Implications of the bank merger wave
for competition and stability

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Abstract

This paper discusses the effects of bank consolidation on competition and stability in the banking sector. Most empirical literature seems to point towards the standard adverse effects on prices of increased concentration in banking. A major issue is the still regional character of loan and deposit markets for households and small enterprises, which contrasts with the generally increasing globalisation of other financial services. In line with other recent papers, we challenge the view that market power - as may be created through banking consolidation - is unambiguously good for banking system stability. Various features of bank mergers may actually increase the scope for instability, in particular when they lead to a small number of large "national champions", monitoring problems, lower money market liquidity or organisational inefficiencies/lack of market discipline. Overall, we stress that competition considerations need to receive adequate attention, even in the special banking sector.

1.   Introduction

The "merger movement" in banking has been widely documented and debated in policy reports and research papers (see eg Boyd and Graham (1991, 1996); Berger, Kashyap and Scalise (1995); Berger, Demsetz and Strahan (1999); Dermine (2000); ECB (2000); OECD (2000); Group of Ten (2001)). While significant consolidation also took place among other financial service providers, the phenomenon was particularly concentrated among banking firms. Bank consolidation accelerated during the last three years of the 1990s and most importantly the largest number of mergers and acquisitions in this sector occurred within national borders.[1] As a consequence, several industrial countries reached a situation of high banking sector concentration or faced a further deterioration of an already concentrated sector (eg Australia, Belgium, Canada, France, the Netherlands and Sweden), while the banking sectors of a few other countries remained relatively unconcentrated (this group includes for example Germany and the United States; see Group of Ten (2001) for details).

Apart from general management objectives, such as increasing profitability by diversification and exploitation of economies of scale, dominating markets and governing larger firms, the origins of this merger wave were found in technical progress (particularly in communication technology), deregulation, European economic and monetary union, general globalisation and the resulting competitive challenges for financial firms. Such an extensive concentration process is of interest for various policy areas, including competition policies to ensure market discipline and the efficient functioning of the financial sector, prudential policies to maintain its stability, and monetary policies, regarding both bank sector liquidity management in the implementation of monetary policy and the monetary transmission mechanism.

In the present paper we discuss the implications of bank mergers and banking sector concentration for both competition and stability. Section 2 focuses on the intensity of competition in the banking sector, while Section 3 addresses the link between this and bank stability/systemic risk.[2] We review the

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[1]   In this paper we will not address the differences between mergers and acquisitions and often refer to both as mergers.

[2]   The competition-stability nexus has recently also been discussed by Canoy et al (2001), Carletti and Hartmann (forthcoming) and Vives (2001). In a direct policy context it was addressed by the Cruickshank (1999) interim report in the United Kingdom.

related empirical literature and derive the main conclusions at the end of each section. The last section presents the start of a new line of research that models the joint consequences of consolidation for bank competition and interbank market liquidity fluctuations. This research and further variations of it have the potential to provide input in the discussion on the implications of consolidation on monetary, competition and supervisory policies and their relations to each other.

One main conclusion from the present paper is that market power and competition need to be carefully addressed in the banking sector, despite or even because of its special character in relation to financial stability.

2.   Competition effects of bank mergers

A good deal of the debate on competition effects from bank consolidation has been phrased in terms of the conflict between two competing hypotheses or paradigms. The structure-conduct-performance (SCP) paradigm, going back to Mason (1939) and Bain (1956), highlights reductions in competition and increases in market power through firm growth and concentration. In contrast, the efficient-structure (ES) paradigm, related to Demsetz (1973) and Peltzman (1977), rather emphasises that differences in market shares/concentration reflect superior efficiency of growing firms.

