The determinants of crisis duration: why did it take Europe so much longer to recover from the Great Recession?

Master Thesis International Economics

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Abstract

The financial crisis that started in 2007 hit both sides of the Atlantic Ocean very hard. However, where the United States recovered quite quickly, it took Europe almost twice as long to get back to their pre-crisis GDP level. This raises the question what might explain this difference in crisis duration. This paper therefore studies the determinants of crisis duration using a relatively new methodology. Most literature on crisis duration and its determinants estimates the effect on the probability of exiting the recession next period. The new methodology in this paper uses the actual duration in months to see if this yields different results. Among the potential determinants are financial variables (credit growth, credit availability, equity prices and housing prices), labour market rigidity, room for policy intervention (measured by fiscal deficit or public debt), fiscal policy (measured by government consumption) and monetary policy (measured by interest rates or money supply). The estimation of a regression model with panel data of 23 European countries and the United States from 1960 to 2016 shows that the extent of a credit boom and monetary policy are important determinants of crisis duration when duration is measured by the actual duration in months. However, in the probability method, the probability of being in a crisis next period is almost entirely explained by whether a country is in a crisis this period. This big difference in results shows that the two methods of measuring crisis duration are not necessarily the same and that it is important to also consider the 'new' duration method.

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Introduction:

Both sides of the Atlantic Ocean have been hit hard by the financial crisis that started in the United States in 2007. Output losses, rising unemployment and bank failures were widespread. Even sovereign states, such as Ireland and Greece, got into trouble with their extremely high debt levels. However, while the United States seem to have recovered quite quickly, the crisis in Europe lingered on. The United States were back at their pre-crisis GDP level by the end of 2011, approximately four years after the beginning of the crisis. It took Europe until April 2016, more than twice as long, before pre-crisis GDP came into sight again (Goodman, 2016). This raises the question where these differences in the duration of the crisis come from. What are the determinants of the duration of a crisis? Why did it take Europe so much longer to recover from this financial crisis?

As mentioned above, it took Europe more than twice as long as the United States to recover from the financial crisis (Goodman, 2016). It is important to know what determines these differences in crisis length. If policy-makers were to have a better idea of the determinants of crisis duration, they could adjust their policies accordingly to make sure a next crisis is resolved more rapidly or more efficiently. It is possible that the current policies employed in Europe to solve the crisis are actually hampering the recovery. The Euro area is less active in using its policy instruments than the federal government in the United States (Mussa, 2009). It seems relevant to know whether this has played a role in the protracted crisis in the Eurozone. In other words, would it have helped if policymakers had responded more?

Another reason why it is important to know how the duration of crises can be limited as much as possible are the costs that are associated with these crises. Estimates of the output loss range from 5 to 8% for currency crises and from 8 to 10% for banking crises (Hutchison & Noy, 2005). In addition, an economic downturn of 2 to 3 years is associated with an output loss of 5 to 10% of GDP (Bordo, Eichengreen, Klingebiel, & Soledad Martinez-Peria, 2001). Hence, it is relevant for policymakers to know what determines the length of these downturns, so that they can try to limit the losses.

There is a large body of research that focuses on which variables determine whether a crisis occurs or not. Researchers have studied the determinants of three types of crises distinguished in the literature separately, namely banking crises (Demirgüç-Kunt & Detragiache, 1998; Hardy & Pazarbasioglu, 1998), currency crises (Bordo et al., 2001; Kaminsky, Lizondo, & Reinhart, 1998) and (sovereign) debt crises (Herz & Tong, 2008; Manasse & Roubini, 2009). However, it is not necessarily true that the same variables that cause a crisis to happen also determine how long that crisis is going to last (Hausmann, Rodriguez, & Wagner, 2006). Therefore, some researchers have looked specifically into the determinants of crisis duration. For example, Hong and Tornell (2005) ask themselves: "how long does it take for the economy to fully recover from a crisis and which economies recover faster than others?" (Hong & Tornell, 2005, p. 72). But they only consider developing countries and currency crises. This paper uses data on Europe and the United States and all types of crises. Others have tried to find explanations for the slow recovery from the most recent financial crisis through studying American data (Bordo & Haubrich, 2017; Gali, Smets, & Wouters, 2012; Stock & Watson, 2012). However, from a European perspective, it is interesting to see which factors contributed to the even slower recovery compared to the United States. This is why this paper looks at the determinants of crisis duration in both Europe and the United States to uncover which determinants may have contributed to the longer European crisis.

Cross-country comparisons have been done by others. Claessens, Kose and Terrones (2012) make a comparison between advanced and emerging economies and find no noticeable differences between them (Claessens et al., 2012). However, no direct comparison between advanced economies, like Europe and the United States, has been provided to date. A comparison of two countries, namely Chile and Mexico, by Bergoeing, Kehoe, Kehoe and Soto (2002), showed that the earlier policy reforms in Chile, especially in banking and bankruptcy procedures, were the main explanation for the quicker recovery than in Mexico (Bergoeing et al., 2002). Since Mexico and Chile are emerging economies, it is possible that this result cannot be generalized to advanced economies like the European Union and the United States.

This paper adds two things to the existing literature. Firstly, most studies only look at one category of possible determinants of crisis duration. For example, they consider real and financial variables, like wars and export collapses (Hausmann et al., 2006) or housing and equity prices (Claessens et al., 2012). Others only consider the influence of fiscal and/or monetary policy on crisis duration (see e.g. Baldacci, Gupta, & Mulas-Granados, 2009; Kannan, Scott, & Terrones, 2014). Hence, this paper is the first to put all these categories of determinants together. This offers the opportunity to see which (type of) determinant is the most important for crisis duration. Secondly and most importantly, this paper uses a relatively new methodology. Instead of using the probability of being in a recession as dependent variable, this paper uses the actual duration in months. Most scholars use so-called duration analysis in which the dependent variable is a binary variable indicating if there is a crisis or not in a certain period. They then estimate a probit or logit regression to estimate the impact of several variables on the probability of exiting a crisis next period (Claessens et al., 2012; Diebold, Rudebusch, & Sichel, 1993; Hausmann et al., 2006; Kannan et al., 2014; Tudela, 2004). This paper follows the methodology of Baldacci et al. (2009) who use the actual duration in years to find the influence of fiscal policy measures on the duration of banking crises. Therefore, this paper is the first to use the actual duration in months as the dependent variable instead of the probability of exiting the recession to study all categories of determinants together in one paper.

In summary, this leads to the following research question:

What are the determinants of crisis duration as measured by the actual duration in months in Europe and the United States between 1960 and 2016?

This paper answers the research question by studying the determinants of the duration of a crisis in Europe and the Unites States with a relatively new methodology. In doing so, it can give an idea of which variables might have played a role in the later recovery from the last crisis in Europe. It explores three categories of determinants (financial, labour market and policy) to see whether they contribute to the duration of a crisis. With data from the National Bureau of Economic Research on recession dates from the period 1960 to 2016, the impact of several variables on the duration of crises will be determined through regressing these determinants on crisis duration measured in months. This is the relatively new methodology used in this paper. The 'old' method, a probit regression with the probability of being in a crisis next month as a measure of crisis duration, will serve as a robustness check to see if the new methodology yields different results. This paper is not after determining which of the two methods is better, but wants to show the effect of using a new methodology on the results in the existing literature.

Using the new methodology of the actual duration in months as the dependent variable, the results indicate that financial determinants such as equity prices and housing prices, labour market rigidity, room for policy intervention and fiscal policy are unimportant for crisis duration. On the other hand, the extent of a credit boom and monetary policy are determinants of crisis duration. A larger growth in credit before the crisis, i.e. a larger credit boom, increases the duration of the subsequent crisis. An expansionary monetary policy like an increase in the money supply can help to shorten the duration. The robustness check results show that the probability of being in a crisis next month is almost entirely explained by whether a country is already in a crisis this month, so-called duration dependence. No other determinants appear to have an influence on this probability. The large difference between the two methods shows that the actual duration in months and the probability of being in a recession are not necessarily measuring the same thing as the earlier literature seems to assume. When using the actual duration in months, other determinants turn out to be important.

This paper is organized as follows. The theoretical framework gives an overview of the existing literature on crisis duration and its determinants. From this literature review, eight hypotheses on the relationship between crisis duration and several variables are formulated. The third section of this paper describes the data used to test the hypotheses. The methodology is explained in the fourth section. Then, the results of the duration method are presented, followed by the results of the robustness check. The last section concludes and discusses policy implications, limitations and suggestions for further research.

Theoretical Framework:

This section starts by defining crisis duration more precisely. Subsequently, it will provide an overview of the existing literature on the determinants of crisis duration. From this literature review, eight hypotheses on the relationship between crisis duration and several variables are formulated.

Definition crisis duration:

Before the determinants of crisis duration are discussed, it is important to define what exactly is meant by crisis duration. Simply stated, the duration of a crisis is how long it takes until the crisis is over. So with the monthly data this paper uses, the duration of a crisis or recession is defined as the number of months between the beginning and the end of the crisis (Hausmann et al., 2006). This paper uses the National Bureau of Economic Research database on business cycles. The typical business cycle consists of two parts. Firstly, the recession phase is the declining phase from the peak of the business cycle to the trough. This phase starts when "a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale retail sales" is observed (National Bureau of Economic Research, 2010, p. 1). Next, the expansion phase follows, from the trough back to a peak (Claessens et al., 2012). Following this classification, the duration of a recession is defined as the number of months between a peak and a trough (Calvo, Coricelli, & Ottonello, 2012; Claessens et al., 2012; Kannan et al., 2014). A more elaborate explanation of the NBER recession indicator and how it can be used to define crisis duration will be given in the Data section.

The rest of this section discusses the determinants of crisis duration. These determinants can be divided into three categories, namely financial determinants, labour market frictions and policy related determinants.

