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Rethinking Credit Risk under the Malinvestment Concept: The Case of Germany, Spain and Italy

*Aykut Ekinci**

Abstract:

This study argues that increasing malinvestment in an economy raises the actual credit risk but not the calculated credit risk until the onset of a recession. To this end, I analyse the relationship between credit risk and malinvestment in Germany, Spain, and Italy using a credit risk indicator based on nonfinancial corporate bond yields and annual loan growth for nonfinancial corporations from January 2004 to November 2014 on a monthly basis. The study also analyses Italy using sectorial non-performing loans data since Italy was the most affected by malinvestment among the countries in question. As a result, this paper suggests that banks should include malinvestment as a subcomponent of credit risk and recognize that the actual credit risk is higher than the calculated credit risk during artificial booms. This recommendation also underscores that malinvestment should be analysed more empirically.

Key words: Credit Risk; Malinvestment; Monetary Transmission Mechanism; Austrian Business Cycle.

JEL classification: B53, E32, E50.

1 Introduction

Despite six years have passed since the 2008 global financial crisis, the crisis's adverse effects continue to ail many countries. Notwithstanding the European Central Bank's (ECB) conventional and unconventional monetary policies,¹ certain economies within the euro area still struggle with lower growth, high unemployment, weak loan growth, higher financial vulnerabilities and public debt. However, the crisis has affected some countries to a lesser degree and they have managed to grow. We have seen such results within the euro area, despite its single currency and monetary policy; thus, it has increasingly become an important area of research for economists.

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¹ The ECB deposit facility rate was 3.25 percent on October 15, 2008, and -0.20 percent on September 10, 2014, in accordance with the traditional Keynesian recommendation of decreasing interest rates to support investment. Furthermore, the ECB's balance sheet was €1.5 trillion just before the 2008 global crisis and increased to around €3 trillion in 2012 through long-term refinancing and other monetary operations. Rodríguez and Carrasco (2014) provide a chronological analysis of the ECB's monetary actions between 2007 and 2014.

The ECB illustrates the effects of the monetary policy on economic growth through the monetary transmission mechanism, which is shaped by mainstream (neoclassical) economics; its approach has been mainly based on the traditional Keynesian interest rate channel (see ECB, 2009, 2010a, 2010b, 2013). Since banks are particularly significant in the euro area for the allocation of savings and the financing of firms and households, banking problems that emerged because of the global crisis have inspired many studies, which provide insight into the role banks play in the monetary-transmission mechanism.

Credit risk is the possibility that a bank's borrower will fail to meet their obligations as outlined in an agreement. Credit risk is the most important risk factor in the financial sector in terms of establishing strong connections with both the quality of the banks' balance sheet and loan interest rates. Therefore, the banks' perception of credit risk directly affects loan growth and real output. The effects of credit risk on output have been mostly examined in the literature in terms of the bank lending channel (see Boivin et al., 2010). There is a growing literature on the importance of credit risk for monetary policy, especially after the 2008 global financial crisis (see Ciccarelli, Maddaloni and Peydro, 2010; Hempell and Kok Sørensen, 2010; Gilchrist and Egon, 2012; Gilchrist and Mojon, 2014).

However, the literature on credit risk disregards malinvestment, a significant component of the Austrian business cycle theory (ABCT). In the ABCT, artificially low interest rates are the trigger for cheap credit growth, and malinvestment is the transmission mechanism for cheap credits. Therefore, malinvestment is the main determiner of the length and amplitude of the cycle (see Hayek 1931, 1941). Investments made with cheap credits rather than real savings signify the emergence of malinvestment. Generally speaking, malinvestment illustrates how cheap credits created by artificial low interest rates misguide entrepreneurs. The excessive credit growth through low interest rates distorts entrepreneurs' profit-and-loss calculations, in that they calculate a high investment return; the banks' perception of credit risk correspondingly decreases. Malinvestment rises as unfeasible projects are misevaluated as being feasible because of the strong demand fostered by artificially cheap credit. Central banks then raise rates out of fear of inflation. The inevitable conclusion is the slowing of credits, and a decrease in the demand for consumer and capital goods with the increase in borrowing costs. Because of malinvestment, bankruptcies occur and the economy enters a recession. An increase in credit risk emerges at the beginning of the recession because of poor economic data. A growing literature recognizes the importance of ABCT in explaining the 2008 financial crisis (Cwik, 2008; Ebeling, 2008; Tempelman, 2010; Boettke and Coyne, 2011; Cochran, 2011; Young, 2012a & 2012b).