The SCP and ES paradigms are also reflected in the more recent theoretical literature on the effects of in-market mergers on prices and quantities under imperfect competition (see, for example, Perry and Porter (1985) and Farrell and Shapiro (1990)). The main idea is that a merger has two effects: first, it enlarges the market share of the merged firms (and thereby enhances their market power); second, it may lead to efficiency gains in terms of a reduction in the costs of the merged firms. The first effect leads to upward pressure on prices. Since each firm involved in the merger internalises the effect of a change in its price on the demand of all other merged firms, it charges a higher markup than before the merger. The second effect tends to reduce prices. If lower costs materialise, then the merged firms become more aggressive and reduce prices in order to enlarge their customer base. Thus, whether a merger leads to price increases (and consequently reductions in quantities) depends on the relative importance of the internalisation effect (increase in market power) and the potential efficiency gains.

These standard results in industrial organisations apply of course also to banking markets. Therefore, if the SCP effects of bank mergers dominated, then bank consolidation should be associated with increasing loan rates and/or decreasing deposit rates (together with decreasing supply), as firms try to exploit market power to increase their profits. If the ES effects dominated, then the opposite should happen, since expanding firms would pass efficiency gains on to customers.

Note that under the antitrust practice followed in most countries the two paradigms lead to opposite policy conclusions. Since competition authorities tend to focus on prices, they would control consolidation that goes beyond a certain point when SCP effects dominate. This would not be the case when ES effects dominate. Now, focusing on prices alone in competition reviews of mergers may be regarded as suboptimal, since it implies that only *consumer surplus* is maximised by the authorities and increases in profits that may lead to higher *total surplus* are ignored. However, Neven and Roeller (2000) recently provided a clear rationale behind the current practice. They show in a political economy framework that the merging firms (here banks) are typically in a better position than their dispersed customers (here depositors and borrowers) to lobby and influence the decision of the antitrust agency. An exclusive consumer surplus objective corrects this imbalance. Therefore in this paper we do not question standard antitrust practice and focus on bank loan rate increases or deposit rate decreases and - to a lesser extent - on quantity reductions as indicators of adverse effects from mergers on competition.

2.1   The effects of bank mergers on small business and consumer loan markets

Quantitative empirical research on the relationship between market structures and loan rates seems to go back to the 1960s, when provisions in the Bank Holding Company Act of 1956 and the Bank

Merger Acts of 1960 and 1966 for the first time required supervisory authorities in the United States to also preserve competition in banking.[3] This implied that they generally had to review bank mergers from a competition perspective. In response to these developments, in 1962 the Board of Governors of the Federal Reserve System launched a comprehensive research programme on bank market structures and competition.

In this environment a "banking competition controversy" unfolded, as witnessed for example by the two conflicting research papers by Edwards (1965) and Flechsig (1965) as well as numerous follow-up papers, including Kaufman (1966), Phillips (1967), Taylor (1968) or Bell and Murphy (1969). Some of the authors followed Edwards' conclusion that concentration increased loan rates, while others followed Flechsig's conclusion that this relationship was not robust. Excellent summaries of the early literature of the 1960s and 1970s are provided by Gilbert (1984) and Weiss (1989), who conclude more or less that most of the better executed studies point to some adverse effect of concentration (as measured in this early literature in deposit markets) on loan rates.[4]

2.1.1 Recent evidence on loan rates

Most studies for the United States show that loan market *concentration* increases small business and consumer lending rates, in line with increased market power of the lenders.[5] Hannan (1991), Berger and Hannan (1997) and Hannan (1997) show this for various cross sections of small secured and unsecured business loans. Kahn et al (2001) also find this for personal loans, but not for automobile loans (which are often collateralised). One European study confirms the market power hypothesis at least for customer and mortgage loans of euro area banks (Corvoisier and Gropp (2001)), whereas a Swiss study on mortgage loans yields inconclusive results (Egli and Rime (1999)).