Financial determinants:

The first two financial determinants are related to credit, namely credit growth and credit availability. Before the crisis hits, the economy often experiences a credit boom. The extent of this boom in turn influences the duration of the crisis that follows after the boom has gone bust. The larger the credit boom before the crisis, the deeper and the longer the recession (Boissay, Collard, & Smets, 2013; Claessens, Dell'Ariccia, Igan, & Laeven, 2010). More explicitly, Baldacci et al. (2009) find that crises preceded by credit booms last approximately one year longer (Baldacci et al., 2009). In addition, Cecchetti, Kohler and Upper (2009) show that a 17 percentage point increase in credit (a larger credit boom) is associated with an increase in crisis length of approximately 2 quarters (Cecchetti et al., 2009). A credit or investment boom before the crisis will create a very large capital stock. As capital is durable, this means that the next period might see less to no investment as the desired capital stock has probably been reached. At this point not much more investment is needed or desirable. Hence, after an investment boom a period with a contraction in investment will follow and economic activity slows down (Hong & Tornell, 2005). The larger the investment boom was, the longer the time before new investment is needed and thus the longer it takes before the economy will come out of the slowdown again. Therefore, the size of the investment or credit boom impacts the length of the crisis.

Hypothesis 1: Countries with higher credit growth before a crisis have a longer crisis duration.
Hence if Europe experienced larger credit growth leading up to the most recent crisis, we expect Europe to have a longer crisis than the United States.

Once the crisis has hit, the availability of credit becomes important as a determinant of the length of the crisis. Banks might tighten lending standards or raise interest rates, which reduces the overall credit supply to households and businesses (Cecchetti et al., 2009). Moreover, a reduction in the availability of credit can depress aggregate demand, which in turn leads to a recession or a crisis. As the financial market gets disrupted, the efficiency and effectiveness of the financial markets becomes less. It becomes harder to serve as an intermediary between borrowers and lenders, which makes the costs of intermediation go up (Bernanke, 1983). Consequently, credit becomes more expensive and difficult to obtain. This so-called credit squeeze will deprive many people of funds and in turn will depress aggregate demand. For the time that it takes to revive the disrupted channels of credit or to establish new ones, credit will barely be available (Bernanke, 1983). Moreover, as long as this situation lasts, the crisis will continue. Once credit comes back, aggregate demand can pick up again and the recession will be resolved.

Hypothesis 2: Countries with higher credit availability have a shorter crisis duration. Thus, if credit
availability was higher in the United States, we expect Europe to have a longer crisis duration.

The next financial determinant of crisis duration is the asset market. If a crisis is preceded by an asset bubble, it tends to last approximately one year longer (Baldacci et al., 2009). Similarly, Claessens et al. (2012) find that recessions that are associated with housing and equity price busts are longer than other recessions by almost 1.5 quarters (Claessens et al., 2012). Equity and housing are the two main parts of the asset market, which is thus a determinant of crisis duration. According to Reinhart and Rogoff (2009), housing prices can fall with 35 percent lasting for over six years. Equity prices decline more on average, to almost 55 percent, but over a shorter period of approximately 3.5 years (Reinhart & Rogoff, 2009).

As asset prices start to decline, because the bubble bursts, the net worth of many businesses and households will worsen. Consequently, their capacity to borrow is reduced, which in turn decreases their ability to invest and consume. Furthermore, a propagation of this mechanism through households and businesses can lead to more decreases in asset prices, worsening everyone's position even further (Claessens et al., 2012). This decreases the chance of getting out of the recession relatively quickly. Hence, the larger the asset price (equity price) bubble, the larger the subsequent drop when the bubble bursts and the longer the recession will last.

Hypothesis 3: Countries experiencing a higher growth in equity prices before a crisis have a longer crisis duration. Therefore, Europe is expected to have a longer crisis than the United States if the equity prices were increasing more in Europe before the most recent crisis. Countries that experience a large bubble on the asset market before the crisis hits will have a longer crisis since the effects of the bubble bursting will be bigger.

Furthermore, for housing prices, the larger the housing price appreciation before the crisis (e.g. the larger the boom), the longer the recession or slowdown that follows (Claessens et al., 2010). Once this bubble bursts, an adverse feedback loop can emerge. The fall in housing prices accompanied by a lower credit availability causes a drop in consumer spending. This worsens the situation in the real sector as the drop in consumption leads to drops in profits for businesses and consequent increases in unemployment (Claessens et al., 2010). Hence, the larger the decline in housing prices, the stronger this adverse feedback loop will be and the longer it will take to get out of the economic slowdown.

Hypothesis 4: Countries experiencing a larger appreciation in housing prices before a crisis have a longer crisis duration. Hence, if the housing price boom was larger in the United States, it is the United States that would be expected to have a longer crisis instead of Europe.

Housing prices might be expected to be more important as a determinant of crisis duration than equity prices. There are two reasons why this might be the case. Firstly, housing is usually a larger share of the wealth of households than equity. Equity wealth is not only a smaller share of households' wealth, but is also more concentrated among relatively wealthy households. Secondly, equity prices are more volatile than housing prices. Hence, a change in equity prices is likely to be short-lived, whereas changes in housing prices tend to be more permanent. These permanent changes will have a larger impact on the decision to adjust consumption. Households thus react to housing price changes more than to equity price changes. A larger housing price decline will lead to a larger (downward) adjustment in consumption and therefore a larger decline in output during the recession after a housing boom (Claessens et al., 2012).

Duration dependence:
The next determinant, duration dependence, is a variable that cannot really be classified alongside the others. However, it could be something that is important to take into account. Duration dependence is defined as follows: "the possibility that a recession is more likely to end the longer it lasts" (Claessens et al., 2012, p. 183). Hence, the duration of a crisis also depends on how long the crisis has lasted already. Several scholars find evidence for positive duration dependence. Thus a crisis that has gone on for quite some time already, is more likely to end than a crisis that has just started (Claessens et al., 2012; Diebold et al. , 1993; Ohn, Taylor, & Pagan, 2004). However, this is not really something that could classify as a determinant. But it does seem important to take the length of the crisis up to a certain point into account if one wants to determine the probability of the crisis ending.

Labour market frictions:

What is important in determining how long a crisis will last, is how quickly the economy adjusts after an economic shock. One of the main reasons an economy might struggle to adapt are rigidities in the labour market. Calvo et al. (2012) find that crises are more frequent in highly rigid labour markets. Moreover, crises also tend to last longer in such a context (Calvo et al., 2012). Especially (downward) wage rigidities are an important type of labour market rigidity. When wages do not adjust downward, it can take a lot longer for the economy to recover. Evidence from Chile, where a wage indexation policy was removed, shows that the subsequent drop in real wages can be seen as one of the main causes of the fast recovery from the crisis (Bergoeing et al., 2002). Furthermore, Gali et al. (2012) find evidence for the presence of downward wage rigidities in the United States. They show that adverse wage mark-ups were a driving force behind the slow recovery from the last recession. Wages did not adjust as much as they should have given the economic conditions (Gali et al., 2012). This shows that downward wage rigidities contribute negatively to the duration of a crisis. Although the recovery was very slow in the United States, they still experienced a much stronger labour market adjustment than in Europe during the most recent recession (Arpaia & Curci, 2010). Hence, it is expected that the recovery and thus the crisis will last even longer in Europe.

The rigidity of wages is influenced by two factors, namely the collective bargaining coverage rate and labour union participation. According to Eichhorst, Escudero, Marx and Tobin (2010), wage flexibility and collective bargaining coverage are correlated. The lower the coverage of collective bargaining, the more flexible the wages are (Eichhorst et al., 2010). Obviously, this is related to labour union participation. Strong labour unions have more coverage and are more likely to obtain high wages, which subsequently cannot easily be adjusted downwards. Hence, countries with high labour union participation adjust more slowly (Groot, Mohlmann, Garretsen, & de Groot, 2011). Both these factors contribute to rigidity on the labour market and therefore a longer crisis duration.

Another measure of how flexible and adjustable the labour market is, is the strength of the employment protection legislation. This type of legislation and other labour market regulations are much stricter in the European Union than in the United States (Heyes & Lewis, 2015). Of course, a certain amount of legislation is needed to protect workers from arbitrary dismissals. However, too much employment protection legislation might hamper the ability of the economy to respond to economic shocks, making the labour market more rigid (Eichhorst et al., 2010). Hence, strict employment protection legislation could increase the duration of a crisis.

Hypothesis 5: Countries with more rigid labour markets have a longer crisis duration.

As mentioned above, Europe has stricter labour market laws than the United States (Heyes & Lewis, 2015). Moreover, the European labour market appears to adjust more slowly than the American market (Arpaia & Curci, 2010). Therefore, it is expected that Europe will have longer recessions.

Policy intervention:

When a crisis hits, the government can respond with a policy intervention. By choosing the right policies or policy mix, the government could potentially help to resolve the crisis more quickly. It has been shown that countries who have more room for policy intervention have shorter recessions (Claessens et al., 2010). Economies that can run large fiscal deficits, i.e. have fiscal space, will absorb shocks more easily and get out of a crisis faster (Baldacci et al., 2009; Claessens et al., 2010).

A related result is that a quick resolution of a crisis is very expensive. This could be due to policymakers taking more drastic action in the wake of a more severe crisis. As severe crises are more expensive to resolve and the more drastic action deals with problems quickly, this can explain the relationship between short crisis duration and expensive policy actions (Demirgüç-Kunt & Detragiache, 1998). Therefore, only countries that are able to run large fiscal deficits will be able to resolve a crisis quickly. Hence, the size of the fiscal deficit presents a measure of the room for policy intervention. Moreover, Baldacci et al. (2009) find that higher deficits and shorter crisis duration are strongly correlated. This provides evidence for the room for policy intervention (as measured by fiscal deficit) as a determinant for crisis duration. Another variable that can be used to measure room for policy intervention is the amount of public debt. Baldacci et al. (2009) state that fiscal space can be created by lowering public debt. Consequently, lower public debt means a country has more room for policy intervention and therefore a shorter crisis duration.