In this paper, I argue that increasing malinvestment, via low interest rates and cheap credits, raises the *actual* credit risk but not the *calculated* credit risk (in calculations such as non-performing loans rates [NPL] and default rates, and in Value at Risk models) until the economy runs into a depression. Section 2 explains the role of malinvestment in the ABCT. Section 3 examines the role of credit risk within the banking system and its relationship with output. Section 4 examines the relationship between credit risk and malinvestment by analysing the loan and credit-risk data of Germany, Spain, and Italy, three major euro-area countries. Section 5 solely focuses on Italy by analysing sectorial NPL ratios.

2 Transmission Mechanism of the ABCT: Malinvestment

The difference between the natural interest rates and the market interest rates is what triggers economic fluctuations, according to the ABCT. Market interest rates—that is, short-run interest rates—are driven below the “natural rate” as a result of credit expansion by the central bank. Market rates are determined by the supply of and demand for loanable funds, while the natural rate is an expression of individuals’ time preferences—that is, their preferred rate of substitution between present goods and future goods. As a result of the differential, without any change in time preferences, entrepreneurs seek to invest more while consumers also try to take advantage of the artificially low interest rates by consuming at an increased rate.

Investments financed by cheap credits rather than real savings amount to malinvestment. To better understand malinvestment, it is helpful to focus on the role entrepreneurs have in the economy. From an Austrian perspective, the market process is generated by entrepreneurs who are integrating capital with labour in various combinations to produce what they believe consumers will want. Consumers value a consumer good because of the utility they expect the good to deliver. Likewise, entrepreneurs value capital goods because of the expected value the consumer will bring in the future. In this way, the value of capital goods is tied to consumer demand; thus it is termed “derived demand.” The concept of derived demand was originally developed by Menger (1871). To demonstrate this concept, Menger divided processes of tobacco production into those based on “higher-order,” capital goods and those based on “lower-order,” consumer goods, a distinction concerning how far these goods were from the final point of consumption. If people were to stop smoking, the prices of goods and services involved in the production of tobacco would fall drastically. For that reason, artificially low interest rates are the main reason consumers are misled to increase their spending and entrepreneurs to miscalculate their investments as being profitable.

The increased demand associated with lowered interest rates also misleads investors in calculating their expected returns and the net present value of their investment projects. Therefore, they also estimate a lower credit risk for their investment projects; the banks correspondingly assume that the credit risk of investment is low (meaning, a high probability that the loan will be repaid). In this situation, the economic variables used by the banks and investors to analyse the credit risk are increasingly degraded. The effect of malinvestment depends on how much (in basis points) and for how long the artificial interest rates deviate from the natural interest rates and how this deviation affects the credit market.

Increasing investment and consumption expenditures cause the reallocation of resources within the economy. On the one hand, because of increased investments, resources are transferred from the middle and comparatively late stages to the early stages. On the other hand, increased consumption causes resources to move from the intermediate and early stages to late and final stages of production. The supply of capital goods becomes scarce; as a result, the entrepreneurs are unable to complete their projects. Mises (1963:556) explains this situation as follows:

The unavoidable end of the credit expansion makes the faults committed visible. There are plants which cannot be utilized because the plants needed for the production of the complementary factors of production are lacking; plants the products of which cannot be sold because the consumers are more intent upon purchasing other goods which, however, are not produced in sufficient quantities; plants the construction of which cannot be continued and finished because it has become obvious that they will not pay.

Mises (1963:557) also aptly describes the state of the entrepreneurial class:

The whole entrepreneurial class is, as it were, in the position of a master-builder whose task it is to erect a building out of a limited supply of building materials. If this man overestimates the quantity of the available supply, he drafts a plan for the execution of which the means at his disposal are not sufficient. He oversizes the groundwork and the foundations and only discovers later in the progress of the construction that he lacks the material needed for the completion of the structure. It is obvious that our master-builder's fault was not over-investment, but an inappropriate employment of the means at his disposal.

As Mises (1963:559) underscores, boom periods last as long as banks continue to provide cheap credits. However, because of the fear of inflation, central banks eventually raise policy rates. The inevitable conclusion is the slowing of credits, and a decrease in the demand for consumption and investment because of the increase in borrowing costs. Because of malinvestment, bankruptcies occur and the economy enters a recession. The length of the recession mainly depends on the size and duration of malinvestment.

An increase in credit risk emerges at the beginning of the recession. Because of the poor economic data, the calculated credit risk increases rapidly and an increase in nonperforming loans degrades banks' balance sheets. At the end, the recovery is dependent on the power of malinvestment in the economy. In other words, the recovery is contingent upon the health of the real sector.

3 Credit Risk

I now turn to measuring credit risk and the role of credit risk within both the banking system and the monetary transmission mechanism.

