states that : "large value net settlement systems may continue to operate in parallel to real-time gross settlement systems but, in the near future, they should ... meet the Lamfalussy standards in full" (Principle 5).

Switzerland - their introduction has been subsidised: in the former country, through the gratuity, until very recently, of daylight overdrafts; in the latter, through the resort to a queuing mechanism which implicitly provides intraday liquidity at no cost.

The concern that the liquidity requirements involved in the execution of payments through RTGS systems may discourage their widespread use has already been recognised by EU central banks. Principle 4 of the 1993 Report recommends that "as soon as feasible, every Member State should have a RTGS system into which as many large-value payments as possible should be channelled" (emphasis added).

5. Meeting intraday liquidity needs: the options

The higher demand for liquidity which the move to a RTGS system is likely to entail can be met in three different ways:

- establishing a queuing mechanism for the payments which are temporarily not supported by sufficient liquidity;
- allowing the intraday mobilisation of reserve requirements for payment-system purposes;
- providing liquidity on an intraday basis.

The first option which has been operational in Switzerland for several years, may entail serious drawbacks. The introduction of a queuing mechanism is in fact tantamount to diluting the finality of the payment process, as pending payments are not final by definition. If the valuable information that pending payments are on their way is withheld from the payee, the efficiency of the system will be reduced. Alternatively, if this information is immediately passed

through - as is the case in Switzerland's SIC - and the receiving bank acts on the assumption that pending payments will carry through, the RTGS loses its distinctive feature of immediate finality, partaking nature and drawbacks of netting systems.

Irrespective of whether information on pending payments is released, reliance on a queuing facility is likely to increase the opacity of the payment process if queuing rules and procedures are not harmonised across the Union. Moreover, there exist serious risks of gridlock[13] at the end of the day - with possible spillovers on the overnight liquidity market - which make the reliance on queues unattractive for monetary policy reasons.

The second option is the resort to balances held to comply with the reserve requirement as a source of intraday liquidity. Indeed, the very calculation of the reserve requirement on end-of-day balances would automatically imply the intraday availability of the liquidity. Reserve requirements, however, are primarily devised as a monetary policy instrument, whose features - most notably, size, remuneration and averaging provisions - will be decided with reference to their role in the overall framework of monetary policy management and not to ensure liquidity to the payment system. Moreover, because of the incentive to the

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13. Incipient gridlocks due to large and persistent queues were not infrequent in the initial period of operation of SIC (Borio and Van der Bergh, 1993), leading authorities to structure fees so as to penalise banks whose payments were initiated later and/or remained too long in the queue. Despite the ensuing improvements, Vital (1989, 1994) reports that still about 20 percent of the payment volume and 50 percent of the payment value is settled after 2 p.m. on an average day. On high-volume days, queues containing over 100,000 payment messages are not unusual.

delocalisation of deposits they offer, they are being reduced to minimal levels in all EU countries.

In order to enhance the liquidity services provided to the RTGS system by reserve requirement balances, the calculation of the maintenance basis could take place with reference to average daily balances, facilitating the emergence of intraday liquidity markets and thereby increasing the velocity of circulation of compulsory reserves. Contrary to present end-of-day settlement arrangements which do not offer intraday profit opportunities (Garber and Weisbrod, 1990), RTGS and intraday averaging provisions for the computation of reserve requirements would generate incentives to make the best possible use of liquid balances during the day.[14]

Despite the increase in velocity of circulation of liquid balances which would be brought about by intraday averaging provisions, reserve requirements are unlikely to provide sufficient liquidity because of their foreseeable small size. Hence, the resort to the third option - intraday central-bank credit - will presumably be warranted.