Hypothesis 6: Countries with more room for policy intervention have a shorter crisis duration.
With debt levels being higher in Europe than in the United States (Mussa, 2009), it is probable that Europe does not have much room for policy intervention and is therefore expected to have a longer crisis

When a government wants to intervene to shorten a crisis, they can typically choose from two types of policies: fiscal policy or monetary policy. A fiscal expansion can help to reduce the length of a crisis through stimulating aggregate demand for example. However, if households have too much debt, they might not spend the additional income generated by an expansionary policy like an income tax cut, but instead use it to pay off their debt (Borio, 2014). Therefore, as mentioned by Baldacci et al. (2009), the composition of the policy mix matters a lot to ensure that it is effective. They find that increasing public consumption is more effective in reducing crisis duration than increasing public investment or tax cuts. Public consumption will stimulate aggregate demand in a more direct way, which makes it more effective in moving the economy out of the recession (Baldacci et al., 2009). Especially recessions associated with financial crises can be shortened by a fiscal expansion (Kannan et al., 2014).

In contrast, monetary policy, if it is expansionary, is not that effective in a financial crisis situation. It can, on the other hand, shorten other types of recessions[1] (Kannan et al., 2014). An expansionary monetary policy, like lowering interest rates, will stimulate aggregate demand by making saving less attractive and borrowing cheaper. Consequently, it can help to move the economy out of a recession. Empirically, the probability of getting out of a recession increases by approximately 6 percent after a 1 percent reduction in the real interest rate (Kannan et al., 2014). Lowering interest rates is not the only expansionary monetary policy that is possible. The central bank can also choose to increase the money supply. In standard monetarist views, a country that rapidly expands its money supply will have a shorter recession. The fact that Chile reduced its money supply in the quarters leading up to a crisis has significantly prolonged the crisis that followed (Bergoeing et al., 2002). Hence, expansionary monetary policy might be helpful when a government wants to reduce the duration of a crisis.

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[1]Kannan et al. (2014) distinguish the following categories of recession defined by the shock that preceded it: financial crisis, oil shock, fiscal policy shock, monetary policy shock, external demand shock.

Hypothesis 7: Countries with more expansionary fiscal policy have a shorter crisis duration.

Hypothesis 8: Countries with more expansionary monetary policy have a shorter crisis duration.
Europe might be more reluctant to use fiscal and monetary policy due to the constraints of the Stability and Growth Pact of the Eurozone and the great importance that is attached to keeping inflation in check (Mussa, 2009). Hence, the United States is expected to have a shorter crisis duration due to the more active use of policy.

Table 1 provides an overview of the relevant determinants of crisis duration and the proxies that will be used for each of these determinants.

Hypothesis	Explanatory variable	Literature	Proxy	Expected sign based on hypotheses
1	Credit growth	Baldacci et al. (2009) Boissay et al. (2013) Claessens et al. (2010)	Growth of total credit to private non-financial sector (% of GDP)	+
2	Credit availability	Cecchetti et al. (2009)	Total credit to private non-financial sector (% of GDP	-
3	Equity price	Baldacci et al. (2009) Claessens et al. (2012) Reinhart & Rogoff (2009)	Share price index	+
4	Housing price	Claessens et al. (2010) Reinhart & Rogoff (2009)	Residential property price index	+
5	Labour market rigidity	Calvo et al. (2012) Eichhorst et al (2010) Gali et al. (2012) Groot et al. (2011)	• Collective bargaining coverage rate	+
			• Trade union density	+
			• Employment protection legislation index	+
6	Room for policy intervention	Baldacci et al. (2009) Claessens et al. (2010)	• Fiscal deficit	-
			• General government debt	+
7	Fiscal policy	Baldacci et al. (2009) Kannan et al. (2014)	Government final consumption expenditure	-
8	Monetary policy	Kannan et al. (2014)	• Central bank policy rate	+
			• Money supply	-

Table 1. Overview of determinants, proxies and hypothesized signs.

Data

This paper investigates the determinants of crisis duration. To estimate this relationship, data on several variables as identified by the hypotheses is needed. Most importantly, crisis episodes and their duration need to be identified. For this purpose, the National Bureau of Economic Research recession indicator database is used. This database consists of a dummy variable indicating whether a country experiences a recession in a particular month. A value of 1 indicates a recessionary month, whereas a value of 0 indicates an expansionary month. The NBER defines a recession as a period with "a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales" (National Bureau of Economic Research, 2010, p. 1). Crisis duration is thus the number of consecutive months with a value of 1 for the recession indicator. The NBER uses three different methods to determine whether a month is a recessionary period or not. The period between an economic peak and an economic trough is defined as a recession. Hence, the peak and the trough are the extrema. The first method is called the midpoint method and according to this method, a recession runs from the midpoint of the peak through the midpoint of the trough. Therefore, this method is also called 'from peak through trough'. The second method, the trough method, lets a recession start in the period after the peak until the last day of the trough. The third and last method, the peak method, lets the recession start from the period of the peak and stops it right before the period of the trough (Federal Reserve Bank of St. Louis, 2017). This paper uses the first method, the 'from peak through trough' or midpoint method, because it is most often used in the literature (see e.g. Claessens et al., 2012; Kannan et al., 2014; Reinhart & Rogoff, 2009).

Taking the Netherlands as an example it can be shown that the three different measurement methods do not differ much. For the most recent crisis in the Netherlands, the midpoint method calculates a duration of 26 months, which becomes 27 months when using either the peak or the trough method. Inspecting the second to last crisis in the Netherlands, the midpoint method, which is used in this paper, calculates a crisis duration of 25 months just like the trough method. The peak method calculates this crisis lasting 24 months, again not a big difference. Therefore, the choice of method should not make a huge difference to the results and this paper chooses to use the method most commonly used in the literature, as mentioned above.

The NBER recession indicator database starts in 1960 and has data on 23 European countries and the United States among others[2]. This research uses the monthly data of this database from February 1960 to December 2016. For some countries data is not available from 1960. This is mostly due to these countries gaining independence relatively late in the 20th century[3]. There is a total of 278 recession episodes in the database with a mean duration of 23 months (Table 2). A list of the number of crisis episodes per country can be found in Appendix Table A.2.

For the first two hypotheses data on credit is needed. Credit growth is measured by the growth from quarter to quarter in the amount of total credit to the private non-financial sector as a percentage of GDP, which is available from the Bank of International Settlements (BIS).

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[2] Countries included in this research are: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom and United States.
[3] Data available from 1993: Slovak Republic. Data available from 1995: Czech Republic, Estonia, Hungary, Poland. Data available from 1996: Slovenia.

Credit availability or credit supply can be measured by the amount of credit outstanding. In this paper, the quarterly amount of total credit to the private non-financial sector as a percentage of GDP is used, which is also available from the BIS. To see if equity prices are a determinant of crisis duration, the share price index is included in the dataset. This data is available at the OECD. The share price index includes prices of common shares of companies that are traded on each country's national stock exchange. The value of the index with a monthly frequency is the average of the daily closing values of the stock exchange during a particular month. The base year of this index is 2010. For housing prices, the BIS has data on the residential property price index. This index gives the average housing price in a given quarter in a country. As for the share price index, the base year used to calculate the index value is 2010. As mentioned in the theoretical framework, labour market rigidity is related to the collective bargaining coverage rate and labour union participation as they make wages less flexible. Data on the latter is available at the OECD as trade union density, data on the former comes from the International Labour Organization (ILO). The collective bargaining coverage rate is defined as the number of employees covered by collective agreements as a percentage of all wage earners. In addition, trade union density is defined as the percentage of employees that are a member of a union. Both are measured annually in October. Labour market flexibility is also related to the strictness of employment protection legislation. This is measured with the employment protection legislation index of the OECD. The index of a particular year is based on regulations that were in place on the 1st of January of that year. It measures the costs and difficulty of dismissing employees and the number of temporary contracts. The higher the index, the stricter the regulation in a particular country is, e.g. the harder it is to dismiss an employee.

Countries that have fiscal space have more room to intervene with policies. Fiscal space or room for policy intervention is measured by the size of the fiscal deficit or the size of the general government debt. Both are measured as a percentage of GDP and at the end of the year. The fiscal deficit is calculated as "the gross government savings plus its net capital transfers minus its gross capital formation", whereas the general government debt is defined as "the total gross government debt as a percentage of GDP" (OECD Government Data, 2017). Both can be retrieved from the OECD, as well as the government final consumption expenditure which is used as a measure for the amount of fiscal policy conducted. A government's final consumption expenditure consists of collective goods provision and transfers directly to households, like education and housing subsidies for example. The measure included in this research is the amount of these government expenditures over a particular year as a percentage of GDP. Monetary policy on the other hand can be measured by two different variables. Firstly, the central bank can set the interest rates in an attempt to conduct expansionary or contractionary policy. Therefore, the central bank policy rate is included in this study. It is the official policy rate of the central bank of a country as a percentage per annum updated with a monthly frequency. Secondly, the central bank can adjust the money supply. Hence, the narrow money (M1) index is included as a measure for monetary policy. This index has 2010 as its base year and includes only narrow money or M1, which is defined as the amount of currency in circulation plus overnight deposits in a given month. This is the money supply measure that is most directly controlled by the central bank and is therefore considered to be the most suitable measure of money supply and monetary policy. The latter monetary policy variable data is retrieved from the OECD, whereas the former can be found at the BIS.

Due to the later starting points of some of the data series of the possible determinants of crisis duration, there are missing data points in the period 1960 to 2016. As mentioned before, a few countries gained independence after 1960, which decreases the early availability of data for these countries. A list of all variables, the indicators used to measure them, their data sources and frequency can be found in Appendix Table A.1 together with an extensive list of missing data points in Appendix D.

