

# **European Banking Distress and EMU: Institutional and Macroeconomic Risks\***

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## **Abstract**

Financial stability in Europe has received renewed attention with the advent of a common currency, wave of mergers and acquisitions among financial institutions, and greater market competition (e.g. ECB, 1999; IMF, 1999; OECD, 1999). This paper examines whether EU country banking systems are particularly vulnerable to systemic risk at present. Our approach is to examine episodes of banking sector distress for a large sample of countries, highlighting the experience of the EU. We estimate multivariate probit models linking the likelihood of banking problems to a set of macroeconomic variables and institutional characteristics. Institutional characteristics, made available by a new data set on corporate governance in the financial sector not previously used in this type of analysis, include aspects of bank supervision and regulation, restrictions on bank portfolios, and development of the banking system. Given these characteristics, the model predicts a low probability of banking sector distress in EMU countries.

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## 1. Introduction

Episodes of banking distress have become commonplace during the past two decades, but the range of experience in terms of the nature of banking sector distress, causes and effects, vary widely across countries and time periods. A review of the experiences of 18 Western European countries (EU member states, Iceland, Norway and Switzerland), reveals that 12 had some form of banking sector distress (14 episodes in total) during the past 25 years. Of these cases, most did not pose systemic risks to the entire financial system. Only the banking problems that surfaced in Finland (1991-94), Norway (1987-93), Spain (1977-85) and Sweden (1990-93) were of an order of magnitude, depth and breath threatening the entire banking system (“crisis” episodes)<sup>1</sup>.

Financial stability in Europe has received renewed attention with the advent of a common currency, wave of mergers and acquisitions among financial institutions, and greater market competition (e.g. ECB, 1999; IMF, 1999; OECD, 1999). Some analysts view the new environment facing European banks as particularly risky at present. The International Monetary Fund argues that ensuring financial stability within EMU will be particularly challenging in the early years, when systemic risks might be on the rise (IMF, 1999; p.105). Another recent report concludes that “Banks, European banks in particular, appear to be vulnerable to economic accidents such as Asia and Russia and, in some respects, more fragile than ever before...” (Danthine, Giavazzi, Vives and von Thadden, 1999, p. 100). Even the European Central Bank sees increased risks in some areas of finance as a direct consequence of EMU (ECB, 1999).

Despite these concerns, very little empirical evidence has been brought to bear on whether European banking systems are particularly vulnerable to systemic risk at this juncture. To address this issue, we build upon a recent literature linking episodes of banking sector distress to economic developments using cross-country panel data sets (e.g. Demirgüç-Kunt and Detragiache, 1998a,b; Glick and Hutchison, 1999; Hutchison and McDill, 1999; Kaminsky and Reinhart, 1999). Following this

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<sup>1</sup> The "significant" versus "crisis" characterization is from Lindgren, et al. (1996). The cases of European banking distress are shown in Appendix Table 1.

approach, we evaluate the extent to which previous episodes of banking sector distress in Europe appear to fit established international patterns and whether anticipated changes in the European economy associated with EMU will influence the likelihood of banking sector distress. We consider a sample of 90 countries (18 Western European) over the 1975-97 period, of which 74 had banking problems of a “significant” or “crisis” nature at some point and several had multiple episodes (90 episodes in total). We estimate probability models (probit equations) with both a panel and cross-section that are designed to test the likelihood of an episode of banking sector distress occurring given macroeconomic developments and institutional characteristics.

We make two innovations to the general literature on the empirical determinants of banking sector distress, both of which are directly relevant to the European experience. Firstly, we consider how institutional variables on the regulatory and financial environment facing banks in various countries, and the EMU area in particular, affect the probability that banking sector distress may arise. This type of analysis is now possible because of new internationally comparable information on institutions following the arduous data collection in the area of corporate governance, financial regulation and banking by La Porta et al. (1998), Barth et al. (1998), Levine (1998) and Mauro (1995). Although these studies address different issues, the institutional data they employ is directly relevant to the issues that we investigate. This is important because institutions are often an important distinguishing feature of industrial countries such as those in the EMU zone and the rest of the world. Previous work has highlighted that industrial countries are "different", and have generally lower probabilities of banking sector problems arising (e.g. Hutchison and McDill, 1999), but have failed to isolate the reason for this empirical observation. We conjecture that differences in institutions (governmental and legal structures) are likely to be important.

Secondly, previous work has largely been focused on episodes of banking distress where this signifies any significant banking problem. By contrast, we distinguish between banking "distress" and "crisis", where the latter indicates a banking problem posing a systemic risk to the entire financial sector. This proves an important distinction, as the factors contributing to major disruptions (crises) are easier to

identify and demonstrate common features that are not evident otherwise. This is especially important in Europe since only four cases of major disruptions (in Finland, Norway, Sweden and Spain) have occurred since 1975, as opposed to numerous smaller cases of banking distress.

In section 2 we discuss the determinants of banking crises, focusing in particular on the new institutional and legal characteristics that we investigate. In section 3 we describe the data and methodology. In section 4 we analyze the key macroeconomic and institutional characteristics, focusing on those aspects that distinguish the European countries from others experiencing episodes of banking sector distress. Section 5 presents estimates of the probit model, and considers the predictions of the model for European countries. Section 6 concludes the paper and raises the questions of whether Europe is particularly at risk for future systemic banking problems.