As to the effects of bank *mergers*, Akhavein et al (1997) find only insignificant changes in loan income of banks involved in 57 US "megamergers". Kahn et al (2001) detect personal loan rate increases but automobile loan rate decreases from US mergers. For Europe, Sapienza (2002) shows in a very careful study of the Italian banking sector (combining information about lenders with information about borrowers for the first time) that only the largest mergers increased credit line rates, whereas smaller ones were associated with cheaper credit lines (indicating that efficiency gains could offset market power effects in those cases). A study for Spain yields inconclusive results in the mortgage market (Fuentes and Sastre (1998)). The papers that have some dynamic dimension indicate that adverse competition effects of bank mergers take time to materialise, often half a year or more after the operation.

2.1.2 Recent evidence on quantities lent to small businesses

Apart from pricing considerations, the bank merger wave raised concerns in the United States that banking consolidation would reduce the amount of credit available to small businesses. This argument was based on the observation that small banks mainly make small loans (since they do not have large enough balance sheets for more sizeable loans often required by larger businesses), assumed to go to small firms, and that large banks tend to lend to large businesses (as the monitoring costs of many small companies would be too high for them).[6] Another concern could be that larger banks would exploit their greater market power to reduce lending (and increase loan rates). This, it was feared by some, would lead to inefficient credit supply, hurting particularly the emergence of small startup firms. However, reductions in lending could of course also be the consequence of the elimination of previously inefficient loans, ie those funding negative net present value projects.

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[3] Strictly speaking the application of competition laws to the banking sector in the United States was only made explicit with the Philadelphia National Bank case in 1963 and with the subsequent amendment of the Bank Merger Act in 1966.

[4] In this paper we look at bank market concentration in general and at bank mergers specifically. As a caveat it should be kept in mind that concentration may also be caused by other developments, for example voluntary market exits or failures.

[5] Concentration is most often measured with the Herfindahl-Hirschman index, which is defined as the sum of the squared market shares of all active banks in a given market. Occasionally, it is also measured as the joint market share of the three or five largest lenders.

[6] See eg Berger et al (1995, Table A.10) for detailed data about the size distribution of loans by small, medium-sized and large banks.

This static view has been challenged from various perspectives. Some authors question the assumption that all *merged banks* lend less to small businesses. For example, Strahan and Weston (1996) find that when small US banks merged in the mid-1990s, their post-merger small business lending was actually higher than before. For mergers among larger banks changes were insignificant. In contrast, Peek and Rosengren (1996) document for a small cross section in the New England area during 1993-94 that when a large bank takes over a small one, the small business lending by the target is lower than before the merger (and only a small part of this effect is offset by new entrants in the local market).

In a later study with broader US data the same authors show a more complex relationship between bank mergers and small business lending (Peek and Rosengren (1998)). They find that the acquirers tend to partially recast the targets on their own image, causing the small business lending share of the merged institution to move towards the acquirers' previous share. Whereas the balance of post-merger portfolio adjustments seems to indicate a higher likelihood of somewhat reduced small business lending, they conclude that the initial concerns seem to have been overstated. Strahan and Weston (1998) point out that not combining different banks into the full holding company may result in biases because of intracompany transactions. For a data set that combines banks in such a way they find similar results to their earlier paper, in that for mergers involving small acquirers and targets small business lending actually increases, whereas the effects of consolidation tend to be insignificant when intermediate or large banks merge. Their interpretation of the results is that lending diversification is important for the smaller players, and organisational diseconomies less so.

In Europe the few available papers point to the traditional concern about reduced small business lending through consolidation. For Italy, Sapienza (2002) shows that merged banks are less likely to extend a credit line to a small business than before merging. And Karceski et al (2000), who use Norwegian data, argue that (mostly small) mergers increase bank relationship exit rates. Borrowers from merger targets also suffer from (weakly significant) negative abnormal stock market returns after the transaction.