As can be seen from Appendix table A.1, some determinants' data series have a lower frequency than monthly. If one would use the probability of being in a recession next month as the dependent variable, this would cause a big loss of explanatory power. One can only explain the variation between quarters or years in this case. However, when the actual duration in months is the dependent variable, this poses less of a problem. How this problem is addressed exactly is further explained in the next section on Methodology.

As mentioned above, the full dataset includes 278 recession episodes with a mean duration of about 23 months. There are two crises with the maximum length of 59 months in the dataset; one in France starting in May 1982 and one in Poland starting in March 1998. The shortest crisis of 7 months took place in Denmark. However, this crisis episode is located in the beginning of the dataset in 1960, so it is very likely that it was already ongoing before.

VARIABLES	(1) Number of observations	(2) Mean	(3) Standard deviation	(4) Minimum	(5) Maximum
Duration	278	23.12	10.47	7	59
Credit growth	225	0.0551	0.136	-0.759	0.631
Credit availability	226	5.824	17.75	-58.40	145
Equity price	202	18.47	32.41	-111.1	173.7
Housing price	122	11.31	17.16	-12.20	93.20
CBC rate	71	65.62	25.66	11.97	100
Trade union density	259	38.71	19.61	5.871	82.72
EPL index	128	2.282	0.788	0.260	4.676
Public debt	92	4.741	9.423	-12.65	48.72
Fiscal deficit	120	-1.095	4.798	-21.63	26.32
Government consumption	246	0.783	1.099	-3.027	5.073
Money supply	207	4.984	5.153	-4.200	26.10

Table 2: Summary statistics Duration method

When reading Table 2, one should keep in mind that the variables included are either changes between two recessions (for the financial variables), changes over a recession period (for the policy variables) or averages over a recession period (for the labour market variables). So the maximum value of 173.7 for the equity price does not mean that there was a country with a share price index of 173.7 at one point. It does show that in one of the 24 countries in the dataset the share price index increased by 173.7 points in between two recessions; in other words, there was a big asset market boom. The same applies to the 4.741 in mean public debt value. This number indicates that the mean change in public debt as a percentage of GDP during a recession period was a 4.74 percentage point increase. These transformations had to be applied in order to make the time-specific variables match to the recession episodes. The next section will elaborate on this issue.

Methodology

This section explains the methodology used in this paper to estimate the effect of several variables on crisis duration. It also elaborates on how this paper tries to eliminate endogeneity issues. To see which variables are possible determinants of crisis duration, two different approaches can be used. Both methods use the NBER recession dummy 'from peak through trough' as the dependent variable. As explained in the last section, this dummy takes on the value 1 in a particular month if a country is experiencing a recession in that month. The dummy switches from 0 to 1 at the midpoint of the economic peak and switches back to zero at the midpoint of the trough, when the economy starts to expand again. The independent variables are the possible determinants of crisis duration as identified in the theoretical framework.

The first method uses the actual duration in months as dependent variable and is therefore called the duration method. The duration of a crisis is then the number of consecutive months with a value of 1 for the recession dummy. For example, in Denmark the recession dummy takes on the value 1 starting in July 2006 until July 2009. This adds up to 37 consecutive months with a value of 1 for the dummy and thus a crisis duration of 37 months. Hence, every recessionary episode becomes one observation. There are 278 recession episodes identified between 1960 and 2016 in the 24 countries in the dataset. Using OLS, this paper then investigates which variables from the theoretical framework are determinants of crisis duration. The second method, the so-called probability method, uses the NBER recession dummy as a probability as the dependent variable. A probit model is then employed to look at the effects the possible determinants have on the probability of being in a recession next period. Using the example of Denmark again, this method studies what the probability of being in a recession in October 2007 is based on several determinants as identified in the theoretical framework and the fact that the recession dummy already had a value of one in September 2007. With this method, every month in the dataset represents a separate observation. Summary statistics of the probability method can be found in Appendix Table A.3.

As every month is a separate observation in the probability method, the data of the independent variables can be matched to it directly without any transformation. That is, as long as this data has a monthly frequency too. Data series with a lower frequency will create missing observations. However, for the duration method, the data of the possible determinants of crisis duration, which are time-specific, has to be transformed first. As in Baldacci et al. (2009), the change in levels of the independent variables during the recession can be calculated to make it non-time-specific (Baldacci et al., 2009). One would then calculate the difference between the value in the last month of the recession and the value in the first month of the recession for all explanatory variables. However, a regression of crisis duration on these changes in the explanatory variables during the crisis will likely suffer from endogeneity bias. Hence, a different approach is needed.

According to hypothesis 1, it is credit growth before the crisis that has an impact on crisis duration instead of the growth in credit during the actual recession. Hence, credit growth in between two recessions has to be calculated. This is the difference between the value in the first month of the recession and the value in the last month of the previous recession. Using credit growth in between two recessions will also solve (a large part of) the endogeneity issue. The boom in credit can influence the length of the subsequent crisis, but the actual duration of the crisis cannot have an impact on the size of the credit boom that took place before this crisis. The same reasoning applies to credit availability,

equity prices and housing prices. Therefore, for all the financial determinants, it is the change in between two recessions that will be included in the regression model.

The policy determinants are treated in a slightly different way. For these variables, it is the change during the previous recession that is included in the regression model. Policy variables are particularly vulnerable to reversed causality issues. Fiscal policy can influence the duration of a crisis, but how long a crisis lasts or is expected to last will also have an impact on how actively policy will be employed. Using the change in the policy determinant during the previous recession instead of the change during the current recession can solve this issue. How actively the government reacted will be indicative of how actively they will react during this crisis to help shorten it and hence the change in policy during the previous recession is related to the duration of the current crisis. However, it is not very likely that the government will take into account the (expected) duration of the next crisis, when they are deciding on their policy response to the current crisis. Therefore, the duration of the current crisis does not influence the policy variable in the previous crisis. As Appendix Table A.4 shows, the policy variable during the previous crisis indeed contains information about the policy variable in this crisis. For money supply and for both measures of room for policy intervention, the null hypothesis of no first-order autocorrelation is rejected. The fiscal policy proxy government consumption and the central bank policy rate do not display first-order autocorrelation, meaning that the value of this variable in the previous crisis is not indicative of the policy reaction during this crisis. This is one reason why money supply is used as the main proxy for monetary policy in this paper. Government consumption however will still be used in this form. Due to the reversed causality concerns, it is still better to use the change in government consumption during the previous crisis than the contemporary value.

When a variable is only available quarterly or annually, it is assumed that it had the same value during the quarter or the year. Looking at to which quarter or year a month of a recession belongs, one can still calculate the differences. For the labour market rigidity proxies, the average over the recession period is calculated instead of the change. As these proxies are only available with an annual frequency, it is assumed that the value stays the same throughout the year. The yearly values are weighted by the amount of months that the recession took place in a certain year, hence the average calculated is a weighted average. It is the state of the labour market, how rigid it is in a certain period, how strict the legislation is etc, that seems to be important to crisis duration rather than the change in these labour market rigidity proxies. They are very stable over time, which is why calculating change is not very informative.

Inspecting a histogram of the dependent variable duration shows that it is skewed to the right (Appendix A Figure 1). In addition, a skewness test rejects the hypothesis that duration is normally distributed (p = 0.000). Applying a log-transformation brings the distribution of duration closer to normal (Appendix A Figure 2). The null hypothesis of the skewness test that duration is normally distributed can now not be rejected (p = 0.2655) (Appendix Table A.5). Moreover, in the duration method, the dependent variable is not serially correlated, so there is no need to include lags of this variable in the regression[4]. Hence, there is no duration dependence. The duration of the previous crisis contains no information about the duration of the current crisis. This leads to the following regression specification:

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[4] Wooldridge test for autocorrelation in panel data cannot reject the null hypothesis of no first order autocorrelation (p= 0.5139)

$$\log(duration_{c,t}) = \beta_{0_{c,t}} + \beta_1 * \Delta creditgrowth_{c,t_b} + \beta_2 * \Delta creditavailability_{c,t_b} + \beta_3 * \Delta equityprice_{c,t_b}$$
$$+ \beta_4 * \Delta housingprice_{c,t_b} + \beta_5 * labourmarket_{c,t} + \beta_6 * \Delta roomforpolicyintervention_{c,t-1}$$

$$+\beta_7 * \Delta fiscalpolicy_{c,t-1} + \beta_8 * \Delta monetarypolicy_{c,t-1} + \alpha_c + \varepsilon_{c,t}$$

Where c = country, t = crisis episode, t-1= previous crisis episode, t_b= before crisis episode t and after crisis episode t-1 (in between crises), a_c = country fixed effects and $\varepsilon_{c,t}$ = error term. In addition, the regression will include country fixed effects to control for all unobserved factors that are fixed over time, but vary between countries. Time fixed effects cannot be included since the regression is trying to explain time variation. As can be seen from Appendix Table B.1, credit growth and credit availability are highly correlated. It is therefore better to not include both these variables in the regression model to avoid multicollinearity. Fortunately, these are the only explanatory variables that have such a high correlation. Moreover, this problem only shows up in the duration method. The Pearson correlation table for the probability method shows that none of the explanatory variables are highly correlated (Appendix Table C.1).

The issue of different frequencies in the available data on the explanatory variables has already been touched upon in the Data section and earlier in this section. As explained above, with the duration method, even if the frequency of the independent variable is different from the frequency of the dependent variable, a 'match' can still be made. The change in the explanatory variable over a recession period or in between two recessions can still be calculated. Therefore, the effect of a change in, for example, housing prices on crisis duration can still be estimated. However, with the probability method, this different frequencies problem poses a much larger challenge. The missing months when the data series has a lower frequency will become missing observations, leading to a loss of observations. This is a reason why the duration method might have an advantage over the probability method.

The specification for the probability method differs from the duration method specification shown above in three respects. First of all, a probit estimation technique needs to be employed to look at the effects the possible determinants have on the probability of being in a recession next period. Secondly, the dependent variable is now serially correlated. Hence, whether a country is in a crisis this month contains information about the probability of being in a crisis next month. Therefore, this specification will include a lag of the dependent variable to account for this so-called duration dependence. According to the Akaike information criterion, the specification with one lag is the best fit for this model (Table 4). The last difference relates to the way the endogeneity issues are tackled.