3.1 Why Credit Risk Is Important for Banks

Considering that banks serve as intermediaries between savers and borrowers, their first function is to make loans. Hence, financially supporting the right investment decisions helps ensure the banks' long-term sustainability. For banks, a proper investment decision means the greatest return on investment at the lowest credit risk. The main challenge in providing credit is accurately measuring credit risk. The misvaluation of credit risk leads to an increase in nonperforming loans. Each loan without repayment decreases banks' profit, decreases their equity, and in the end, may result in bank failure if the bank cannot pay off its liabilities. Therefore, the measuring and management of credit risk is critical for banks; this process involves the following steps:

After the credit application, the first step for the bank is to assess the credit risk of the investment in the feasibility report. The purpose of the feasibility report is to evaluate the investment project to judge the investor's capacity to repay the loan; it can be prepared either by the bank's own staff or by an outside institution. A feasibility report generally includes some analysis of the project's profitability, supply and demand conditions, price movements, general and sectorial conditions, and the effects of substitute and complementary goods, as well as technical analyses of the investment and other components. Expectations regarding economic variables are important for the feasibility report because they concern the future, which is concurrently the loan period. As the ABCT has indicated, if the economy is in the boom period and there is malinvestment, entrepreneurs optimistically evaluate future variables based on past variables such as income, expenditure, profitability, sales, and prices. In this situation, feasibility reports can too easily assess the investment as profitable—in other words, they record low credit risk for the investment.

The next step in assessing the credit risk involves the preparation of internal reports by the bank for the board of directors and legal reports for the regulatory institution. European banks prepare the credit risk reports in accordance with the Basel regulations. In general, the Basel Accord as a legal report requires banks to provide a minimum capital-adequacy ratio, which is a ratio of equity capital to

total risk-weighted assets (credit, market, and operational risk). Credit risk is the most important input in calculating risk-weighted assets; thus, it is the most significant determiner of the minimum equity for continuing banking services, particularly for providing loans. The credit risk is mostly based on the quality of banks' collaterals as determined by the Basel Accord. Boom periods raise the quality of commercial and real estate collaterals by distorting their prices. This situation decreases the credit risk and increases the loans, including credit derivatives.

Essentially, calculating the credit risk concerns the probability of default (PD). Rating agencies such as Moody's and S&P categorize firms' credit risk according to their calculated PD value. The PD value denotes the creditworthiness of corporate bonds by categories such as Aaa, Aa, A, Baa, Ba, B, and Caa. These grades can be used for credit risk mitigation according to the Basel Accord. In this way, as these grades change the capital-adequacy ratio, the credit risk that has been measured by the rating agency directly affects the firm's borrowing costs and the bank's ability to provide loans. Normally, rating agencies only compute credit ratings for big companies with bonds traded on the market. Therefore, banks compute the PD value for their own credit portfolio which includes big and small companies, when preparing internal reports for themselves and preparing Basel reports.

The internal credit risk report is prepared for the bank's board of directors and is the main consideration in the bank's credit risk management. The internal credit risk report essentially consists of two main parts: the first part contains some descriptive and inferential statistics on the loans; and the second part contains credit risk models. Descriptive and inferential statistics on the loan portfolio, such as the concentration of loans and nonperforming loans, and big-loans analyses are used to understand the general structure of loans. Credit risk models² such as Altman's Z score, Credit Value at Risk, and CreditMetrics, and various stochastic models such as Vasicek and Black-Scholes, are all used to measure the credit risk. All these statistical models, in computing the PD value, generally involve price information on traded bonds; profitability ratios, such as return on assets; and balance-sheet ratios, i.e., the current ratio and the debt-to-equity ratio.

All analyses measuring the credit risk, ranging from the most basic to the most complex, utilize financial variables and ratios. If these financial variables and ratios reflect the boom period created by cheap credit, even when the calculated credit risk is correct statistically and theoretically, the actual and the calculated credit risks differ. Hence, investments are seen as being profitable and the

² Since this study is not intended to focus on the mathematics related to credit risk models, I do not explain the models. See Hull (2015) for more information on credit risk models.

calculated credit risk as being low. The continued creation of credits continues to misguide investors and banks. The ideal solution to eliminating the malinvestment is to avoid implementing an artificially low interest rate policy; however, in practice this does not occur. Given that condition, the inclusion of malinvestment within calculated credit risk can impede the misdirection of investment.

In the following section, I discuss the effects of credit risk on output.