## **2. Determinants of Banking Sector Distress**

The theoretical literature on the determinants of banking sector distress may be categorized by three groups of models: "bank run" models (e.g. Diamond and Dybvig, 1983), "adverse shock/credit channel" models (e.g. Bernanke, et al., 1992; Gertler, 1992), and "moral hazard" models. These models emphasize different determinants of banking sector problems. The bank run model focuses on "non-fundamental" factors, multiple equilibrium, and the possibility that shifts in expectations can set off a bank run and liquidity crisis in the banking system. The adverse shock/credit channel model focuses on adverse economic shocks, informational asymmetries between borrowers and lenders, and how recessions and collapsing asset prices may bring on credit crunches and episodes of banking distress. The moral hazard explanation focuses on how government guarantees and weak regulatory and supervisory policies may lead to excessive risk taking (involving both domestic and foreign asset and liability positions) and a higher probability of banking distress sector distress.

The empirical literature has identified several variables associated with banking crises that are consistent with one or more theoretical models. The macroeconomic variables identified-- mainly associated

adverse shock/credit channel model-- are real GDP growth (e.g. Demirgüç-Kunt and Detragiache, 1998a, Hutchison and McDill, 1999), inflation (e.g. Hutchison and McDill, 1999), and various measures of turbulence in foreign exchange markets (e.g. Eichengreen and Rose, 1998; Kaminsky and Reinhart, 1999; and Glick and Hutchison, 1999). The main institutional variable identified, mainly associated with the moral hazard explanation since it allows more portfolio flexibility and risk-taking on the part of banks, is financial liberalization (e.g. Demirgüç-Kunt and Detragiache, 1998a and Glick and Hutchison, 1999).

These four variables (real GDP, inflation, exchange rate turbulence and financial liberalization) are the explanatory variables of our base ("canonical") model of banking sector distress<sup>2</sup>. Our objective is to extend the canonical model, in addition to the European dimension, to focus on the institutional features capturing financial structure, development and regulation.

#### *Legal and Regulatory Environment, Moral Hazard and Banking Sector Stability*

A number of recent studies, drawing on new cross-country data sets, have attempted to measure the impact of differing legal and institutional structures on the economy. La Porta et al. (1998) investigate the extent to which legal rules, and their enforcement, cover protection of corporate shareholders and creditors, and how rules affect the pattern of corporate ownership. Levine (1998) investigates whether cross-country differences in the legal rights of creditors and contract enforcement explain differences in the level of banking sector development and economic growth. Demirgüç-Kunt and Levine (1999) present stylized facts concerning the relationship between financial structure and economic development and the links between financial structure and legal, regulatory and policy determinants for a broad cross-section of countries.

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<sup>2</sup> Several other macroeconomic variables were considered, but not reported since they did not contribute significantly to the explanatory power of the model. These variables are real credit growth, nominal (and real) interest rate changes, the budget position of the general government, and explicit deposit insurance. The explicit deposit insurance dummy variable is from the recent survey by Kyei (1995). Indices of stock prices, real estate prices and aggregate asset prices were also considered. However, the asset price data is only available for a small sample of countries and was therefore not included in the base regressions. The evolution of these variables in relation to the onset of banking crises is shown in the summary statistics, but not reported in the probit regressions.

Barth et al.(1998) focus on the regulation and supervision of the banking sector and ask whether regulatory restrictions on banks are a substitute for the strength of the government capacity and bureaucratic system. They also consider the link between regulatory restrictions and developments in the banking system.

These studies have not considered how the institutional characteristics of countries influence the likelihood of financial instability and banking sector distress,<sup>3</sup> nor have they focused on Europe. These types of institutional characteristics, however, are in principle important determinants of banking distress in line with the moral hazard/lax supervision theory. The way banks are regulated and supervised, accounting standards, and other characteristics of the financial system bare directly on the extent to which government guarantees and moral hazard translates into higher risk taking on the part of banks.

To address this issue, we consider several institutional characteristics of particular importance to the financial sector and highlighting the relevance to Europe: three addressing the regulatory environment (and information disclosure) and three addressing the financial environment. The regulatory environment is measured by three factors: a composite index of the quality of the governmental/bureaucratic system ("government"); the extent that contract law is enforced ("enforcement"); and the extent that public corporations disclosure financial information about their balance sheets and operations ("accounting"). We expect that a stronger governmental/bureaucratic system, more rigorous enforcement of contract law, and greater financial disclosure would all lead to greater financial stability and lower risk of a serious banking problem arising.

The financial environment is measured by two factors in addition to financial liberalization (included in the canonical model): restrictions on the activities of banks ("restrictions"), and the size and development of the banking sector ("banking"). A priori, one might expect that liberalization of interest rates, fewer restrictions on bank portfolios, and a less developed banking system would to associated with a higher probability of banking instability.

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<sup>3</sup> The only exception is Barth et al. (1998). They focus on the link between legal restrictions on banking activity and the likelihood of a banking crisis.

### 3. Data and Methodology

#### *Defining Banking Distress*

Banking problems are usually difficult to identify empirically because of data limitations. Most studies have employed a combination of events to identify and date the occurrence of significant banking sector problems. Institutional events usually include forced closure, merger, or government intervention in the operations of financial institutions, runs on banks, or the extension of large-scale government assistance. Other indicators frequently include measures of non-performing assets, problem loans, and so on. We have identified and dated episodes of banking sector distress following the criteria of Caprio and Klingebiel (1996, and updated from a personal correspondence in 1999) and Demirgüç-Kunt and Detragiache (1998a). If an episode of banking distress is identified in either study, it is included in our sample. Given the differences in magnitude of banking crises, we define two alternative variables: banking distress and banking crisis. "Banking distress" denotes an episode of banking distress that includes large-scale disruptions in the banking sector as well as problems of a smaller magnitude. The "banking crisis" variable, by contrast, includes only large-scale disruptions in the banking sector. The distinction between small to medium and large-scale disruptions in the banking sector is derived from Caprio and Klingebiel (1996 and updated by a personal correspondence) and Lindgren et al. (1996).