Just like the duration method, the probability method suffers from endogeneity problems, especially when the effect of a policy measure on the probability of being in a recession next period is estimated. But also the stock market might already react if it is expected with a high probability that the recession will end next month. If the probability of no longer being in a recession next month is high, policy-makers might not want to intervene a lot, because they hope that the recession will resolve automatically. On the other hand, if the probability that the recession will end soon is very low, policy-makers might actively employ different policy measures to speed up recovery. If this is the case, it is not only the policy measures that affect the probability of being in a recession, but also the probability affecting the amount of policy employed. This could apply to other explanatory variables used in this research as well.

To try to solve the endogeneity issues in the probability method, one-month lags of the explanatory variables will be included instead of the contemporary values. As can be seen in Table 2, the average crisis duration is about 23 months. Lagging the explanatory variables by only one month might not be enough to solve the endogeneity issues. Therefore, it is also examined what happens if the explanatory variables are lagged by one year. But 248 out of the 278 crises in the dataset are longer than one year, so one-year lagged values in the middle of such a long crisis are still in-crisis values and therefore possibly still suffer from reversed causality. Therefore, each recessionary month is assigned the value of the explanatory variable in the month before the crisis started to make the explanatory variable as exogenous as possible.

In conclusion, the main dependent variable form of interest in this paper is the actual duration in months of a recession. This is the relatively new methodology that this paper is the first to use in combination with all types of determinants of crisis duration instead of only policy or real variables. This methodology will then be compared to the probability method, which serves as a robustness check, to see if the two methods yield different results.

Results

This section will discuss the results. Firstly, the results of the duration method will be discussed since this is the main methodology in this paper and the main contribution to the literature. Secondly, the probability method will serve as a robustness check and its results conclude this section.

Duration method:

To answer the hypotheses and to study which type of determinant is the most important for crisis duration, a regression model is estimated that includes all possible determinants. However, some of the determinants can be measured by multiple proxies. This applies to labour market rigidity, room for policy intervention and monetary policy. To determine which proxy is the best, the model is re-estimated while changing one proxy at the time and those models are then compared[5]. From this analysis, it follows that trade union density is the best measure for labour market rigidity. Employment legislation protection index was a contender, but collective bargaining coverage rate never was, because it had too few observations compared to the other two. The effects of changing the labour market measure to EPL is disclosed in Appendix Table B.3 to show that the models with trade union density are indeed a better fit. As for room for policy intervention, fiscal deficit is treated as the main proxy for this determinant. The effect of changing it to public debt is disclosed in Appendix Table B.2, which shows that fiscal deficit has a higher explanatory power. For the monetary policy determinant, money supply turns out to be a better proxy than the central bank policy rate. The change in money supply during the previous crisis contains information about the change in money supply during the current crisis, which does not apply to the central bank policy rate (Appendix Table A.4). This is an extra reason to choose money supply as the main proxy.

Table 3 shows the results of the preferred model. A closer examination of the correlations between the explanatory variables (Appendix Table B.1) shows that credit growth and credit availability are highly correlated. The results in the first column are therefore not very informative due to multicollinearity issues. Hence, columns 2 and 3 examine models with either credit growth or credit availability. Comparing the two models, the model with credit growth turns out to be a better fit, although the difference is not large.

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[5] Results not shown

VARIABLES	(1) Duration	(2) Duration	(3) Duration	(4) Duration
Credit growth	0.446	0.483*		0.531
	(0.483)	(0.286)		(0.47344)
Credit availability	0.000287		0.00255*	0.00054
	(0.00220)		(0.00137)	(0.00332)
Equity price	-0.00114	-0.00113	-0.00103	-0.00006
	(0.00122)	(0.00120)	(0.00123)	(0.00114)
Housing price	0.00292	0.00290	0.00355	0.00046
	(0.00270)	(0.00265)	(0.00248)	(0.00241)
Trade union density	-0.0120	-0.0120	-0.0102	-0.0009
	(0.0115)	(0.0114)	(0.0114)	(0.0019)
Fiscal deficit	-0.00242	-0.00224	-0.00366	0.00505
	(0.00892)	(0.00851)	(0.00864)	(0.00942)
Government consumption	0.0281	0.0280	0.0283	0.0508
	(0.0362)	(0.0360)	(0.0359)	(0.0415)
Money supply	-0.0378***	-0.0378***	-0.0376***	-0.0269***
	(0.00695)	(0.00690)	(0.00698)	(0.00732)
Constant	3.679***	3.682***	3.623***	3.230***
	(0.380)	(0.376)	(0.377)	(0.101)
Observations	119	119	119	119
R-squared	0.354	0.354	0.350	0.288
Country Fixed effects	Yes	Yes	Yes	No
Adjusted R-squared	0.124	0.134	0.129	0.101

Table 3. Dependent variable is the logarithm of crisis duration in months. Credit growth, credit availability, equity price & housing price: change in between crises. Trade union density: average during crisis period. Fiscal deficit, government consumption & money supply: change during previous crisis. Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

To address endogeneity concerns, the financial determinants are all measured as the change between the previous crisis and this crisis instead of the change during the current crisis. In other words, it is the extent of the boom before the crisis that is included in the regression. All these determinants return insignificant results, except for the credit market variables (Table 3 columns 2 & 3). Credit growth and credit availability are both significant on a 10%- level. The positive sign on credit growth shows that a larger credit boom before the crisis leads to a longer duration of the crisis that follows after the boom has gone bust. As this is the same direction as expected in hypothesis 1, this hypothesis cannot be rejected. Credit availability on the other hand does not have the expected sign. The results show that a higher credit availability before the crisis leads to a longer crisis duration, whereas hypothesis 2 stated the opposite expectation. However, credit availability is expected to be more important after the crisis has started. If disrupted channels of credit recover quickly and therefore more credit is available during the crisis, it is expected that the duration of the crisis is shortened. Hence, it could be that the relationship between credit availability and crisis duration is positive before the crisis and becomes negative once the boom has gone bust and the crisis started. But since the coefficient does not have the expected sign, hypothesis 2 has to be rejected.

How large the equity or housing boom is before the crisis is unimportant for subsequent crisis duration. Hence, hypotheses 3 and 4 are rejected, because there is no relationship between these determinants and crisis duration. As mentioned in the theoretical framework, housing price was expected to be a more important determinant than equity prices, because housing represents a larger share of household wealth and because its prices are less volatile. Housing price does return larger coefficients than equity price but since both coefficients are insignificant, the results cannot confirm this expectation (Table 3).

The next determinant is labour market rigidity, which is measured by trade union density. As this is a very stable variable over time, it is not the change in trade union density that matters for crisis duration. It is the state of the labour market during the crisis that determines whether the economy will be able to adjust quickly. Therefore, as explained in the methodology section, the variable trade union density is a weighted average percentage of people that are a member of a labour union during the period of the crisis. As can be seen in Table 3, hypothesis 5 is rejected. The rigidity of the labour market is not related to crisis duration in the preferred models (Table 3 columns 2 & 3).

As for room for policy intervention, it is expected to have a negative sign. Countries who can run higher fiscal deficits will have more fiscal space to intervene and therefore have more room for policy intervention. More room for policy intervention is expected to lead to a shorter crisis. Hence, the higher the fiscal deficit is, the shorter the crisis will be. However, one could also reason that countries that already have a high fiscal deficit will not have much room left to increase their deficit even further. In this case, the higher the fiscal deficit is, the longer the crisis will be as there is less room for policy intervention. This ambiguity might explain why fiscal deficit and thus room for policy intervention does not turn out to be a significant determinant of crisis duration. Hypothesis 6 is therefore rejected.

In addition, fiscal policy as measured by government consumption is not a determinant of crisis duration as it consistently returns insignificant results (Table 3). Hypothesis 7 is therefore rejected. Monetary policy on the other hand appears to be very important. Money supply is highly significant across all specifications (Table 3). An expansionary monetary policy, an expansion of the money supply, helps to shorten the crisis. Hypothesis 8 can therefore not be rejected. Given that the government conducted an expansionary policy in the previous crisis leads to a shorter crisis duration in the current crisis, because it is probable that the government will react with expansionary policy again. This result is not sensitive to changing trade union density to the EPL index nor to changing fiscal deficit to public debt (Appendix Tables B.2 & B.3). The money supply remains a highly significant determinant of crisis duration with the same negative sign, as expected in hypothesis 8.

In conclusion, as the preferred specification in column 2 of Table 3 shows, the main determinants of crisis duration can be found on the credit market and in the area of monetary policy. It is the size of the expansion or contraction of the money supply that turns out to be important in determining crisis duration. In addition, a credit boom before the crisis will make the subsequent crisis last longer.

Probability method:

This paper so far used a methodology that has never been used to examine all types of categories of determinants of crisis duration as in this paper. Most literature on crisis duration uses the probability of being in a recession next month as the dependent variable in their regression analysis instead of the actual duration in months. However, to see how the results in this paper relate to the literature, this older methodology serves as a robustness check.

The interpretation of the results from the probability method is less straightforward than in the duration method. Firstly, because of the probit estimation technique that is needed, it is difficult to interpret the coefficients directly. One can only tell what the direction of the relationship is. Moreover, a positive coefficient indicates a longer crisis duration. If the probability of being in a recession increases, in the case of a positive coefficient, the recession will end later. On the other hand, a negative coefficient indicates that the probability of being in a recession next month decreases, hence a shorter duration.

As in the duration method, some determinants can be measured by different proxies. Again, trade union density, fiscal deficit and money supply are chosen as the better proxy for labour market rigidity, room for policy intervention and monetary policy respectively. In addition, credit growth and credit availability are no longer highly correlated and can therefore be included together in one regression model (Appendix Table C.1).