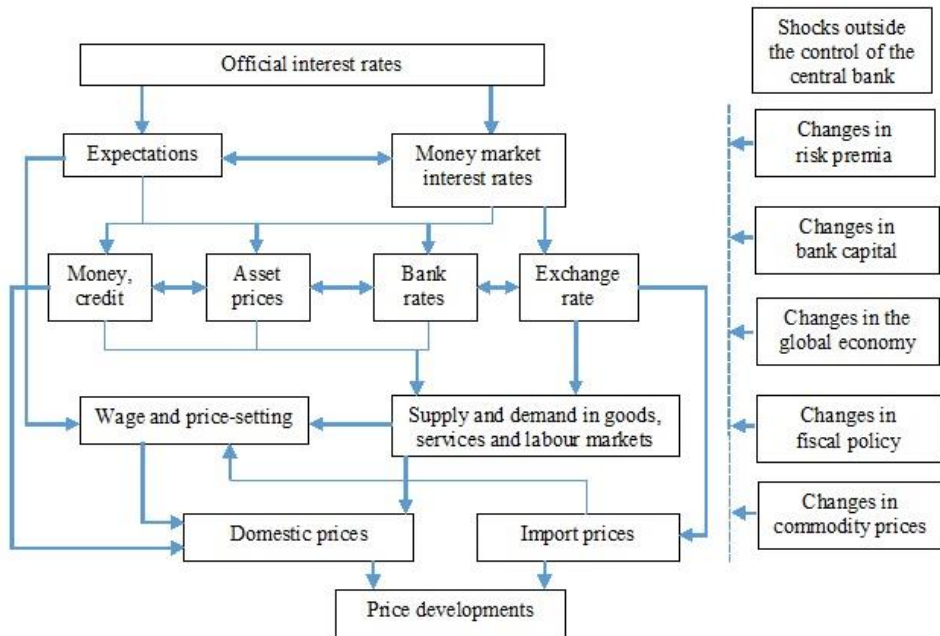
3.2 The Effect of Credit Risk on Output

In a narrow sense, the monetary transmission mechanism describes how changes in political interest rates impact real variables, such as aggregate output and employment. Boivin et al. (2010) categorized the monetary-transmission mechanism into two main classes: neoclassical and non-neoclassical channels. Among the neoclassical cases are the investment model of Jorgenson (1963) and Tobin (1969); life-cycle / permanent-income models of consumption, such as Modigliani and Brumberg's (1954), Friedman's (1957), and Ando and Modigliani's (1963); and the international IS/LM-type models of Mundell (1963) and Fleming (1962). There are three non-neoclassical channels involving market imperfections: effects on credit supply from government interventions in credit markets; bank-based channels (bank lending and bank capital); and the balance-sheet channel (for more information, see Boivin et al., 2010). However, the relationship between monetary policy and output is still a "black box" (see Bernanke and Gertler, 1995) and the most studied area in monetary economics.

The ECB's understanding of the transmission mechanism is stylized in figure 1. Changes in political interest rates affect the rates on bank lending and deposits, and, hence, consumption, saving, and investment decisions. In turn, these decisions influence aggregate demand, ultimately leading to changes in price-setting behaviour and inflation expectations. This channel, usually referred to as the interest rate channel, is the most significant channel within the euro zone. The two other channels through which monetary policy can affect prices are the exchange rate channel and the asset price channel (see ECB 2010a).

Credit risk is mainly described by the ECB as shocks outside the central banks' control in terms of "changes in risk premium," where risk premium consist of two main factors, credit and liquidity risk. However, when taking the literature on the effects of credit risk on output, a new and active area of research, into consideration, it is hard to say that the role of credit risk is only limited and exogenous.

Fig. 1: Illustration of the transmission mechanism from official interest rates to prices



Source: ECB, 2010a.

Most of the studies linking credit risk to the real economy have used diffusion indexes, stress tests, default spreads, expected default frequencies, loan loss provisions, loss given default, and nonperforming loans as credit risk measures. Lacroix and Montornes (2009), Ciccarelli, Madaloni, and Peydro (2010), de Bondt et al. (2010), Del Giovane et al. (2011), and Hempell and Kok Sørensen (2010) demonstrate that the diffusion indexes constructed from the ECB bank-lending survey are significant in predicting credit and output growth in the euro area. Some studies explaining the link between credit risk and the economy have included the stress test to understand its effects on bank balance sheets (Peng et al., 2003, Pesola, 2005). Some other papers focus on the nonlinear relationship between macroeconomic shocks and credit risk (Drehmann, 2005; Jakubík, 2007). Depending on what data sets are provided, the probability of default can be modeled directly (Hamerle, Liebig and Scheule, 2004) or indirectly (Fungačová and Jakubík, 2012). However, such data is often not available, and instead, NPLs are typically used in credit risk models as a measure of credit risk. Glen and Mondragón-Vélez (2011) used twenty-two advanced economies for the period 1996–2008 and indicated that loan loss provisions are determined mainly by real

GDP growth, private sector leverage, and a lack of capitalization within the banking system.