The experience of the US Fedwire - the most-often-quoted example of this kind of arrangement - has however shown that, if intraday overdrafts are granted for free and are not

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14. In making the case for intraday averaging provisions, Angell (1994) even goes so far as claiming that otherwise banks would be "denied the property rights attached to their reserve holdings with the central bank during the day". Casting the argument in terms of property rights may be misleading, since it is not clear, as long as no intraday liquidity markets exist, that end-of-day accounting entails a loss from the point of view of individual banks (Garber and Weisbrod, 1990). Yet, the key point that intraday averaging provisions set correct incentives from the point of view of the efficiency of RTGS as a whole is certainly well taken.

collateralised, their overall size tends to get very large. Indeed too large on two scores. First, on efficiency grounds. Although the externalities involved in the use of the intraday liquidity warrant a subsidy, a price equal to zero need not provide the necessary incentives for an efficient allocation (and circulation) of liquid balances. Secondly, the oversupply of intraday credit increases the risk that if intraday overdrafts turn into overnight loans the undesired creation of monetary base may give rise to serious problems in terms of both monetary control and risk exposure on the part of the central bank. These concerns have recently led the Federal Reserve to introduce a fee - proportional to the amount of the daylight overdraft, even though independent of its timing and intraday length - which has brought about a drastic reduction of the overall size of intraday central-bank credit.

ESCB practices will certainly not replicate this evolutionary process. Not only does the ESCB have the advantage of benefiting from the lessons drawn from the US experience, but art. 18 of its Statute explicitly provides for lending to be based on "adequate collateral". In addition to economic arguments, there are thus compelling legal restrictions to rule out the free and uncollateralised provision of intraday liquidity. Whether the implicit cost of collateralisation under the initial rules (yet to be decided) will lead to a shadow price of intraday liquidity which is optimal from the point of view of the functioning of a RTGS system is hard to tell in advance. The resulting shadow price may well be too high - requiring a partial relaxation of collateral requirements, legally possible through the interpretation of the word "adequate" - or too low - necessitating the introduction of an explicit fee.

In conclusion, although compulsory reserves can (and should) contribute to fill the liquidity gap involved in the

switch from netting schemes to RTGS systems, they are unlikely, on their own, to provide sufficient liquid balances to support the smooth functioning of the payment system. Queues tend to dilute the degree of finality of payments and may entail serious risks of gridlocks. The ESCB will thus have to provide intraday liquidity through a standing facility or by engineering open market operations, although its price and quantity are difficult to surmise ex ante. The next Section explores the implications this may have for monetary policy.

6. Monetary policy implications

6.1 Intraday liquidity and monetary stance

The supply of intraday liquidity for payment-system purposes is generally thought not to have any implication for monetary control, provided that intraday central bank credit does not turn into overnight credit. This conclusion has been implicitly endorsed by European monetary authorities. After recalling in the preamble that central-bank intraday credit may be useful for the smooth functioning of payment systems, the Council Regulation No. 3603/93 states, in art. 4, that intraday credit to the public sector "shall not be considered as a credit facility within the meaning of Article 104 of the Treaty, provided that they remain limited to the day and that no extension is possible". Only if intraday liquidity does not impinge on monetary control can daylight credit to the public sector be compatible with the ban on monetary financing.

The analytical support to this view comes from an arbitrage argument which can be embedded in a broad class of models (e.g. Angelini, 1994). Since it is not possible to replicate an overnight contract with a combination of intraday contracts - daylight loans have to be reimbursed fully before the end of the day - intraday liquidity conditions have no

bearing on the determination of the overnight rate, which thus remains the price of the shortest-maturity contract in terms of outside money relevant for the conduct of monetary policy.

Crucial to this argument - and indeed to the intuition underlying the irrelevance of the intraday liquidity for monetary policy - is the assumption that the amount of end-of-day outside money is set by the central bank irrespective of the liquidity conditions prevailing during the day. Market participants must also be convinced that this is going to be the case. Otherwise, their guesses about the central bank's reaction to intraday liquidity conditions would cause shifts in their demand for end-of-day overdrafts - thus affecting the overnight rate - even if the central bank had no intention whatsoever to respond to intraday fluctuations in reserves.

Whether these two assumptions are valid depends on the information which intraday liquidity conditions can be expected to convey. In general, the demand for daylight reserves only reflects the vagaries of payment flows and hence the central bank cannot possibly extract any information relevant for monetary policy decisions. Therefore, the ESCB should, as a norm, refrain both from reacting to intraday liquidity fluctuations and from following monitoring practices which may lead market participants to surmise that movements in intraday liquidity influence the supply of end-of-day reserves.