#### *Other Variables*

The data appendix (Appendix Table 2) describes all of the institutional variables and sources of data in detail. The variable "restrict", adapted from Barth et al. (1998), measures the extent that a country's regulatory system allows banks to engage in the following nontraditional activities: securities (underwriting, brokering, dealing and related activities), insurance (underwriting and selling), real estate (real estate investment, development and management), and non-financial firm ownership. The variable "government" is a composite index of the quality of the government/bureaucratic system. In principle, a strong system of

legal enforcement could substitute for weak rules since active and well-functioning courts can step in and rescue investors abused by the management. To address these issues, LaPorta et al. (1998) examine proxies for the quality of enforcement of these rights, namely estimates of "law and order" in different countries compiled by private credit risk agencies for the use of foreign investors interested in doing business in the respective countries. We look at a weighted average of two such indices to form the "enforcement" variable. The "accounting" variable is a quantitative measure of the value of information disclosure revealed by company annual reports. Accounting plays a potentially crucial role in corporate governance. For investors to know anything about the companies in which they invest, basic accounting standards are needed to render company disclosures interpretable.

The institutional variable in the canonical model is "liberalization" of deposit interest rates. This variable is from Demirgüç-Kunt and Detragiache (1998b), supplemented by national and international sources. It is constructed on the basis of the beginning of observed policy changes to liberalize interest rates, taking on a value of unity during the liberalized period of market-determined rates and zero otherwise. "Exchange rate pressure", following Glick and Hutchison (1999), is constructed from "large" changes in an index defined as a weighted average of monthly real exchange rate changes and monthly (percent) reserve losses.<sup>4</sup> The weights are inversely related to the variance of changes of each component over the sample for each country. Large changes in exchange rate pressure are defined as changes in our pressure index that exceed the mean plus 2 times the country-specific standard deviation.<sup>5</sup> The source of the macro data is the International Monetary Fund's International Financial Statistics (CD-ROM).

### *Data Samples and Windows*

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<sup>4</sup> Our currency pressure measure of crises does not include episodes of defense involving sharp rises in interest rates. Data for market-determined interest rates is not available for many of the countries or for a large part of the sample period.

<sup>5</sup> Kaminsky and Reinhart (1999) use a three standard deviation cut-off. While the choice of cut-off point is somewhat arbitrary, Frankel and Rose (1996) suggest that the results are not very sensitive to the precise cut-off chosen in selecting crisis episodes.



Our data sample is determined by the availability of data on banking sector health, as well as on the determinants of bank crises, discussed above. However, we do not confine our analysis to countries experiencing banking crises. We also include developed and developing countries that did not experience either a severe banking problem during the 1975-97 sample period. Using such a broad control group allows us to make general statements about the conditions that have distinguished countries encountering crises from those that have not.

The minimum data requirements to be included in our study are that GDP are available for a minimum of 10 consecutive years over the period 1975-97. This requirement results in a sample of 90 countries. For each country-year in our sample, we construct binary measures of banking sector distress, as defined above (1 = banking distress, 0 = no distress, i.e. tranquil). Of the 90 countries in our sample, 74 countries had banking problems at some point during the sample period. Several countries had multiple occurrences of banking sector distress.

In most of our analysis we are concerned with predicting the onset of banking crises and their relative timing. To reduce the chances of capturing the continuation of the same banking episode, we impose windows on our data. In the case of multi-year banking crises, we use only the first year in a spell of banking distress, i.e. the year of the banking sector distress “onset.” The duration of banking sector distress was greater than one year in most episodes.

We use annual observations in our study. Attempting to date banking sector distress by month (as in Kaminsky and Reinhart, 1999) or by quarter seems arbitrary. We employ monthly data for our (real) exchange rate pressure index to identify currency crises and date each by the year in which it occurs. Of course, annual data may obscure or limit some insights about the relative timing of the onset of banking crises, since it does not enable us to distinguish the lead and lag timing of crises to the extent that crises occur at different points of the same year. However, we do not believe that it is possible to date banking

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crises with such precision as monthly data presumes. Moreover, using annual data enables inclusion of a relatively large number of countries in the analysis.

#### 4. Statistical Contours

Table 1 presents a summary of the institutional characteristics associated with Europe's financial and legal systems compared with the broader sample. From the table we observe that the EU countries, on average, are significantly different from the remainder of the sample for every institutional variable excepting the measure of accounting standards. And all of these indicators point to better-managed and more liberalized financial sectors. In particular, all of the EU countries had liberalized deposit interest rates by the early 1990s compared with 70% of the non-EU group. The EU group also had significantly fewer restrictions on the portfolio activities of banks (a rank of 4 is most restrictive). The least restrictive banking controls in the EU (values less than 1.5) are Austria and the United Kingdom. The EU banking systems also had more developed systems of financial intermediation, judging by the percent of loans in the financial system relative to GDP.

In terms of the regulatory environment, the EU area on average also has more competent governments/bureaucracies, better enforcement of laws, and higher accounting standards than the rest-of-the-world. Two European countries, the Netherlands and Switzerland, have a value of 10 (the maximum score possible) for the government variable. The average value of accounting is higher in the EU, but not significantly different from the non-EU sample average. This variable measures the number of disclosures (based on a set of 90 criteria) made on corporate income statements, and ranges in the sample from 24 (Egypt) to 83 (Sweden). The highest in Europe were Sweden (83) and the United Kingdom (78), and the lowest were for Portugal (36) and Greece (55).

A graphical examination of the macroeconomic characteristics around episodes of banking sector distress is shown in Figure 1. The light solid line shows the mean value of each variable for the group of

countries that did not experience banking sector distress. The dark solid line (dashed line) shows the average values for all European episodes (all episodes other than Europe) of banking sector distress. This "event" study alignment of dates set the data (at time zero) from the first year of the onset of an episode of banking sector distress.