Most of the literature focuses on country-specific studies. For instance, Gambera (2000) and Meyer and Yeager (2001) underscore that a small number of macroeconomic variables are good predictors of nonperforming loans in the United States. Salas and Saurina (2002) analyse bad loans for Spanish commercial and saving banks and find that the main determiners of credit risk are microeconomic, individual-bank-level variables, such as bank-size–net-interest margin, capital ratio and market power, and real GDP growth. Hoggarth et al. (2005) provide evidence demonstrating a direct link between the business cycle and banks' write-offs in the UK. Analogous evidence is provided in cross-country comparisons by Bikker and Hu (2002), Laeven and Majoni (2003), Marcucci and Quagliariello (2008) show that Italian banks' borrowers' default rates rise during recessions. Quagliariello (2007) analyses the Italian banking sector's course over the business cycle. Quagliariello uses loan loss provisions, NPLs, and the return on assets to argue that banks' riskiness and profitability are affected by the business cycle. Louzis, Vouldis, and Metaxas (2012) argue that macroeconomic variables such as GDP, unemployment, and interest rates are the main determiners of the quality of credits in Greek banking sector.

Following Gilchrist et al. (2009) and Gilchrist and Zakrajsek (2012), Gilchrist and Mojon (2014) construct new credit risk indicators for the euro area, Germany, France, Italy, and Spain, using average spreads on the yield of private-sector bonds relative to the yield on German federal-government securities of matched maturities over the 1999–2013 period. They indicated that credit risk has strong predictive power for economic activity, such as industrial production, unemployment, and real GDP for the euro area as a whole and for individual countries in the euro zone. Moreover, credit risk has substantial predictive content for loan growth. These findings are further supported by FAVAR analysis.

4 The Relationship between Malinvestment and Calculated Credit Risk

As can be seen in the previous section, there are many monetary transmission channels that might explain the impact of monetary changes on an output. The traditional Keynesian interest rate channel is the most widely accepted among these channels. However, despite the ECB's low-interest-rate policy and unconventional monetary interventions following the global crisis, growth remains low and bank loans have been unable to rise to the desired and projected level in most of the euro-area countries. As a result, studies of the banking sector's impact on the monetary transmission mechanism have continued to increase. Credit risk is mostly seen as a category within the bank-lending channel, itself a category of the non-neoclassical channel, and is seen as being an exogenous shock outside of the

central bank's control. There are also an increasing number of studies supporting the notion that credit risk's impact on production is significant. If credit risk is a significant variable affecting output, the question of how malinvestment affects credit risk attains greater importance.

But does credit risk really decrease as malinvestment increases? Can the effects of malinvestment on credit risk only be seen during a recession? I follow the Austrian methodology by analysing the relationship as an event study in order to analyse the empirical relationship between credit risk and malinvestment, without resorting to an econometric analysis. There are few studies³ that are provided as proxies for malinvestment but they are mostly related to the real sector—for example, capacity-usage ratios and sectorial employment. As Mises (1963:559) indicated, a growth in bank loans during the boom period increases the malinvestment. Therefore I used the annual logarithmic growth rate of nonfinancial corporations' (NFCs) loans in Germany, Italy, and Spain in the period 2004:01–2014:11 as proxy for malinvestment.⁴ I selected these countries since they differ in terms of credits and growth and the degree to which they have been affected by the crisis. I gathered the data for each country from the ECB website (see figure 2).⁵

I take the credit risk indicator from Gilchrist and Mojon (2014), who developed new credit risk indicators for the euro area and various other European countries. I use this indicator because the NFCs operate in the countries in question and their debt securities was measured specifically for each country; furthermore, each country's credit risk indicator is continuously updated by Gilchrist and Mojon. The credit risk indicator⁶ acquired for each country's NFCs reflects average spreads on the yield of NFC bonds relative to the yield on German federal-government securities of matched maturities over the 1999–2013 period. Thus credit risk is a spread, and the unit of measure is a percentage point or basis point. For example, the credit risk of NFCs as measured for Italy at time t basically

³ Keeler (2001) used the capacity variable as a resource-allocation proxy. The capacity variable is the ratio of the plant-capacity utilization rate in more capital-intensive industries relative to the rate in less capital-intensive industries. Young (2012a) used the industry-level input–output data for obtaining an index to measure the US time structure of production (i.e., roundaboutness) from 2002 through 2009.