Yet, in some exceptional circumstances, "excessively" large intraday overdrafts might anticipate a surge in the demand for reserves stemming either from a very sizeable liquidity shock (which the central bank would presumably notice anyway) or from a sudden shift in expectations. To make a concrete example, a speculative attack on the ECU may start with a massive increase in intraday overdrafts with the

central bank. If the monetary tightening in response to the attack were intended to leave the overnight rate at or below the penalty rate applied to the marginal refinancing facility - i.e. if the "Lombard" window continued to be available to banks willing to pay an interest rate higher than the market rate - the intraday supply of liquidity should not be altered. What would be the rationale, from a monetary policy point of view, in denying reserves on an intraday basis while granting them at the end of the day?[15] Conversely, if the attack were so intense as to induce the ESCB to resort to such an extreme monetary policy measure as the closing of the Lombard facility, then also daylight overdrafts should be curtailed. Otherwise, the monetary restriction would not be as intense and effective as the ESCB desires, since the intraday supply of liquidity would lead to a slippage in monetary control.

In sum, the supply of intraday liquidity to lubricate the working of payment systems does not impinge on the effectiveness and efficiency of monetary control provided that the ESCB makes clear to market participants that, in normal circumstances, the vagaries of intraday payments do not influence monetary policy decisions. Although, in exceptional circumstances, this principle could be forsaken, exceptions should only be very rare and clearly understood by market participants. Since the distinction between normal and exceptional may turn out to be difficult in practice, the objective of transparency in the relationship between monetary control and the supply of intraday liquidity could be achieved by sticking to the rule that the granting of intraday overdrafts can be restricted only if the situation is so exceptional as to require the closing of the Lombard facility.

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15. The issue of the transformation of intraday overdrafts into overnight ones is discussed in the next Section.

After all, the supply of intraday credit can undermine monetary control only in two cases: when the desired monetary stance is so tight as to require the interruption of marginal lending at a penalty rate; or when market participants are led to make unfounded guesses about the (non-existent) reaction on the part of the ESCB to fluctuations in intraday liquidity.

6.2 The provision of intraday liquidity and monetary policy operations

The ESCB can supply intraday liquidity through the two basic sets of instruments which are used to regulate the monetary base: standing facilities and open market operations.

The granting of intraday overdrafts in the accounts held by commercial banks with the ESCB is a very attractive arrangement because of its flexibility. As the supply of liquidity is demand driven, it can minimise the risk of gridlocks in payment systems. Liquidity is made directly available to the banks needing it even in the absence of a well-developed market for daylight funds. Collateralisation of overdrafts virtually avoids the credit risk borne by the ESCB. At the same time, it attaches a cost to daylight overdrafts which prevents liquidity from being a free good, with the inefficient oversupply this would entail.[16]

The only drawback involved in the granting of intraday overdrafts is the risk that they are turned into overnight advances, implying an undesired creation of monetary base. This risk can however be drastically reduced by imposing

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16. As noted above, the cost of reserves implied by collateral requirements need not be the one leading to the optimal supply of reserves. Hence, the introduction of fees or subsidies may also be desirable on efficiency grounds.

penalties which are stiff enough to discourage the transformation of a daylight credit into an overnight one as a source of liquidity. After all, such a transformation is analogous, from a monetary policy point of view, to the access to the Lombard facility. Also commercial banks' resort to the latter leads to a creation of outside money which was not planned by the ESCB. However, monetary control will not be affected, given that the use of the marginal refinancing facility can be expected to be, under normal circumstances, rare and small in size. Why should commercial banks ask the ESCB for a Lombard advance when they can get liquidity in the market at a lower rate? In exceptional circumstances, the ESCB may close (or ration) the Lombard facility as a component of an extreme monetary tightening. If this were the case, however, it has been argued above that the supply of intraday liquidity would have to be curtailed too.