In economies experiencing banking sector distress, real output growth slowed gradually prior to the onset of banking problems, dropped sharply at the onset of banking problems and gradually recovered. Two macroeconomic variables also indicate a shift over episodes of banking distress: real credit growth and stock price changes. Movements in credit growth and stock prices mirror real GDP growth: gradual decline in growth rates prior to the onset of problems, sharp drops during the first year as problems emerge, and moderate rebounds during the latter phase of the episode.

Where does Europe fit into the general pattern? Similar to most countries, declining real GDP growth, declining credit growth, and weakness in equity markets characterized the Europe group after the onset of banking distress. Both groups also experienced strong economic recoveries in terms of output growth and stock price developments following episodes of banking distress. The fluctuation in these variables around the onset of banking problems, however, was less in the European group than elsewhere. Real GDP and real credit growth, in particular, demonstrate less pronounced changes. Inflation tended to fall in Europe with the onset of banking problems, while increasing elsewhere.

#### **4. Probit Estimation Results**

This section presents a multivariate probit analysis to estimate how a particular variable changes the probability of the occurrence of banking sector distress holding constant the other explanatory factors. We investigate whether economic and institutional characteristics of countries are associated with the onset of banking distress (crises), and apply the model to evaluate the risk of banking problems arising in EMU countries. We employ panel and cross-section data sets that encompass both distress episodes as well as

periods of tranquility (for the countries eventually experiencing banking distress and a control group of countries not experiencing large banking problems). This allows us to avoid sample selection bias that may be evident in studies such as Kaminsky and Reinhart (1999) that only include a select group of countries experiencing banking problems.

Table 2 reports the probit panel regression results using the panel data set where the dependent variable is banking sector distress. An episode of distress is any significant banking sector problem, thus including large-- potentially systemic--problems, as well as episodes more concentrated to a particular segment of the banking system. The canonical model forms the baseline regression, shown in column 1, and this set of variables is also included in each subsequent equation estimated (columns 2-7). The number of observations varies between 604 to 919, with the inclusion of the various institutional variables limiting the data set.

All of the coefficients in the baseline/canonical regression (inflation, real GDP growth, exchange rate pressure and financial liberalization), excepting inflation, are statistically significant with the expected signs. A fall in GDP growth, sharp bouts of exchange rate pressure, and financial liberalization are associated with an increased likelihood of (the onset of) banking sector distress. These results are robust and hold in every specification of the model.

In addition to financial liberalization, all but one of the institutional variables are statistically significant (in either one or both formulations of the model). Well-developed banking sectors, competent governments/bureaucracies, and conscientious enforcement of legal rights are associated with greater stability in the banking sector. Greater disclosure on firms' public statements ("accounting"), however, is positively associated with the likelihood of an episode of banking sector distress. Moreover, there is also some indication (although not statistically significant at conventional levels) that restrictions on banks' lending and portfolio activities ("restriction") are positively associated with banking sector distress. (These results are discussed further below.)

In terms of overall predictive power, 44-60% of the actual episodes of banking distress were predicted by the model to have had banking sectors that were at risk at the time, i.e. the conditional probability of banking distress was 10% or higher—twice the unconditional probability rate of 5%.

As discussed in section 2, the determinants of large scale banking problems (crises) may be easier to identify than the determinants of banking distress since the latter captures not only system-wide problems but also sector-specific events that may have idiosyncratic causes. In Table 3, we report the probit estimates for the model attempting to explain bank crises. Again the variables entering the canonical model are significant with the expected signs. Moreover, the significance levels are considerably higher and inflation is statistically significant (higher inflation is associated with a higher probability of a banking problem) in banking crisis equation estimates. The overall performance statistics-- number of observations correctly predicted and pseudo R-squares are similar to the previous set of regressions.

The results for the institutional variables in the banking crisis regressions are very similar to those reported in the banking distress regressions. Competent governments, efficient bureaucracies and well-developed banking sectors are associated with lower probabilities of banking sector crisis, while countries with more restrictions on banks' portfolios and those that have seemingly high accounting standards have had a relatively higher frequencies of problems arising. Banking sector development and accounting standards drop off in statistical significance, however.

Surprisingly, the variable measuring the extent of restrictions on bank's activities (restrictions on securities, insurance and other business operations) and the accounting standards proxy are both significantly positive, indicating that more restrictions and more information disclosure are associated with a higher probability of the onset of a banking sector crisis. This may be explained by two factors. La Porta et al. (1998) find that laws are only weakly protective of shareholders and that good accounting standards are associated with low concentration of firm ownership and poor investor protection. In this way, good accounting standards may be a response to other problems likely to increase the risk of banking sector distress. Similarly, Barth, et al. (1998) find that tight restrictions on the banking sector are typically found

in countries with weak governmental structures and bureaucracies. They also suggest that tight legal restrictions on banking activities may be a response to weak bureaucracies, and are therefore positively associated with banking sector problems.

#### *Cross Section Regressions on Institutional Variables*

The institutional variables show vary little variation across time and therefore are primarily identifying cross-country differences in the likelihood of banking distress and crisis. Recognizing this data limitation, Table 4 reports probit regressions using cross-section (across countries) data where the dependent variable is banking distress (crisis). In these regressions the dependent variable takes on a value of unity if the country in question experienced an episode of banking distress (crisis) at any time during the sample period. The right-hand-side variables are the institutional variables either individually (in the upper first and second panels) or jointly (in third panel).