To address the endogeneity concerns, all explanatory variables are transformed into their one-month lag equivalent (Appendix Table C.2). Moreover, the recession dummy turns out to be autoregressive. As it is positive, this means that the fact that a country is in a recession this month increases the probability that it will be in a recession next period as well. This is referred to as duration dependence in the literature (see e.g. Diebold et al., 1993; Ohn et al., 2004). Therefore, a one-month lag of the dependent variable has to be included in the recession, like in column 2 of Appendix Table C.2. Looking at this regression, the probability of being in a recession is mainly explained by trade union density and whether there is a recession in the previous month. A more rigid labour market leads to a higher probability of being in a recession next month and hence a longer crisis duration, which is as expected in hypothesis 5. However, these regression results are not very informative as the explanatory power of these models is extremely low. Moreover, since the average crisis duration is about 23 months, lagging the explanatory variables by only one month is not likely to solve the endogeneity issues.

Therefore, the effect of using one-year lags is examined in Appendix Table C.3. In these models, the duration of a crisis is explained entirely by duration dependence, i.e whether there is a crisis in the previous month. Again, the explanatory power of these models is very low. Although this approach might solve the endogeneity concerns for short crises, it does nothing for the numerous longer crises in the dataset. 248 out of the 278 crisis episodes in the dataset are longer than 12 months. For all these crises the one-year lagged values of the explanatory variables are still in-crisis values. Hence, it can still be both the variable impacting the probability of being in a crisis next month and the probability affecting the variable of interest. Therefore, it is considered what happens if one takes the value of the variable before the crisis instead of any in-crisis value. This is more likely to solve endogeneity issues. Results of this approach are shown in Table 4. Again, a one-month lag of the recession indicator (dependent variable) is included and turns out to be highly significant. Surprisingly, it is mainly this lag that explains whether a country will be in a recession next month or not (Table 4). Being in a recession this month increases the probability of being in a recession next month significantly. The model in column 3 is the preferred model and the recession lag is the only significant determinant here. As can be inferred from the Akaike information criterion, the inclusion of a second lag does not improve the fit of the model (Table 4).

The exclusion of fiscal deficit is considered, because it has relatively few observations. The only change is that housing price becomes significant and has the expected sign (Table 4 column 4). The higher the housing price in a particular month, the higher the chance that the bubble will burst next month and hence, the higher the probability that there will be a recession next month. All in all, the model in column 3 of Table 4 is the preferred specification and it is therefore concluded that only duration dependence is a significant determinant of crisis duration within this method.

VARIABLES	(1) Recession Probit	(2) Recession Probit	(3) Recession Probit	(4) Recession Probit	(5) Recession Probit	(6) Recession Probit
Recession (-1)			3.453***	3.148***	9.305	8.867
			(0.446)	(0.322)	(6,074)	(3,680)
Recession (-2)					-5.882	-5.746
					(6,074)	(3,680)
Credit growth	-0.0791*	-0.109***	-0.00756	-0.0275	-0.00774	-0.0268
	(0.0409)	(0.0403)	(0.0563)	(0.0510)	(0.0559)	(0.0509)
Credit availability	0.00100	0.00191	-0.00334	-0.00167	-0.00323	-0.00162
	(0.00312)	(0.00255)	(0.00331)	(0.00293)	(0.00325)	(0.00291)
Equity price	0.00320	0.000438	-0.00222	-0.00225	-0.00248	-0.00231
	(0.00308)	(0.00219)	(0.00424)	(0.00318)	(0.00417)	(0.00317)
Housing price	0.0162	0.0105	0.0169	0.0147*	0.0166	0.0146*
	(0.0104)	(0.00674)	(0.0105)	(0.00801)	(0.0104)	(0.00801)
Trade union density	0.0141	0.00258	0.00796	0.00349	0.00764	0.00341
	(0.0164)	(0.0115)	(0.0158)	(0.0137)	(0.0154)	(0.0136)
Fiscal deficit	-0.0461		-0.0199		-0.0173	
	(0.0306)		(0.0334)		(0.0326)	
Government consumption	-0.0731	-0.0446	-0.0121	0.00237	-0.0124	0.00300
	(0.0811)	(0.0572)	(0.0898)	(0.0734)	(0.0882)	(0.0730)
Money supply	-0.00104	-0.000345	0.000296	0.000117	-3.64e-05	-0.000303
	(0.00614)	(0.00533)	(0.00888)	(0.00791)	(0.00888)	(0.00796)
Constant	1.266	1.808*	-0.398	-0.525	-0.314	-0.495
	(1.380)	(0.970)	(1.719)	(1.328)	(1.698)	(1.321)
Observations	1,437	1,592	1,437	1,592	1,437	1,592
Pseudo R-squared	0.236	0.131	0.117	0.099	0.104	0.094
Akaike information criterion	363.93	389.83	153.23	169.77	154.44	170.83

*Table 4. Dependent variable is the recession indicator, which takes on value 1 in a recessionary period. One month and two month lags of dependent variable included. Explanatory variables take on the value they had one month before the crisis during the crisis period. In all other months, they take on the value of that particular month. Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.*

In conclusion, comparing the preferred specification of the 'old' probability method (Table 4 column 3) to the preferred specification of the 'new' duration method (Table 3 column 2) used as this paper's main methodology shows that the results vary quite a lot between the methods. Table 4 includes a lag of the dependent variable because it turned out to be autoregressive, which was not the case in the duration method and therefore a lag was not needed in Table 3. Apart from this, both tables include the same eight explanatory variables.

Within the 'old' probability method, duration dependence turns out to be very important. Whether a country is in a crisis this month is basically the only significant determinant of the probability of being in a crisis next month. This is not a very reassuring result for policy-makers. The results also differ quite a lot from the duration method results, where the credit market and monetary policy turned out to be determinants of crisis duration. In contrast to the robustness check results, in the duration method, policy-makers could make a difference in helping to shorten the crisis. These results show that the probability of being in a crisis and the actual duration in months are not necessarily the same thing as the earlier literature assumes. They use the probability as a measure of duration, but when using the actual duration other determinants of crisis duration turn out to be important.

Conclusion

In the financial crisis that started in 2007, a big difference in recovery time was observed between Europe and the United States. It took Europe almost twice as long to recover from the crisis. This paper therefore studied what might explain this difference in crisis duration by looking at the determinants of crisis duration using a relatively new methodology. Instead of the probability of being in a recession next period, this paper uses the actual duration in months as the dependent variable. Three categories of determinants are considered, namely financial determinants, labour market determinants and policy determinants.

Using a panel dataset with data from 1960 to 2016, this paper shows that credit growth and monetary policy are determinants of crisis duration. Other financial determinants, such as equity prices and housing prices, labour market rigidity, room for policy intervention and fiscal policy play no role. A larger credit boom before the crisis leads to a longer duration, which means hypothesis 1 cannot be rejected. As for the monetary policy determinant money supply, it has the expected negative sign. A monetary expansion through the money supply is found to have a shortening effect on the duration of the crisis. Consequently, hypothesis 8 cannot be rejected. All other hypotheses are rejected, because these determinants do not appear to have a significant effect on crisis duration. Although credit availability does return a significant coefficient, hypothesis 2 is still rejected, because the coefficient does not have the expected sign. A schematic overview of the results can be found in Table 5.

In addition, this paper started with the observation that Europe took almost twice as long to recover from the last crisis than the United States. As this paper used data on Europe and the United States to study the determinants of crisis duration, the results can shed light on this difference in crisis length. The difference is possibly due to the two main determinants of crisis duration found in this research, namely credit growth and monetary policy. If the credit boom before the last crisis was larger in Europe than in the United States, this could explain the subsequent longer crisis duration. This paper also found a negative relationship between monetary policy and crisis duration. If the United States were conducting a more expansionary policy, the results show that they are likely to have a shorter crisis. Earlier research has found that Europe is less active in employing policy measures than the United States (Mussa, 2009), so this could indeed be an explanation. However, this paper's main focus was not on explaining the difference in crisis duration during the last crisis specifically, but on finding the determinants of crisis duration in Europe and the United States more generally. More specific research into this difference is therefore needed to give more conclusive answers about what caused Europe to recover so slowly.

Hypothesis	Explanatory variable	Proxy	Expected sign based on hypothesis	Actual sign in data
1	Credit growth	Growth of total credit to private non-financial sector (% of GDP)	+	+*
2	Credit availability	Total credit to private non-financial sector (% of GDP)	-	+*
3	Equity price	Share price index	+	-
4	Housing price	Residential property price index	+	+
5	Labour market rigidity	Trade union density	+	-
6	Room for policy intervention	Fiscal deficit	-	-
7	Fiscal policy	Government final consumption expenditure	-	+
8	Monetary policy	Money supply	-	-***

Table 5: Overview of results. Comparison of expected signs of determinants and the actual signs found in the data.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

This paper's main focus is on finding the determinants of crisis duration in Europe and the United States through the introduction of a new methodology. A comparison with the most common methodology in the literature on crisis duration shows that the results are very different across the two methods. In the 'old' probability method, duration dependence turns out to be the most important determinant. Whether a country will be in a crisis next month is almost completely determined by whether it is already in a crisis this month. In contrast, the results from the duration method are more reassuring for policy-makers, showing that they can indeed make a difference with monetary policy specifically. In addition, in the duration method, the situation on the credit market before the crisis has an influence on the duration of the subsequent crisis. These large differences between the two methods show that the actual duration in months and the probability of being in a recession are not necessarily the same thing as the earlier literature assumes. They use the probability as a measure of duration, but as this paper's results indicate, it might not measure the same thing. When using the actual duration, other determinants turn out to be important. This paper has not shown which of the two methods is better, it just shows that it does matter which method is used since they do not necessarily yield the same results.