These arguments suggest that the granting of collateralised overdrafts to supply daylight liquidity does not in general impinge either on the firmness of monetary control or the smooth functioning of the Lombard facility to accommodate unexpected liquidity shocks hitting single banks. However, especially at the beginning of Stage Three, market participants may not be accustomed to the new system and may have doubts about the resolve of the ESCB in resisting the transformation of intraday credit into overnight credit. In order to establish credibility in this aspect of monetary management, the penalty for this transformation should be particularly stiff, in any case such as to make the overnight credit obtained by the prolongation of what had initially been announced as an intraday credit more expensive than the advances obtained by resorting directly to the Lombard facility. This penalty policy would enhance the distinction between intraday funds for payment-system purposes and overnight advances, create an additional incentive for the

efficient management of liquidity, and provide an effective remedy against the moral hazard that intraday funds are not reimbursed at the end of the day.

Open market operations (OMOs) - which are bound to be the key instrument used by the ESCB to steer liquidity conditions - could in principle be used to supply intraday funds. Their main advantage lies in the fact that they are oriented to the "market" and not to single intermediaries. OMOs enhance the role of economic forces in the efficient allocation of liquidity and provide the ESCB with useful information about liquidity conditions through the auction procedure. Furthermore, they reduce the risk that intraday funds are transformed into overnight credit, as repo operations automatically provide for both the injection and the withdrawal of liquidity.

However, the execution of daylight OMOs would be efficient only if the market for intraday liquidity were sufficiently developed, that is endowed with smooth procedures for the quotation of prices and the execution of transactions. So far, in no country has a market for intraday liquidity developed such features. Even in countries - such as the US, Japan or Switzerland - where intraday liquidity is valued, although for different reasons,[17] there have been no signs that an intraday market with characteristics comparable to ones of the interbank market is emerging. Intraday liquidity transactions have so far been relatively few and small-valued, and have taken the form of bilateral exchanges

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16. In the US, intraday liquidity is valuable as a result of the recent introduction of fees on daylight overdrafts with the Federal Reserve. In Switzerland, because the fee structure of SIC penalises both late payments and prolonged permanence in the queuing mechanism. In Japan, the BOJ-Net provides two cut-off times, between which banks exchange liquidity on a continuous basis.

rather than of transparent market transactions with publicly-quoted prices and bid-ask spreads.

The establishment of a new market requires investment in physical capital as well as in training in the new trading techniques. As set-up costs are very high, market participants take initiatives only if efficiency gains are perceived to be sufficiently large. The fact that a well organised market for intraday funds has not yet developed in any country suggests that private agents do not foresee large efficiency gains. Appartently, intraday liquidity has not been scarce enough to make improvements in the efficiency of its allocation among market participants very attractive. Should the ESCB promote the development of a well-functioning market for intraday funds? Competitive forces may not be sufficient to lead to the establishment of a new, welfare-improving market because benefits may not accrue to the same agents who would have to bear the set-up costs. Indeed, this is one of the classical instances of market failure where welfare-improving public intervention is called for.

Present experience does not seem to provide a very strong case for an active promotion on the part of the ESCB. No major inefficiencies in the distribution of intraday funds have emerged despite the absence of a well-developed market for intraday liquidity. After all, the presumption that no major efficiency gains can be expected from improving the allocation of intraday liquidity may be viewed as an implication of the argument that intraday reserves should be relatively abundant in order to "internalise" the externalities involved in the use of the monetary base and lubricate the payment system effectively. This reasoning, naturally, does not imply that the ESCB should not foster the emergence of the new market if economic forces pushing for its establishment surfaced and gained strength.

Until a fully-fledged market for intraday funds has developed, the execution of intraday OMOs would presumably encounter two kinds of problem. First, the launching of tenders may be complicated by the difficulty in estimating intraday liquidity needs - and the corresponding daylight "interest rate" conditions - if a substantial amount of intraday funds continued to be exchanged through bilateral arrangements.

Secondly, the compliance with the principles of decentralisation and equal opportunity would require that a relatively large number of banks be eligible for participation in intraday OMOs. The processing of a large number of bids - as well as the involvement of several NCBs in the injection and withdrawal of liquidity - could be a rather cumbersome and time-consuming process. Although certainly manageable for monetary-policy-oriented OMOs, such a process could not be efficient for payment-system-oriented intraday OMOs which, by their very nature, require both parts of the repo transaction to be carried out within the same day.