The first (second) panel of Table 4 reports the results from the bivariate regressions with banking distress (crisis) as the dependent variable regressed on each of the new institutional variables investigated in this study. (Constant terms are included in all of the regressions but are not reported for brevity). There is only weak evidence that the institutional factors play a role in the banking distress regressions, but strong evidence that they are important in distinguishing countries that have experienced bouts of large-scale banking problems (crisis) from those that have not.

In particular, the second panel shows that competent government/efficient bureaucracy, enforcement of legal rules, high accounting standards and a well-developed financial system are inversely associated with the likelihood of a banking crisis erupting. And countries where banks are heavily restricted in the types of activities that they may undertake are more likely to have had an episode of banking crisis. These results are consistent with the panel probit regressions, with the exception that accounting is now significantly negative. The cross-country probit regressions suggest, in line with

theoretical priors, that higher accounting standards, and presumably more public disclosure of firm operations, are inversely related to the probability of banking sector problems.

The unconditional probability of having at least one episode of banking sector distress (crisis) for this sample is 78% (52%). This unconditional probability is obviously much higher than in the panel regressions since a country is coded as having had a banking crisis if it occurred at any time during the 1975-97 sample period. To measure a "successful" prediction, we used the unconditional sample means as our base of comparison. Judging by this criterion, the range of successful predictions based on each bivariate probit regression ranges from 85-100% for banking distress and 55-76% for banking sector crisis. Clearly, institutional variables are helpful predictors of banking sector problems.

We also ran log likelihood ratio test of the joint significance of the institutional variables. This test is in the context of a multivariate probit regression with banking distress (crisis) as the dependent variable and set of institutional characteristics as the independent variables. (Enforcement is again not included since it is so highly correlated with government competence). The log-likelihood ratio test (with the base regression including only a constant) indicates that the variables are jointly significant (at the 99% level of confidence), helping to explain the cross-country differences in the pattern of both banking distress (0.005 significance level) and banking crises (.0108 significance level).<sup>6</sup>

### *Predictions for Europe*

The model estimates reported in Tables 2-4 cover all the episodes of banking sector distress in the sample and may or may not do well in predicting the likelihood of a problem arising in any given country at a particular point in time. That is, the model could have relatively high predictive accuracy in general but still not predict the occurrence of any particular banking problem. Our question is whether the general statistical characteristics of banking sector distress identified by the model help to explain the timing and likelihood of episodes of banking distress that have occurred in Europe.

To this end, we report at the bottom of each table the percentage of successful predictions for the model for the set of European countries. For the European countries, the percentage of successful predictions in the panel regressions ranged from 15-39% for episodes of banking sector distress (Table 2) and 25% (except in one instance) for episodes of banking (Table 3). In the set of cross-section regressions, the successful predictions of banking distress were 64-100% range for banking distress 0-25% range for banking crisis. Lower success in predicting banking sector crisis in Europe (only four occurrences) suggests that these "big" events were not so much related to legal/institutional characteristics as to macroeconomic and, perhaps, idiosyncratic factors.

Following up on this point, we also show in Figure 2 the predicted probabilities for the 1975-97 period for the three Scandinavian countries that experienced the most severe banking crises. The line for each country uses the coefficient estimates from column 7 of Table 2 to predict the probability of banking sector distress in each European country for each year. The country names (abbreviated) refer to the year when each particular country in the sample had a banking problem.

These results indicate that the model does reasonably well in predicting the banking problems in these countries. The predicted value for Finland, for example, peaked in 1991 (at about 18 percent likelihood of the onset of banking distress)-- the year that problems actually became acute. The model also predicts that problems were likely Sweden in the early 1990s, when acute banking distress did emerge. However, banking stability is predicted in Norway despite the occurrence of a banking crisis in the late 1980s.

## 5. Implications for European Banking Stability

How can our empirical work help us assess the risk of instability in European banking? We evaluate this question from two perspectives: institutional and macroeconomic. The institutional

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<sup>6</sup> Due to the high correlation between institutional characteristics of each country, however, most of the individual coefficient values are not statistically significant (as with the panel regressions).



characteristics of financial markets and the regulatory environment in EU area indicate very low risk of serious banking distress. Relatively few restrictions on banks, well-developed banking sectors, competent government bureaucracies and vigorous enforcement of shareholder rights and the strength of legal systems all predict banking stability. Accounting standards and information disclosure are also higher in the EU area than most other parts of the world, and should lead to greater banking stability. (The prediction equations give mixed results on this point. However, the argument that high accounting standards are a measure to shore-up systems with weak protections for investors does not seemingly hold in EU countries.) Finally, all the European countries had substantially liberalized their domestic financial systems by the early 1990s (measured here as a relaxation of interest rate controls) and have presumably already adjusted to this frequently destabilizing effect on the banking system. Hence, from an institutional perspective, our results suggest that Europe is unlikely to experience a major banking crisis

The evaluation of macroeconomic risks depends on how business cycles, inflation and exchange rate instability in Europe are likely to be affected by EMU. The conventional wisdom holds that national business cycles are likely to be larger within the EU area because of the loss of the country-specific monetary stabilization instrument.<sup>7</sup> However, if European business cycles in the past are attributable to unstable monetary policies, both lower inflation and more stable economies could be the consequence of EMU (e.g. Thygesen, 1999). Moreover, it seems clear that exchange rate stability is likely to be enhanced in Europe since the underlying tensions and conflicts associated with the ERM are removed. Balancing these factors in light of our regression results would indicate that EU countries on average are likely to experience less macroeconomic instability than the previous (low) level and much lower than most part of the world. Both the macroeconomic and institutional variables therefore point to relatively low risk for banking sector distress and/or banking crisis in EMU.

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<sup>7</sup> See Eichengreen (1992) and Bergman (1996) for a review of the optimal currency area literature as it applies to Europe.