Another group of authors argues that merged banks reduce small business lending, but that this effect is offset by incumbent rival banks expanding their loans or de novo entry in the same local market. For example, Berger et al (1998) detect in a large data set that US mergers significantly increase small business loans by competitor banks. Goldberg and White (1998) consider the fact that the late 1980s and early 1990s saw a large number of new bank charters, in parallel with the merger wave, and estimate that de novo banks have a significantly larger share of small business loans on their balance sheets than comparable incumbents. In another long and broad data set Berger et al (1999) combine these two facts and find that mergers in local markets significantly increase the likelihood of new entrants in that market and that the new players have a larger share of small loans in their portfolio than incumbent banks. (However, Seelig and Critchfield (1999) find exactly the opposite, for a shorter and narrower data set.)

In a new line of research, Berger et al (2001) argue that small business lending can be heavily influenced by *market size structure*. Surprisingly, their data show that in markets with a higher share of large banks small businesses have a higher likelihood of receiving a credit line, and even at lower interest rates, than in markets composed of smaller banks. (However, larger borrowers are still more likely to go to larger banks.) They explain (part of) the difference to the previous literature with the fact that they can directly observe the size of the borrower (in a way similar to Sapienza for Italy) and do not have to approximate it by the size of loans. Apart from the two papers mentioned above, we could not find any other research on the small business lending issue with European (or Japanese) data (see also Dermine (2000)).

2.1.3   Summary and conclusions

In sum, the available research literature seems to suggest that increasing bank market concentration and consolidation tend to drive loan rates up in many local markets. This finding is in line with the SCP paradigm, according to which concentration leads to market power. The fact that sometimes loan rate increases are not quantitatively large may either be explained by successful bank merger reviews, stopping or amending those that risk creating institutions with stronger market power, or by remaining efficiency gains from mergers (not controlled for in the estimations) that partly offset rate increases.

Regarding the effect of consolidation on quantities, available literature seems to indicate that early concerns about collapsing small business loan supply seem to have been overstated, since dynamic competitive forces lead at least in part to the replacement of lending lost.

However, it should also be noted that research outside the United States remains relatively limited and less clear-cut. For example, in Europe it is of utmost importance that euro area or even EU-wide bank and firm micro data on local loan (and deposit) markets be collected in a broad and systematic way, covering all countries. Such data would allow researchers to undertake homogeneous cross-country analyses of competitive conditions in EU banking markets, comparable to a long tradition in the United States. They would put various area-wide policy areas on a much safer information basis than has been the case so far. Overall, the evidence available to date makes a case in favour of the systematic application of competition reviews in the banking sector.

2.2 The effects of bank mergers on retail deposit markets

The issue of concentration in deposit markets has recently received considerable attention in Europe through a report by the Competition Commission (2002) in the United Kingdom. This voluminous report on "The supply of banking services by clearing banks to small and medium-sized enterprises" highlighted in particular the "significant market concentration … in the markets for liquidity management services, 90 per cent or more of such services being supplied by four clearing groups in each geographical market".[7] The report concluded that "the restriction and distortion in price competition ... has led to excessive prices and profits" and that the situation constituted "a complex monopoly situation". Although shying away from structural measures, such as the divestment of bank branches, it recommended some behavioural measures, including minimum interest rates to be paid by the banks in England and Wales.

Turning back to research results, studies of the effects of concentration and consolidation on bank retail deposit markets to a large extent mirror the broad results found for small business and consumer loan markets, although they seem to have started much later. A larger number of papers using different US data sets find a statistically significant negative relation between market *concentration* and various customer deposit rates (such as those for money market deposit accounts (MMDAs), short-term certificates of deposit (CDs) or negotiated order of withdrawal accounts (NOWs)). These papers include Berger and Hannan (1989a,b), Calem and Carlino (1991) and Neumark and Sharpe (1992). Berger and Hannan (1997) estimate that this relationship continues to hold when one controls for changes in cost efficiency.