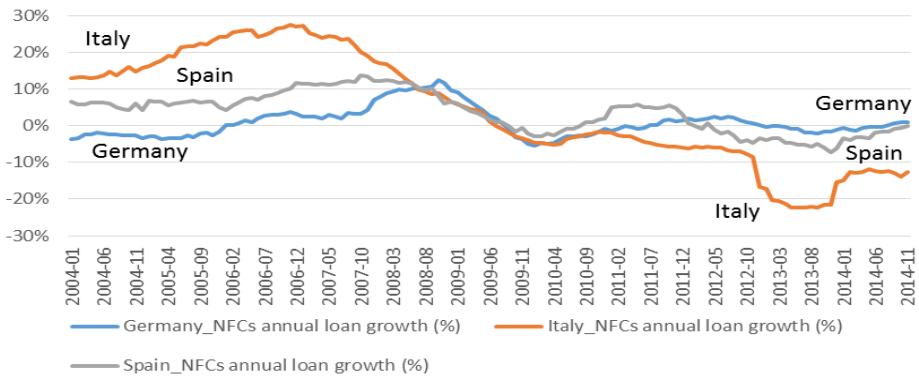
⁴ The dates are formatted as year:month. For example, 2004:01 is January 2004, and 2014:11 is November 2014.

⁵ Respectively, series names for Germany, Spain, and Italy are BSI. M.DE. N.A.A20.A.1.U2.2240.Z01.E, BSI. M.ES. N.A.A20.A.1.U2.2240.Z01.E, and BSI. M.IT. N.A.A20.A.1.U2.2240.Z01.E. Common data features are outstanding amounts at the end of the period (stocks), loans, nonfinancial corporations, (S.11) sector, euro, data that is not adjusted seasonally or for working days.

⁶ For further information on measuring credit risk, see Gilchrist and Mojon (2014).

equals the difference between the bond yields of NFCs in Italy that are active and whose corporate bonds are being traded on the market (e.g., 7 percent) and the yield of German government bonds (e.g., 2 percent), which is taken as the risk-free rate (the spread in this example is five percentage points or 500 basis points). Therefore, the phrase, “the credit risk of NFCs”⁷ used throughout this study, signifies the difference between the borrowing rates of NFCs and the risk-free rate.

Fig. 2: NFCs Annual Loan Growth as Proxy of Malinvestment in Italy, Spain and Germany



Source: Gilchrist and Mojon, 2014.

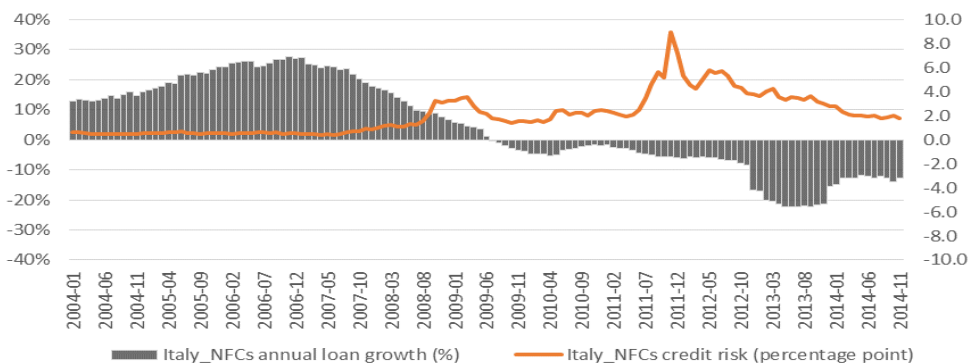
In figure 2, considering the NFCs’ loan growth of the three case countries, it can be seen that malinvestment was strongest in Italy and then Spain because of the strong annual loan growth in those countries. The loan interest rates of euro-area countries decreased while the loan volume increased before the global crisis under the ECB’s implicit protection.⁸ At the beginning of 2004, the annual loan growth for Italy was 13 percent compared with 7 percent for Spain; Italy reached its maximum growth of 28 percent in 2006:11, while Spain’s maximum growth rate was 14 percent the following year (2007:10). This differential is the main reason why malinvestment affected Italy’s economy more strongly than it did Spain’s. Meanwhile, Germany loan growth rose just before the 2008 global crisis; however, this upward trend was short, and corrective effects of the global crisis demonstrated that it would be highly difficult for a strong malinvestment process to begin in Germany.

⁷ Hereafter credit risk.

⁸ The long-term interest rates for Italian and Spanish government bonds converged to the long-term interest rates for German bonds after introducing the euro in 1999 and separated after the 2008 global crisis.