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**Table 1**

## Institutional Summary Statistics

Variable	Non-EU		EU		Probability of Different Means
	Mean	Standard Deviation	Mean	Standard Deviation	
<b>Financial Environment</b>					
Liberalization	0.69	0.47	1.00	0.00	99%
Restriction	2.39	0.65	1.82	0.39	99%
Banking	0.71	0.58	1.06	0.38	97%
<b>Regulatory Environment</b>					
Government	6.14	2.27	8.27	1.31	99%
Enforcement	6.67	2.20	9.06	0.96	99%
Accounting	59.31	14.50	63.62	12.02	67%

**Table 2**  
Determinants of Banking Sector Distress

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	-2.13** (0.18)	-2.36** (0.35)	-1.97** (0.32)	-1.25** (0.31)	-1.47** (0.41)	-2.09** (0.47)	-2.84** (0.86)
Macroeconomic Variables:							
Inflation	0.20 (0.13)	0.22 (0.16)	0.17 (0.17)	0.15 (0.16)	0.15 (0.17)	0.29* (0.17)	0.23 (0.18)
GDP growth	-5.36** (1.74)	-6.44** (2.26)	-6.52** (2.43)	-7.78** (2.14)	-6.99** (2.42)	-6.65** (2.36)	-7.96** (2.49)
Exchange Pressure	0.41** (0.17)	0.55** (0.19)	0.59** (0.20)	0.54** (0.19)	0.58** (0.21)	0.58** (0.20)	0.52** (0.22)
Financial Environment:							
Liberalization	0.84** (0.18)	0.68** (0.23)	0.96** (0.29)	0.73** (0.22)	1.01** (0.29)	0.71** (0.25)	1.06** (0.31)
Restriction		0.16 (0.12)					0.16 (0.18)
Banking			-0.37* (0.20)				-0.04 (0.27)
Regulatory Environment:							
Government				-0.11** (0.04)			-0.16** (0.06)
Enforcement					-0.11** (0.04)		
Accounting						0.00 (0.01)	0.02** (0.01)
Number of Obs	919	694	627	728	627	636	604
Pseudo R2	0.113	0.113	0.145	0.144	0.155	0.124	0.172
Percentage Predicted:							
Overall	45.8%	43.8%	52.4%	56.9%	54.8%	46.5%	60.0%
Europe	30.8%	15.4%	23.1%	23.1%	15.4%	30.8%	38.5%

**Table 3**  
Determinants of Banking Sector Crisis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	-2.27** (0.19)	-2.88** (0.44)	-2.07** (0.34)	-1.33** (0.35)	-1.29** (0.43)	-2.30** (0.54)	-4.36** (1.21)
Macroeconomic Variables:							
Inflation	0.36** (0.13)	0.41** (0.17)	0.38** (0.18)	0.37** (0.16)	0.33* (0.17)	0.50** (0.17)	0.49** (0.19)
GDP growth	-3.59* (1.92)	-4.93** (2.46)	-4.91* (2.66)	-5.37** (2.27)	-5.61** (2.64)	-4.86* (2.59)	-6.97** (2.74)
Exchange Pressure	0.38** (0.19)	0.59** (0.21)	0.63** (0.22)	0.56** (0.21)	0.63** (0.23)	0.61** (0.22)	0.51** (0.25)
Financial Environment:							
Liberalization	0.60** (0.20)	0.50** (0.25)	0.57* (0.30)	0.52** (0.24)	0.67** (0.31)	0.53* (0.29)	0.78** (0.33)
Restriction		0.27* (0.14)					0.54** (0.23)
Banking			-0.38 0.25				0.26 0.34
Regulatory Environment:							
Government				-0.14** (0.05)			-0.28** (0.09)
Enforcement					-0.15** (0.05)		
Accounting						0.00 0.01	0.04** (0.02)
<hr/>							
Number of Obs	970	743	668	778	668	685	645
Pseudo R2	0.099	0.141	0.163	0.160	0.194	0.149	0.230
Percentage Predicted:							
Overall	23.1%	33.3%	32.0%	34.4%	48.0%	34.6%	45.8%
Europe	25.0%	25.0%	25.0%	25.0%	25.0%	50.0%	25.0%