There also seems to be some time variation in the statistical significance of the relationship, in that it sometimes becomes quite weak (see eg Berger and Hannan (1992), or Hannan (1997)). Radecki (1998) argues that more recently this may be related to the fact that the borders of US retail deposit markets have expanded from Metropolitan Statistical Areas (MSAs; normally used in previous studies as the relevant market) to States, due to deregulation and the (internal) reorganisation of bank holding companies. He detects stronger relationships between concentration and deposit rates at State level.[8]

For euro area countries, Corvoisier and Gropp (2001) confirm the inverse relation between concentration and deposit rates for time deposits, but not for demand deposits, where paradoxically it is reversed. As with Egli and Rime (1999) for Switzerland, they find only mixed results for euro area savings deposit markets.

Regarding the effects of *mergers* on deposit rates, the analyses by Akhavein et al (1997) and by Praeger and Hannan (1998) suggest that only the larger in-market mergers have statistically significant adverse effects on more local MMDA and NOW rates, but not on three-month CD rates.[9] However, Simons and Stavins (1998) for the United States and Focarelli and Panetta (2002) for Italy point out in two more dynamic analyses that the largest deposit rate reductions happen in the first years after the operation and that in later years the rates come up again. This is explained with the fact that the necessary restructurings of merged banks to achieve cost efficiency gains can often take

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[7] The three geographical markets identified were (1) England and Wales, (2) Scotland and (3) Northern Ireland. Liquidity management services include business current accounts, overdraft facilities and short-term bank deposit accounts.

[8] Berger et al (1999) discuss whether the negative relationship between market concentration and deposit rates weakened in the 1990s as compared to the 1980s. However, the papers reviewed do not allow for a clear conclusion in this regard.

[9] The results from Fuentes and Sastre (1998) for Spain are inconclusive.

years. Both papers find that competitor banks of merger parties in the same market consistently reduce deposit rates though, even in the long run.

The *conclusion* for retail deposit markets is then quite similar to the one for small business and consumer loans. The ES hypothesis only receives occasional support. Since there is evidence that consolidation can lead to increased market power, vigorous antitrust reviews in banking seem highly advisable to avoid consumers and small businesses paying too high loan rates, receiving too low deposit rates or receiving unsatisfactory service. However, could the limitation of profits through controls of market power have adverse effects on banking system stability? We address this question in the next section. As a final note, it appears that also for deposit market analyses there is an urgent need for carefully raised cross-country micro data sets in the euro area or even the European Union.

3. Stability effects of bank mergers

It has been argued in the literature that the erosion of market power is a source of banking instability (see eg Marcus (1984)). These arguments would suggest a more cautionary approach in competition policy, to avoid conflicts with supervisory policy. Carletti and Hartmann (forthcoming, Section 3) show that all G7 countries and all EU countries give a strong role to supervisory authorities in the review of bank mergers. In some countries the authority in charge of prudential supervision has a much stronger responsibility than the regular antitrust authority, or in one or two even has all the competence.

In this light, it is somewhat surprising that the number of research papers explicitly addressing the link between bank consolidation and stability is still relatively limited. A good deal of the debate was kicked off by the empirical work by Keeley (1990), who argued that the erosion of bank market power (as measured by a decline in banks' market-to-book asset ratio, Tobin's *q*) led to a higher risk premium that banks had to pay on certificates of deposit and in lower capital-to-asset ratios in the United States during the 1980s. The implied trade-off between the intensity of competition in the banking sector and its safety became known under the term "charter value hypothesis".[10]

3.1 Bank mergers and risk diversification

Other studies addressed reverse causation, namely whether bank mergers - which as shown in Section 2 often cause some increases in market power in loan and deposit markets - were associated with lower bank risk. Craig and Santos (1997) find the risk reduction effect confirmed (as measured by the *z*-score statistic of default probability and by stock return volatility) and relate it to benefits from diversification.[11] Benston et al (1995) argue on the basis of pre-merger earnings volatility and target-acquirer correlation that the motivation for mergers in the first half of the 1980s must have been risk reduction through diversification, rather than the exploitation of the put option on deposit insurance funds.