The results in this paper have several implications for policy makers. Fiscal policy does not appear to make a difference to crisis duration, since government consumption does not have an effect on crisis duration. Hence, policy makers who try to stimulate the economy with more government consumption to shorten the crisis are probably not being very effective. Moreover, how much room for policy intervention a country has as measured by how large a fiscal deficit it can run does not affect the duration of a crisis. In contrast, monetary policy turns out to be very effective to shorten crises. The money supply has a highly significant effect on crisis duration. This result shows that a monetary expansion through the money supply can significantly shorten the crisis. Altogether, the results point towards monetary policy being more effective than fiscal policy in reducing crisis duration.

One limitation of this paper is the lack of balancedness in the data set. Because the time periods for which data on the determinants is available varies per determinant and the data has differing frequencies, there is a loss of observations that can be quite substantial. This problem is present in both the probability and the duration method. As the probability method uses every month from 1960 to 2016 as a separate observation over a thousand observations are still left even after a large amount of observations got dropped. Because the duration method turns every crisis episode into one observation, it already has less observations (278 crisis episodes in total). Due to the gaps in the data set, only 119 observations could be used in the panel regression. Although this might be enough to find out what the determinants of crisis duration are, it could also be the case that research with more observations will find different or stronger results. Therefore, this research should be repeated with a more balanced dataset when that becomes available to limit the loss of observations. Maybe then a more conclusive answer about what the determinants of crisis duration are can be given.

Another limitation of this paper is that it does not take into account the time trend in the amount of crises. Over the last 50 years, crises have become a more frequent phenomenon. Of the 278 crisis episodes in this research, 97 took place in the last 17 years. The 181 other crisis episodes were spread out over the 40 years between 1960 and 2000. This shows that since the change of centuries something might have substantially changed. Possibly other determinants have become important for crises and their duration. Because this paper considers the whole period from 1960 and 2016, it could be that differences between the two periods are averaged out. Unfortunately, it is difficult to repeat the research in this paper only for the last 17 years, because there will be too few observations to include. An interesting path for future research will be to study the differences between crisis duration determinants before and after 2000 with the duration method. Only looking at the United States and Europe will not be possible for another couple of decennia probably, but including more countries can solve the problem of the restricted period not having enough observations in the duration method.

Apart from the suggestions for further research to solve this paper's limitations, two other paths of research might be interesting. This paper used data on 23 European countries and the United States to investigate the determinants of crisis duration. It could very well be that these determinants are different in developing countries since these countries often experience more and deeper crises. Applying the duration method to these type of countries can possibly provide interesting new insights. In addition, the probability of being in a crisis is accepted as a good measure of the duration of a crisis in the literature. This paper, however, shows that using the actual duration in months returns very different results. Therefore, more research is needed into the difference between the duration method and the probability method. An answer about which method is better can then be given, which can be helpful in the future for policy-makers who try to determine how they can help shorten crises.

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Appendix A:

Variable	Indicator(s) used	Data source	Frequency
Crisis duration	Recession indicator	NBER	Monthly
Credit growth	Growth in total credit to private non-financial sector (% of GDP)	BIS	Quarterly
Credit availability	Total credit to private non-financial sector (% of GDP)	BIS	Quarterly
Equity price	Share price index	OECD	Monthly
Housing price	Residential Property Price index	BIS	Quarterly
Labour market rigidity	Collective Bargaining coverage rate (%)	ILO	Annually
	Trade union density (%)	OECD	Annually
	Employment protection legislation index	OECD	Annually
Room for policy intervention	General government debt (% of GDP)	OECD	Annually
	Fiscal deficit (% of GDP)	OECD	Annually
Fiscal policy	Government final consumption expenditure (% of GDP)	OECD	Annually
Monetary policy	Central bank policy rate (% per annum)	BIS	Monthly
	Money supply: narrow money (M1) index	OECD	Monthly

Table A.1. List of variables, data sources and frequency. NBER = National Bureau of Economic Research. BIS = Bank for International Settlements. OECD = Organisation for Economic Cooperation and Development. ILO= International Labour Organization.

Country	Number of crises (Number of observations Duration method)	Mean duration (in months)	Minimum duration (in months)	Maximum duration (in months)	Number of observations (Probability method)
Austria	14	21.5	10	40	683
Belgium	16	23.2	10	47	683
Czech Republic	5	26	15	42	263
Denmark	16	21.6	7	41	683
Estonia	7	18	13	29	263
Finland	13	25.8	11	51	683
France	12	26.5	10	59	683
Germany	14	22.6	10	47	683
Greece	13	22.5	10	52	683
Hungary	6	17	10	29	263
Ireland	14	24.4	11	44	683
Italy	12	26.4	9	45	683
Luxembourg	15	23.6	13	43	683
Netherlands	13	24.2	10	51	683
Norway	14	22.4	11	36	683
Poland	5	28.8	17	59	263
Portugal	14	19.9	13	39	683
Slovak Republic	5	18.2	8	30	287
Slovenia	5	18.2	15	23	251
Spain	12	25.3	16	48	683
Sweden	12	28.6	10	40	683
Switzerland	15	19.4	10	34	683
United Kingdom	13	23.9	10	43	684
United States	13	22.7	12	49	684

Table A.2. List of number of crises per country with mean, minimum and maximum duration.

VARIABLES	(1) Number of observations	(2) Mean	(3) Standard deviation	(4) Minimum	(5) Maximum
Recession	13,886	0.460	0.498	0	1
Credit growth	3,903	0.494	2.087	-10.76	33.09
Credit availability	3,923	121.8	59.94	21	450.3
Equity price	11,711	60.31	52.70	0.790	353.2
Housing price	2,242	109.0	64.79	17.80	457.1
CBC rate	325	65.20	26.20	11.70	100
Trade union density	1,037	39.11	19.52	5.654	83.86
EPL index	603	2.321	0.844	0.257	5
Fiscal deficit	593	-2.201	4.507	-32.03	18.67
Public debt	490	69.36	33.88	6.664	185.2
Government consumption	1,155	18.46	4.006	7.578	27.94
Central bank policy rate	7,595	4.505	4.791	-0.750	40
Money supply	12,613	45.08	42.25	0.566	248.1

Table A.3. Summary statistics probability method.

Wooldridge test for autocorrelation in panel data.			
H0: no first-order autocorrelation			
Determinant	Proxy	F-statistic	Prob>F
Room for policy intervention	Public debt	6.421	0.0185
	Fiscal deficit	4.782	0.0392
Fiscal policy	Government consumption	0.006	0.9406
Monetary policy	Money supply	0.786	0.0354
	Central bank policy rate	4.994	0.3855

Table A.4. Test for autocorrelation in explanatory policy variables.
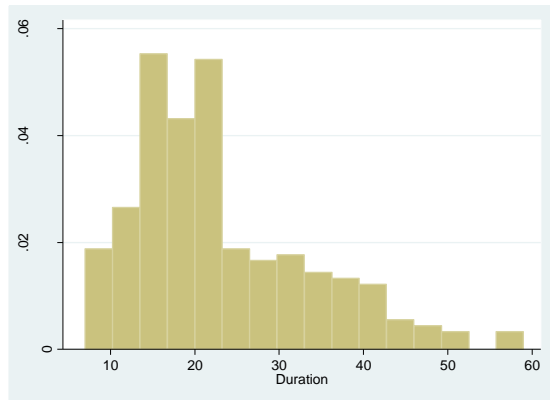
Figure 1: Histogram Duration   *Figure 2: Histogram log(Duration)*
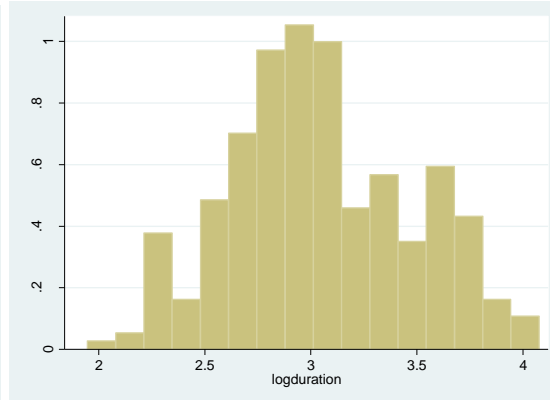
				- **Joint** -	
Variable	Observations	Pr(Skewness)	Pr(Kurtosis)	Adj chi2 (2)	Prob > chi2
Duration	278	0.0000	0.0555	32.17	0.0000
Log(Duration)	278	0.2655	0.0095	7.52	0.0233

Table A.5. Skewness/Kurtosis tests for Normality

	Credit growth	Credit availability	Equity price	Housing price	CBC rate	Trade union density	EPL index	Public debt	Fiscal deficit	Government consumption	Central bank policy rate	Money supply
Credit growth	1.00											
Credit availability	0.87	1.00										
Equity price	0.42	0.46	1.00									
Housing price	0.45	0.43	0.25	1.00								
CBC rate	-0.04	-0.01	0.01	-0.02	1.00							
Trade union density	-0.13	-0.11	-0.11	0.04	0.48	1.00						
EPL index	-0.08	-0.06	-0.01	-0.15	0.50	0.05	1.00					
Public debt	-0.22	-0.09	-0.17	-0.35	-0.20	-0.25	-0.07	1.00				
Fiscal deficit	0.18	0.26	0.10	0.17	0.21	0.05	0.15	-0.09	1.00			
Government consumption	-0.07	-0.14	-0.15	-0.09	-0.06	0.13	0.04	0.15	-0.52	1.00		
Central bank policy rate	0.04	0.06	-0.17	0.03	0.01	0.27	-0.05	-0.15	0.16	-0.16	1.00	
Money supply	0.18	0.19	0.24	-0.08	0.04	-0.31	-0.08	0.13	-0.04	0.10	-0.21	1.00

Table B.1. Pearson correlation table. Duration method.