**Table 4**

## Bivariate Results

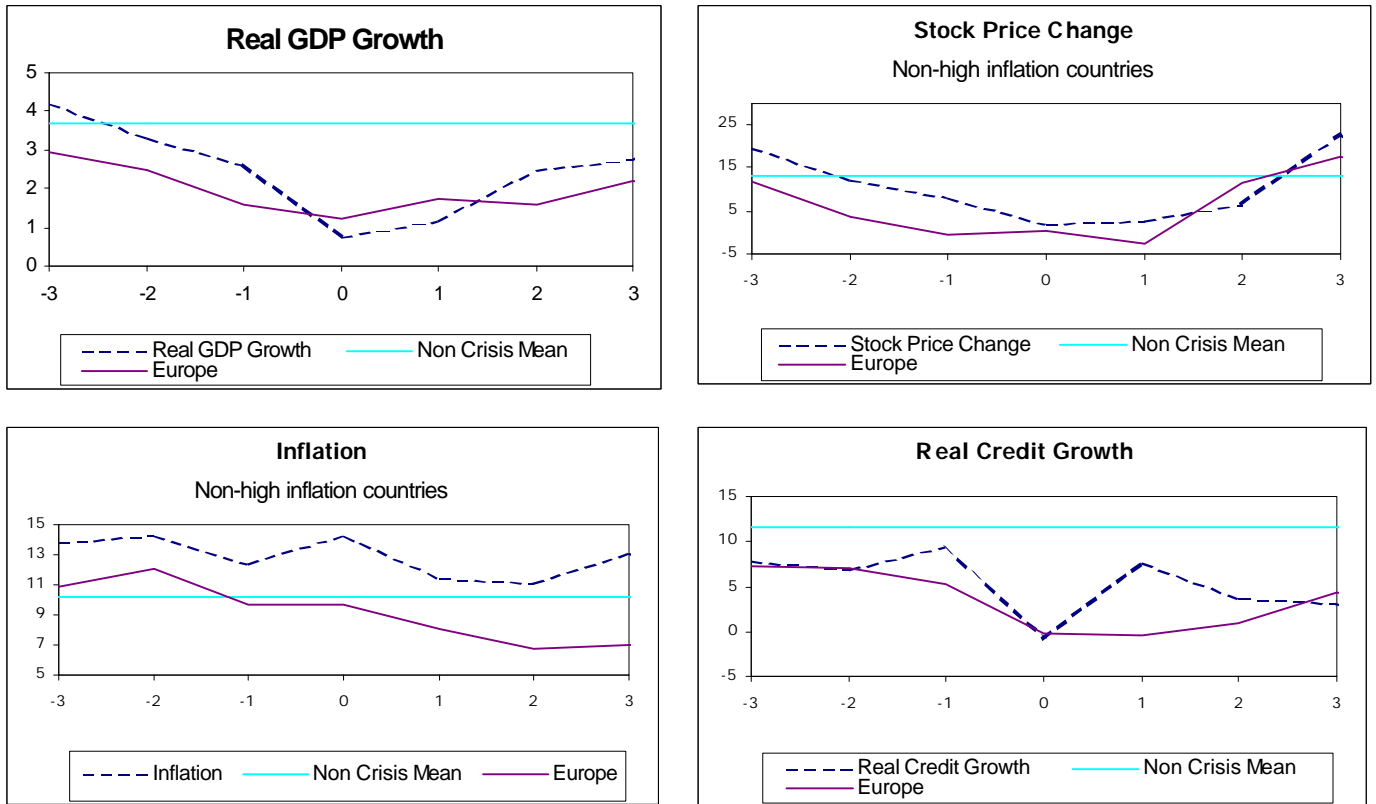
Dependent Variable:  
Banking Sector Distress

	Restriction	Banking	Government	Enforcement	Accounting
Coefficient	0.66	-0.78	-0.17	-0.16	0.00
P-value	0.12	0.09	0.12	0.21	0.87
Pseudo R2	0.076	0.104	0.072	0.056	0.001
No. of Obs	44	40	47	40	39
Percent Predicted at 78%					
All Countries	89.5	88.6	85.4	100	100
Europe	81.8	81.8	63.6	100	100

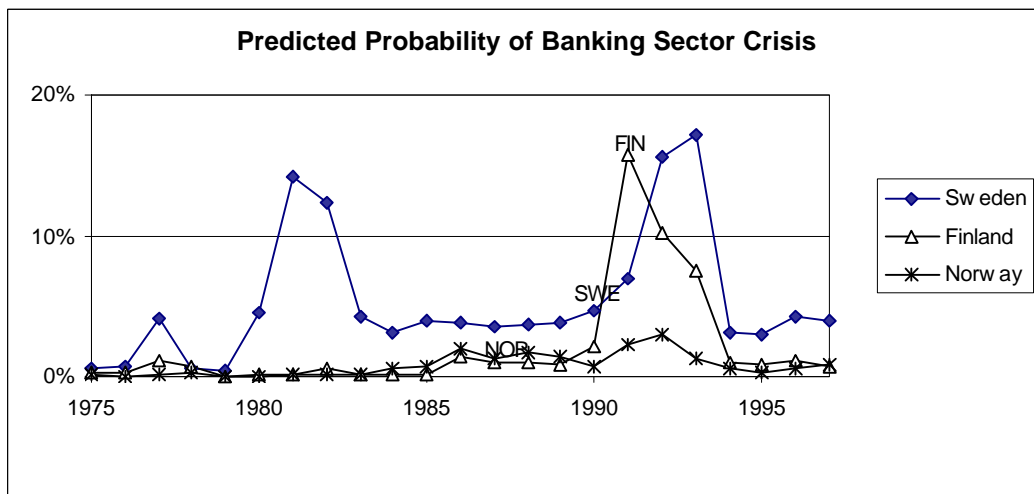
Dependent Variable:  
Banking Sector Crisis

	Restriction	Banking	Government	Enforcement	Accounting
Coefficient	0.69	-0.95	-0.32	-0.32	-0.03
P-value	0.03	0.03	0.00	0.00	0.06
Pseudo R2	0.079	0.095	0.199	0.192	0.072
No. of Obs	44	40	47	40	39
Percent Predicted at 52%					
All Countries	69.6	65.0	76.0	75.0	55.0
Europe	25.0	0.0	0.0	0.0	0.0

**Figure 1**  
 Economic Developments Prior to and after the Onset of Banking Distress:  
 Comparison of Full Sample and European Episodes



**Figure 2**





**Appendix Table 1**  
**Occurrences of European Banking Distress, Foreign Exchange Market Turmoil and Domestic Interest Rate Liberalization**