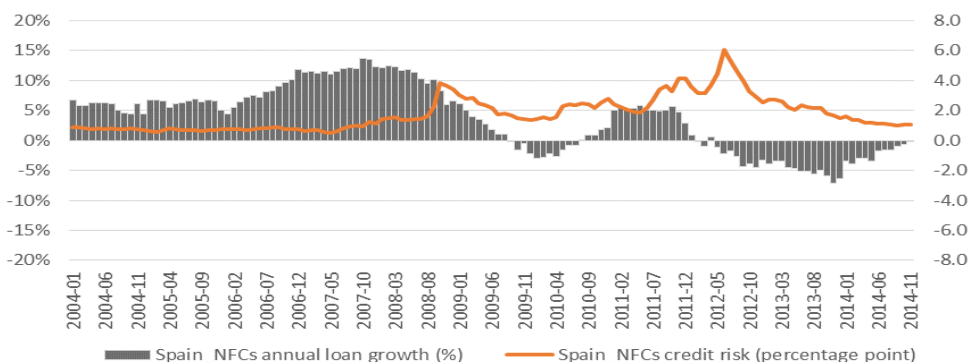
Given that excessive loan growth in NFCs indicates malinvestment in Italy, Spain, and Germany, the credit risk indicator for NFCs in those countries also needs to be considered when analysing the relationship between malinvestment and credit risk. The credit risk in Italy was low despite the high loan growth before the 2008 global crisis (see figure 3). The average credit risk was 0.53 percentage points (fifty-three basis points) during 2004:01–2007:06, and the credit risk started to rise in July 2007. However, the rise in credit risk was not exclusive to Italy, as seen in the Spain and Germany figures. This rise was mainly because of problems in US financial institutions related to subprime mortgages and mortgage-related securities.⁹ This situation is illustrated in figure 6.

Fig. 3: NFCs’ annual loan growth rate and credit risk for Italy



Source: Authorial computation.

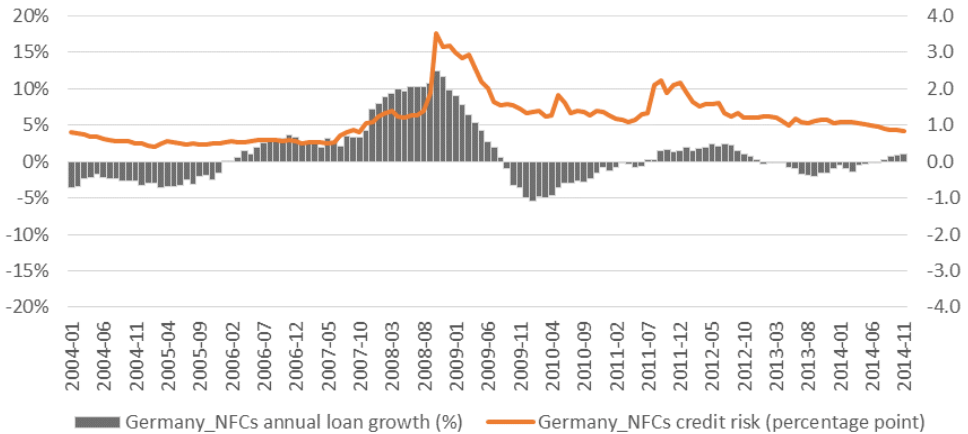
Fig. 4: NFCs’ annual loan growth rate and credit risk for Spain



Source: Authorial computation.

⁹ For the 2008 global crisis timeline, see www.stlouisfed.org/financial-crisis/full-timeline.

Fig. 5: NFCs’ annual loan growth rate and credit risk for Germany

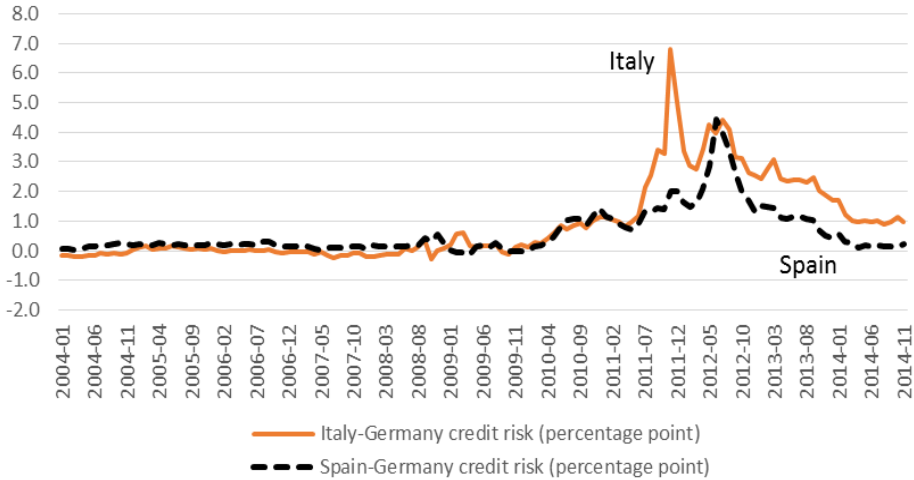


Source: Authorial computation.