In a similar vein, Hughes et al (1999) simulate different consolidation strategies from structural bank holding company relationships estimated with 1994 data. They find that interstate expansion in the United States should lead to insolvency risk reductions, in particular when diversifying macroeconomic risks. The more recent paper by Amihud et al (forthcoming) addresses the issue for cross-border mergers covering many countries. Their result is that international mergers between 1985 and 1998 had no systematic effects on acquiring banks' total relative or systematic stock price risk. One interpretation of this result is that diversification benefits are offset by particular monitoring problems associated with foreign operations. However, as a cautionary note it should be recalled that cross-border and interstate mergers (almost by definition out-of-market mergers) have less potential to restrict competition than the in-market mergers discussed in the previous section.

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[10]   "Charter value" denotes the present value of future monopoly rents from holding a bank charter.

[11]   The *z*-score used in this paper is a statistic derived from historical profits, equity and asset stocks measuring the number of standard deviations below the mean that a bank's profits would have to fall before its equity became negative. See Goodhart et al (1998, p 90) for a brief summary of credit scoring techniques more generally.

3.2 Bank size and risk-taking

Yet another group of papers checks whether larger banks actually fail less often than smaller banks or whether they take on new risks after diversification. For example, Chong (1991) undertakes an event study and finds that US interstate consolidation increases bank stock return volatility. Boyd and Runkle (1993) point out that the reductions in stock price volatility in their data (related to potential diversification benefits) do not translate into significant reductions in the failure probability of large banks. They find only insignificantly lower z-scores.[12] On the basis of realised bank failure rates Boyd and Graham (1991, 1996) document that on average large banks in the United States failed more often than small banks during the 1970s and the first half of the 1980s but not during the late 1980s/early 1990s. They explain the fact that better diversification of larger banks does not reduce failure risk systematically with their greater tendency to leverage, potentially as a consequence of an implicit too-big-to-fail protection.

Demsetz and Strahan (1995, 1997) argue that in line with diversification larger banks have lower stock return volatility if their portfolios are held constant. But when, for example, loan portfolios are allowed to vary, risk is no longer reduced. In other words, large banks benefit from their better risk-return trade-off by expanding risky loans and reducing equity ratios. Similarly, Hughes et al (1996) and Hughes and Mester (1998) argue that increased risk-taking by growing banks may be a reflection of the efficient exploitation of scale economies. If size increases go hand in hand with better risk diversification, then the implied lower average and marginal costs of risk management will naturally lead them to take on more risk.

De Nicolo (2000) reasserts with similar estimations to Boyd and Runkle for more recent (1988-98) and broader data that z-score failure probabilities increase with size not only for US banks but also for European and Japanese banks. As additional explanations to the ones put forward above, he also finds that state ownership has a positive impact on failure risk of banks and discusses recent theoretical literature arguing that size-related diversification does not necessarily reduce bank insolvency risk (Hellwig, 1998).

Finally, a background paper to the Ferguson Report (Group of Ten (2001)) by de Nicolo and Kwast (2001) observes that the market share of large and complex banking organisations (LCBOs) in the United States increased during the 1990s and that the increases in market shares were highly correlated with similarly increasing LCBO stock return correlations. The authors argue that this may be an indication of heightened systemic risk in the banking sector. Note that similar to the bank size and risk literature this is inconsistent with the typical "charter value" prediction of an inverse relationship between market power/concentration and risk.