	Dates, Significance (Significant or Crisis) and Details of Banking Sector Distress*	Foreign Exchange Market Turmoil**	Liberalization of Interest Rates***
<b>EU Member States:</b>			
Austria			1975
Belgium		1982	1986
Denmark	1987-1992 Significant: Cumulative loan losses over 1990-92 were 9% of loans; 40 of the 60 problem banks were merged		1981
Finland	1991-1994 Crisis: Nonperforming loans and credit losses reached 13% of total exposure at peak in 1992; liquidity crisis in September 1991. Savings sector badly affected. Govt. took over Skopbank in August 1991. Several banks suffered large losses due to bad loans and share investments.	1977-1978, 1982, 1991-1993	1986
France	1994-1995 Significant: Nonperforming loans were 8.9% of total loans in 1994. 15% (US \$27billion) of Credit Lyonnais' loans were nonperforming and several other banks posted large losses.	1982	1975
Germany	1978-1979 Significant: Giro institutions faced problems.		1975
Greece	1991-1995 Significant: Localized problems required large injection of public funds into specialized lending institutions.	1980, 1982-1983, 1985	1975
Ireland			1985
Italy	1990-1995 Significant: Nonperforming loans system-wide 10% of total in 1995. During 1990-94 58 banks in difficulty and merged with other institutions; 3 of the 10 largest banks received large injection of public funds; 10 banks undercapitalized in 1994.	1976, 1992, 1995	1975
Luxembourg			NA
Netherlands			1975
Portugal	1986-1989 Significant:	1976-1978, 1982-1983, 1993, 1995	1984
Spain	1977-1985 Crisis: From 1978-83, 51 institutions accounting for 1/5 of all deposits were rescued. In 1983, 20 small- medium sized banks were nationalized.	1976-1977, 1982, 1992-1993	1974
Sweden	1990-1993 Crisis: 18% of total unconsolidated bank loans were reported lost and the 2 main banks were assisted (Govt. injected US\$800 million into state controlled Nordbanken and guaranteed US\$609 to rescue largest savings bank).	1977, 1981-1982, 1992-1993	1980
United Kingdom	1975-1976 Significant: "Secondary Banking Crisis" 1984 Significant: Johnson Matthey bank failure.	1976, 1979, 1981-1982, 1986, 1992	1974

Non-EU Members:			
Iceland	1985-1986 Significant: One of three state-owned banks insolvent and merged with 3 private banks.  1993 Significant: Government injects capital into one of the largest state-owned commercial banks to cover its large loan losses.	1983-1984, 1988, 1992-1993	NA
Norway	1987-1993 Crisis: 6% of bank loans nonperforming. Crisis at end of 1991. Govt. became principal owner in 3 largest banks whose share of total commercial bank assets was approximately 85%. Central bank provided special loans to 6 banks suffering from post-oil recession of 1985-86. State-backed Bank Insurance Fund had to increase capital.	1978, 1986, 1992	1984
Switzerland		1978	1989

**Notes:**

\*Source of banking distress data and characterizations: Caprio and Klingebiel (1996), Demirgu-Kunt and Detragiache (1998a) and Lindgren, Garcia and Saal (1996). Updated from Caprio et al. (1999).

\*\*See text for calculation of measure of foreign exchange market pressure.

\*\*\*Characterization and dating of domestic interest rate liberalization is Demirgu-Kunt and Detragiache (1998b).

**Appendix Table 2: Data for Institutional Variables**

Variable	Description	Scale	Sources
Accounting	Account standards Index created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items.	1-90 A higher ranking indicates more information disclosure.	International accounting and auditing trends. Center for International and Financial Research. Reported in La Porta et al. (1998)
Rule of Law	Assessment of the law and order tradition in the country produced by the country risk rating agency International Country Risk (ICR). Average of the months of April and October of the monthly index between 1982 and 1995.	0-10 Lower scores indicate less tradition for law and order.	International Country Risk guide. Reported in La Porta et al. (1998).
Corruption	ICR's assessment of the corruption of government. Lower scores indicate that "high government officials are likely to demand special payments" and "illegal payments are generally expected throughout lower levels of government." Average values of the months of April and October of the monthly index between 1982 and 1995.	0-10 Lower scores indicate greater corruption.	International Country Risk guide. Reported in La Porta et al. (1998).
Red Tape	Business International's (BI) assessment of "the regulatory environment foreign firms must face when seeking approvals and permits. The degree to which it represents an obstacle to business" Simple average over 1980-83 period.	0-10 Lower scores indicate more red tape (more obstacles to business).	Business International (Economist Intelligence Unit). Reported in Mauro (1995).
Repudiation	Likelihood of repudiation of contracts by government. ICR's assessment of the "risk of a modification in a contract taking the form of a repudiation, postponement, or scaling down" due to a budget cutbacks, government action or a policy change. Average of the months of April and October of the monthly index between 1982 and 1995.	0-10 Lower scores indicate higher risk.	International Country Risk guide. Reported in La Porta et al. (1998).
Government	Average value of Rule of Law, Corruption and Red Tape (defined above). Composite index of the quality of government/bureaucratic system.	0-10 Higher scores indicate a better functioning government.	International Country Risk guide and Business International. Index also used in Barth et al. (1998).
Enforcement	Average value of the Rule of Law and Repudiation of contracts by government.	0-10 Lower scores indicate higher risk.	Constructed variable from data reported by International Country Risk guide. Also employed in Levine (1999).
Restrictions	Restrictions on banking. Average value of three indices measuring the ability of banks to engage in: (1) securities underwriting, brokering, dealing and all aspects of the mutual fund business; (2) real estate investment, development and management; (3) insurance underwriting and selling; (4) ownership and control non-financial firms.	1-4 Lowest value is unrestricted, highest value is prohibited. Higher values indicate more restrictions on bank activities.	Constructed by Barth et al. (1998). Original data sources reported are Barth et al. (1997), Kyei (1995), Akamatsu (1995), Institute of International Bankers (Global Survey-, various years) Euromoney (Banking Yearbook 1995), and various central bank and government sources.
Banking	Banking sector development. Value of loans by commercial banks and other deposit-taking banks to the private sector divided by GDP. Average over 1976-93 period.	Zero is lower bound. Data range is 0.1 to 2.7.	Reported in Levine (1998).