On the other hand, this feature which distinguishes OMOs geared to the smooth functioning of payment systems is likely to reduce also the risk that the execution of intraday OMOs might interfere with OMOs aiming at the management of the monetary stance. The execution of the latter, however, may take into account payment-system considerations, especially as regards the timing of their settlement. In particular, certain settlement arrangements - early in the day for OMOs injecting liquidity and late in the evening for those withdrawing it - could give rise to a useful source of intraday liquidity in the days when monetary-policy OMOs are carried out.

7. Conclusion

The establishment of an integrated market for central-bank money across the Union is an indispensable requirement for the conduct of the single monetary policy in Stage Three. A unified, efficient, low-risk European payment system is a necessary, albeit not sufficient, condition to this end. EU central banks have been working together in the field of payment systems since 1991. The TARGET project is the latest offspring of this ongoing reform effort; it is intended to meet the needs of the single monetary policy in Stage Three while accommodating the increase in demand for payment finality brought about by technological and financial progress.

The greatest difficulties encountered in the conception of TARGET stem from the high degree of fragmentation and heterogeneity of existing national payment systems. While making action all the more urgent, this situation makes the cost of a big-bang solution unacceptably high, and this possibility was therefore discarded at an early stage. Decentralisation and a "minimum approach" were thus Hobson's choice for the TARGET project, even though they entail some potential drawbacks. In particular, the persistence of differences in payment practices and procedures across the Union may be a source of friction not only for the payment system but also for the functioning of the interbank market. Furthermore, competition between gross and net settlement systems, on the one hand, and between national payment systems, on the other, may hinder a generalised switch to RTGS, have detrimental effects for the management of the single monetary policy, and even amplify systemic risks.

The key issue for the successful implementation of TARGET - and its consistency with the instruments and

procedures of monetary policy - is how to satisfy the increasing liquidity needs which RTGS systems are likely to entail. The resort to queuing systems has a number of undesirable implications, and should not be encouraged. An active intraday use of balances held to comply with reserve requirements - possibly encouraged by the introduction of averaging provisions for intraday balances - may help fill the liquidity gap resulting from the switch to RGTS systems. However, reserve requirements will be designed for monetary policy purposes and are thus unlikely to provide sufficient liquidity on their own. Accordingly, the ESCB is likely to have to provide intraday liquidity through other channels. The determination of the exact quantity and price of intraday injections of liquidity is an eminently empirical issue which cannot be solved at the theoretical level. However, while it will be necessary to comply with the Treaty provision that ESCB loans must be collateralised, there are good reasons for believing that the explicit cost of liquidity should be low so as to encourage the widespread use of RTGS systems and ensure their smooth functioning.

The supply of intraday liquidity need not impinge on either the effectiveness or the efficiency of monetary control, provided the ESCB makes it clear to market participants that, in normal circumstances, intraday payment flows will not influence monetary policy decisions. Departures from this principle, if any, should be very rare and clearly understood by market participants. As a rule, one can envisage that intraday overdrafts would be curtailed only if circumstances were so exceptional as to require the closing of the "Lombard-type" facility. In order to strengthen the separation between monetary policy management and the provision of intraday liquidity, penalties should be introduced to discourage the transformation of daylight loans into overnight credit, possibly making reserves obtained in

this way even more expensive than the outright resort to "Lombard" credit.

This paper has also argued that, in the absence of a fully-developed market for intraday liquidity, standing facilities may be a more suitable means of providing daylight liquidity than intraday open market operations. Estimating liquidity needs before a tender offer could prove exceedingly difficult if a substantial amount of intraday funds continued to be exchanged in rather informal ways. Moreover, the principle of decentralisation implies that there would be a relatively large number of banks eligible for participation in intraday open market operations, making them cumbersome and possibly inefficient. This, however, does not rule out "local" intraday open market operations run by individual NCBs, provided that they do not give rise to competitive distortions. Finally, it may be worth noting that the choice of the time of day for the settlement of open market operations carried out for the management of the monetary stance should also take account of payment-system considerations.

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