3.3 Summary and conclusions

In sum, on the basis of this literature one cannot ascertain a clear-cut relation between the effects of consolidation and bank or systemic risk. Some studies suggest that a more consolidated banking sector would be more stable (in particular if concentration creates market power that avoids incentives for excessive risk-taking and if size brings about diversification gains which are not offset by the adoption of new risks) and other studies suggest the opposite (in particular if consolidation worsens too-big-to-fail problems, complicates monitoring in agency problems, is related to organisational diseconomies and reduces the costs of risk management). More research is certainly necessary to understand under which conditions which sign of the relationship applies. The last section discusses one possible avenue for such work. In any case, the available empirical literature does not contain a strong argument in favour of generally constraining competition, encouraging in-market consolidation or discouraging out-of-market consolidation as means to foster the stability of the banking system. Hence, given the risks to market efficiency discussed in Section 2, the conclusion that thorough competition reviews of bank mergers are necessary remains valid.

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[12] Note, however, that Boyd and Runkle (1993) also find that greater size (among US bank holdings) is associated with unchanged or lower "charter value", as measured by Tobin's q. So we cannot assume that size in this study is related to market structure or market power in an unambiguous way.

4.   Further research avenues

A cornerstone of a stable banking system is a robust and liquid interbank money market. The money market is particularly important since it links large banks to each other, so that a problem in this market may have widespread consequences. Recent theoretical literature has modelled the scope for contagion (Rochet and Tirole (1996); Allen and Gale (2000); or Freixas et al (2000)) and adverse selection in interbank markets (Flannery (1996)). However, such efforts have not yet incorporated the implications of bank mergers for the functioning of the money market. Nor have they modelled the structure and competitive pressures of banking markets, which - as discussed in Section 3 - may influence the risk of bank activities. Hellman et al (2000), Matutes and Vives (2000) and Cordella and Yeyati (2002) analyse the link between competition for deposits and individual banks' incentives for risk-taking on the asset side, while Perotti and Suarez (2001) examine the effects of active merger policy and temporary entry restrictions for bank stability in a dynamic duopolistic model where banks compete in deposits. None of these papers, however, addresses how competition affects banks' liquidity management and the functioning of the interbank market.[13]

Work in this direction has been started by Carletti et al (2002). The model addresses the consequences of consolidation for loan rates, reserve holdings and interbank market liquidity fluctuations. Following traditional banking theory, the model features stochastic withdrawal shocks on deposits, which banks can finance either with reserves or by interbank market borrowing. Less traditionally, it features competition in a differentiated oligopolistic loan market. When liquidity shocks are uncorrelated across merging banks, a merger creates an internal money market, saving interbank borrowing costs for the two institutions. Surprisingly, for most parameter configurations this internalisation effect dominates the diversification of liquidity risk, so that merged banks increase reserve holdings. As a consequence of the internal money market, they also enjoy lower liquidity risk and expect lower liquidity needs than competitor banks. Hence, regarding individual bank liquidity risk the effect of consolidation goes in the same direction as the one derived by the risk diversification literature described at the start of Section 3, although for different reasons.

As to the loan market, merged banks gain market power but also enjoy cost advantages through lower refinancing costs and potentially also through efficiency gains. Loan rates increase when the market power effects are stronger. So the competition model can accommodate both the SCP hypothesis (when market power effects dominate) and the ES hypothesis (when cost saving effects dominate), as described in Section 2.

Finally, aggregate bank system liquidity improves through higher reserve holdings and deteriorates through an asymmetry in deposit bases induced by loan competition. Hence, with uncorrelated shocks the aggregate liquidity effects of a merger are ambiguous, whereas with correlated shocks they are unambiguously negative. The latter effect illustrates the possibility that significant bank consolidation can make liquidity fluctuations in the interbank money market more violent and therefore, ceteris paribus, impair financial stability.

This finding provides a theoretical foundation for the statement in the G10 Report on Consolidation in the Financial Sector that "... by internalising what had previously been interbank transactions, consolidation could reduce the liquidity of the market for central bank reserves, making it less efficient in reallocating balances across institutions and increasing market volatility" (Group of Ten (2001), p 20). Now, the confirmation that such an effect is possible is first of all of historical value. In the absence of a central bank the more violent liquidity fluctuations will occasionally lead to liquidity crises, since the amount of available reserves is limited in the short term, even for very high money market rates. However, in the Carletti et al model, as in modern central banking practice, any missing liquidity can be provided elastically by the central bank in order to prevent the money market rate from deviating from the policy interest rate or in an extreme situation to avoid a liquidity crisis.[14]

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[13]   For a more comprehensive survey of the small theoretical literature on bank market structure and risk, see Carletti and Hartmann (forthcoming, Section 4.1).