VARIABLES	(1) Duration	(2) Duration	(3) Duration	(4) Duration
Credit growth	0.860	0.584*		0.837
	(0.634)	(0.338)		(0.569)
Credit availability	-0.00178		0.00207	-0.0008925
	(0.00250)		(0.00140)	(0.00347)
Equity price	0.000214	0.000304	0.000740	0.0011592
	(0.00172)	(0.00168)	(0.00160)	(0.00131)
Housing price	0.00269	0.00266	0.00307	0.0000317
	(0.00396)	(0.00384)	(0.00381)	(0.00293)
Trade union density	-0.0127	-0.0126	-0.0105	0.0009378
	(0.0190)	(0.0191)	(0.0197)	(0.00213)
Public debt	0.00652	0.00604	0.00413	0.009096*
	(0.00580)	(0.00563)	(0.00534)	(0.00484)
Government consumption	0.0349	0.0386	0.0428	0.0425
	(0.0342)	(0.0339)	(0.0349)	(0.0381)
Money supply	-0.0346***	-0.0346***	-0.0338***	-0.0241***
	(0.00965)	(0.00957)	(0.00952)	(0.0081)
Constant	3.600***	3.599***	3.535***	3.057***
	(0.612)	(0.617)	(0.640)	(0.1255)
Observations	91	91	91	91
R-squared	0.384	0.382	0.372	0.2690
Country Fixed effects	Yes	Yes	Yes	No
Adjusted R-squared	0.0601	0.0732	0.0587	0.0774

Table B.2. Dependent variable: logarithm of crisis duration in months. Credit growth, credit availability, equity price & housing price: change in between crises. Trade union density: average during crisis period. Public debt, government consumption & money supply: change during previous crisis. Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$*

VARIABLES	(1) Duration	(2) Duration	(3) Duration	(4) Duration
Credit growth	0.212	0.785		-0.195
	(0.773)	(0.477)		(0.623)
Credit availability	0.00589		0.00746*	0.00938*
	(0.00625)		(0.00386)	(0.005597)
Equity price	-0.00199	-0.00174	-0.00199	-0.00104
	(0.00161)	(0.00150)	(0.00161)	(0.00122)
Housing price	0.00154	0.00178	0.00170	0.0007591
	(0.00292)	(0.00301)	(0.00275)	(0.00295)
EPL index	-0.538	-0.548	-0.530	0.011
	(0.395)	(0.391)	(0.388)	(0.054)
Fiscal deficit	0.00952	0.0101	0.00975	0.00714
	(0.0209)	(0.0211)	(0.0204)	(0.0071)
Government consumption	0.0440	0.0434	0.0450	0.0536
	(0.0671)	(0.0668)	(0.0656)	(0.0489)
Money supply	-0.0313***	-0.0316***	-0.0311***	-0.0242***
	(0.00772)	(0.00771)	(0.00754)	(0.00834)
Constant	4.460***	4.478***	4.441***	3.178***
	(0.883)	(0.872)	(0.867)	(0.137)
Observations	90	90	90	90
R-squared	0.394	0.388	0.394	0.2077
Country Fixed effects	Yes	Yes	Yes	No
Adjusted R-squared	0.0709	0.0775	0.0857	0.0797

Table B.3. Dependent variable: logarithm of crisis duration in months. Credit growth, credit availability, equity price & housing price: change in between crises. EPL index: average during crisis period. Fiscal deficit, government consumption & money supply: change during previous crisis. Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1*

Appendix C:

	Credit growth	Credit availability	Equity price	Housing price	CBC rate	Trade union density	EPL index	Fiscal deficit	Public debt	Government consumption	Central bank policy rate	Money supply
Credit growth	1.00											
Credit availability	0.02	1.00										
Equity price	0.11	0.47	1.00									
Housing price	0.13	0.19	0.02	1.00								
CBC rate	0.03	0.06	0.06	0.20	1.00							
Trade union density	0.00	-0.00	-0.26	0.03	0.49	1.00						
EPL index	-0.06	-0.13	-0.07	-0.12	0.52	0.05	1.00					
Fiscal deficit	0.08	0.16	0.07	-0.03	0.18	0.40	0.02	1.00				
Public debt	-0.09	-0.16	0.07	-0.19	0.20	-0.03	-0.02	-0.41	1.00			
Government consumption	0.04	0.18	0.12	0.28	0.51	0.32	0.23	-0.03	0.10	1.00		
Central bank policy rate	0.01	-0.49	-0.48	-0.12	-0.12	0.18	-0.06	-0.07	-0.20	0.13	1.00	
Money supply	-0.01	0.57	0.68	0.04	-0.15	-0.30	-0.15	-0.04	0.27	0.25	-0.58	1.00

Table C.1. Pearson correlation table. Probability method.

VARIABLES	(1) Recession Probit	(2) Recession Probit
Recession (-1)		4.219***
Credit growth (-1)	0.110	0.0414
	(0.0934)	(0.0463)
Credit availability (-1)	0.0188***	-0.000543
	(0.00671)	(0.00270)
Equity price (-1)	-0.0170**	0.00490
	(0.00686)	(0.00311)
Housing price (-1)	0.00781	
	(0.0119)	
Trade union density (-1)	0.0111	0.0182**
	(0.0173)	(0.00849)
Fiscal deficit (-1)	0.0628	-0.0402
	(0.0477)	(0.0307)
Government consumption (-1)	0.00759	-0.0402
	(0.0874)	(0.0457)
Money supply (-1)	-0.00475	0.00148
	(0.0124)	(0.00608)
Constant	-2.840	-2.410***
	(2.006)	(0.885)
Observations	361	453
Pseudo R-squared	7.26e-21	1.90e-13

Table C.2. Dependent variable is the recession indicator, which takes on value 1 in a recessionary period.
*Explanatory variables are one-month lags. Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$*

VARIABLES	(1) Recession Probit	(2) Recession Probit
Recession (-1)		4.087***
		(1.014)
Credit growth (-12)	-0.0419	-0.185
	(0.0872)	(0.142)
Credit availability (-12)	0.00624	-0.00497
	(0.00522)	(0.0103)
Equity price (-12)	0.00919	0.0195
	(0.00648)	(0.0145)
Housing price (-12)	0.0145	0.0346
	(0.0112)	(0.0264)
Trade union density (-12)	0.0237	0.0237
	(0.0165)	(0.0380)
Fiscal deficit (-12)	-0.0846	-0.166
	(0.0710)	(0.166)
Government consumption (-12)	0.121	0.201
	(0.0848)	(0.164)
Money supply (-12)	-0.0162	-0.0313
	(0.0117)	(0.0229)
Constant	-5.992***	-9.099**
	(2.161)	(4.605)
Observations	361	361
Pseudo R-squared	4.29e-15	9.06e-14

Table C.3. Dependent variable is the recession indicator, which takes on value 1 in a recessionary period.
Explanatory variables are one-year lags. Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix D: **List of missing data points**

Credit growth & credit availability: Missing until October 1960: Austria, Switzerland, Germany, Italy, Norway, Portugal. Missing until 1961: Netherlands, Sweden. Missing until 1963: United Kingdom. Missing until October 1966: Denmark. Missing until October 1969: France. Missing until 1970: Spain (January), Belgium, Finland, Greece (October). Missing until April 1971: Ireland. Missing until October 1989: Hungary. Missing until 1992: Poland. Missing until 1993: Czech Republic. Missing until 2002: Luxembourg.

Equity price: Missing until 1983: Denmark. Missing until 1985: Belgium, Greece, and Spain. Missing until 1986: Norway. Missing until 1988: Portugal. Missing until 1991: Hungary (January) Poland (May). Missing until September 1993: Slovak Republic. Missing until 1994: Czech Republic (January), Slovenia (June). Missing until June 1996: Estonia. Missing until 1999: Luxembourg.

Housing price: Missing until 1970: Switzerland. Missing until 1976: United States. Missing until 1988: Portugal. Missing until 1990: Italy. Missing until 1992: Norway. Missing until 1995: Netherlands. Missing until 2000: Austria, Germany. Missing until 2002: Denmark. Missing until 2005: Belgium, Estonia, Ireland, and Sweden. Missing until 2006: France, Greece, Slovak Republic, and Spain. Missing until 2007: Hungary, Luxembourg, and Slovenia. Missing until 2008: Czech Republic. Missing until 2010: Finland, Poland.

Collective Bargaining Coverage rate: Missing completely: Poland. Missing until 2000: all countries. Missing from 2013: all countries.

Trade union density or union membership: Missing until 1970: Luxembourg. Missing until 1977: Greece. Missing until 1978: Portugal. Missing until 1980: Spain. Missing until 1991: Slovenia. Missing until 1994: Slovak Republic.

Employment Protection Legislation index: Missing until 1985: all countries. Missing from 2013. Missing until 1990: Hungary. Missing until 1993: Czech Republic. Missing until 2008: Estonia, Luxembourg, and Slovenia.

Public debt: Missing until 1995: all countries. Missing until 1998: Ireland. Missing until 1999: Switzerland. Missing until 2001: Slovenia. Missing until 2002: Luxembourg. Missing until 2003: Poland. 2016 missing: Austria, Czech Republic, Estonia, France, Germany, Ireland, Italy, Luxembourg, Slovak Republic, Switzerland.

Fiscal deficit: Missing until 1970: United States. Missing until 1975: Finland. Missing until 1978: France. Missing until 1990: United Kingdom. Missing until 1995: all other countries.

Government consumption: Missing until 1970: Germany. Missing from 1971 to 1980: Switzerland. Missing until 1990: Czech Republic, Slovak Republic. Missing until 1991: Hungary. Missing until 1995: Estonia, Slovenia.

Central bank rate: Missing until March 1986: Norway. Missing until 1987: Hungary. Missing until 1996: Czech Republic. Missing until 1999: all Eurozone countries except for: Slovenia until 2007, Estonia and Slovak republic until 2009.

Money supply: Missing until 1970: Denmark. Missing until October 1986: United Kingdom. Missing until November 1989: Hungary. Missing until 1990: Poland. Missing until 1992: Czech Republic. Missing until February 1998: Sweden.