[14]   The central banks contributing to the G10 report did not see any evidence so far that financial sector consolidation had led to impairing money market liquidity. However, they agreed that the situation should be monitored carefully.

Although nowadays central banks have the relevant instruments available to keep the liquidity situation in the money market stable, the model conveys two lessons: (1) If there was no central bank or if the central bank could not perfectly anticipate the right amount of liquidity needed, then it cannot be excluded that liquidity crises may sometimes occur in the money market. The model shows how their frequency may vary as a function of bank consolidation. (2) In the presence of a central bank, the model informs about how liquidity management may have to change with significant bank consolidation.[15] For example, in the case of correlated deposit shocks across merging banks the average amount of liquidity to be provided by the central bank to stabilise the money market rate or to prevent a liquidity crisis in case of a shortage is larger after consolidation than before. However, the model also shows that there are plausible situations (under uncorrelated deposit shocks) in which consolidation leads to an improvement of the liquidity situation in the money market (contrary to the concern raised in the Ferguson Report, Group of Ten (2001)).

As already mentioned, aggregate liquidity fluctuations in the money market can sometimes impair overall financial stability. Therefore, the paper also has something to say about the controversial relationship between competition and stability in banking. Concretely, it describes different scenarios for this relationship. In one scenario mergers lead to more market power in the loan market (SCP effects dominate ES effects) and to more violent liquidity fluctuations in the money market. In this case, the negative relationship between competition and stability in banking - as claimed by the "charter value" literature - does not hold. Both competition and stability have worsened. Moreover, it is interesting to observe that the adverse aggregate liquidity effects of the merger are a function of the competitiveness of the loan market before the merger. The larger the number of banks and the more substitutable loans are, the less severe the adverse liquidity effects of the merger. In other words, in this relatively plausible scenario more competition is actually good for interbank market stability.

In other scenarios consolidation causes improvements in competition (ES effects dominate market power effects) and either also improvements in money market liquidity or a deterioration of money market liquidity. However, the empirical evidence provided in Section 2 indicates that in practice this may be a less frequent set of cases. Finally, the scenario in which market power increases and liquidity improves is also possible under certain parameter configurations in the model. The multiplicity of possible scenarios is not too surprising, given the heterogeneous results found in the empirical literature discussed in Section 3.

The results are also instructive regarding the relationship between antitrust and supervisory authorities in the review of bank mergers. In the cases where competition worsens and interbank stability improves or where competition improves and interbank stability worsens a policy conflict can emerge between the two types of authorities. Solving the trade-off would require some coordination, either directly between the two authorities or through a third, potentially higher authority. The latter is, for example, the case in Canada, where the Minister of Finance decides on bank mergers on the basis of two reports, one from the competition authority and the other from the supervisor. In the United States, this task is fulfilled by the courts. There are also countries in which supervisors have the competence to decide on their own. (See Carletti and Hartmann, forthcoming, for descriptions of these arrangements in G7 countries and the European Union.)

Finally, from the perspective of monetary policy implementation careful monitoring of consolidation tendencies is justified as well. Changes in aggregate liquidity risk, as described by the model, may affect the aggregate liquidity management by the central bank. How important such effects can become is an empirical question, which will inter alia depend on the importance of bank consolidation, as compared to the size of the money market.

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[15] In all bank theories in which there is only liquidity risk, ie shocks do not adversely affect asset values, the introduction of a central bank that can provide unlimited amounts of liquidity removes the occurrence of liquidity crises. This feature is not specific to the present model.

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