A similar situation occurred in Spain’s economy. The average credit risk was 0.74 percentage points during 2004:01–2007:05. The credit risk in Spain started to rise in 2007:06 and reached its local maximum in 2008:10 because of the global crisis. The annual loan growth and credit risk for Germany is shown in figure 5. As with Spain, the credit risk began to rise in Germany in 2007:06. The average credit risk for Germany from 2004:01 to 2007:05 was 0.56 percentage points. The credit risk for Italy and Spain was calculated as very low before the global crisis despite excessive loan growth rates. The course of credit risk in Italy and Spain relative to Germany is analysed in figure 6.

To understand the difference between the NFC credit risks in Italy and Spain and in Germany, I subtracted the NFC credit risks for Italy and Spain from that of Germany to determine the credit risk spreads for Italy and Spain (see figure 6). Until 2010:02, the credit risk of both countries followed Germany’s credit risk closely as can be seen in the figure—the average credit risk between 2004:02 and 2010:01 was 0.0 percent for Italy and 0.16 percent for Spain. This situation demonstrates that there was no significant difference for markets between the credit risk of Germany’s corporations and those of Italy and Spain until 2010:02. The credit risk began to increase simultaneously for Italy and Spain in 2010:02; as a result, the markets could not differentiate the credit risk between both countries until 2011:05. Nonetheless, Italy’s credit risk began to rise in 2011:05 relative to Spain’s one.

Fig. 6: Credit risk spread of Italy and Spain relative to Germany



Source: Authorial computation.

Why could the market not differentiate the credit risk of these three countries until 2010:02 and of Italy and Spain until 2011:05? The answer to this question lies in the ABCT. When the euro currency was implemented, the ECB provided an implicit credit guarantee to the markets. From 2002 to 2006, with the support of the low-interest-rate policy, the interest of sovereign-debt securities decreased and drew closer to the rate of German bonds. Under the ECB's implicit credit guarantee and expansionary monetary policy, fund providers could not see a significant difference in credit risk among Italian, Spanish, and German corporations. The funds on the market were directed toward countries including Italy and Spain and amounted to cheap credits in these countries. The growth of NFC loans supported the development of malinvestment and resulted in misguided growth. Because of increasing income and profits in an expanding economy under malinvestment, calculated credit risks are lower than actual credit risks until problems emerge in the real sector.

Given these facts, banks should include malinvestment as a subcomponent of credit risk and recognize that the actual credit risk is higher than the calculated credit risk during artificial boom periods. Low interest rates, low credit risk, and excessive loan growth create malinvestment in the economy. Banks suffer from nonperforming loans because of malinvestment during the recession; their equity can fall as a result. Furthermore, because of the reshaping of consumer preferences and the time-consuming reallocation of capital goods, the solution to credit risk is not an expansionary monetary policy. An expansionary monetary policy can only

reduce liquidity risk for the short-term; however, a reduction in credit risk is both a long-term concern and is strongly tied to malinvestment.

5 A Closer Look: Italy

In this section, I will analyse malinvestment in Italy more closely. I chose Italy's economy because of its having the highest loan growth among the three countries under study, which resulted in much malinvestment. Furthermore, the availability of extensive data on Italy's sectorial nonperforming loans allows me to analyse malinvestment at the sectorial level.

Italy represents the fourth-largest banking market in Europe,¹⁰ with an estimated total asset value of around €4,000 billion at the end of the first half of 2014. The Italian banking system comprises 694 private banks, most of which conform to the traditional banking model that raises funds through customers to lend to firms and households. In 2012, loans accounted for 68 percent of total banking assets, about ten percentage points higher than the euro-area average, according to ECB data. Additionally, at the end of 2013, bank lending to households and businesses (total €1,400 billion) represented 91 percent of the gross domestic product. Bank loans constitute almost two-thirds of the debt financing of companies; more than one-third of the financial wealth of households is invested in deposits and bonds. A significant indicator of a bank's profitability is its return on equity (net income / shareholder's equity). The ratio was -11.5 percent in Italy in 2013, due mainly to an increase of nonperforming loans¹¹ having resulted from decreased loan repayments, indicating loss of equity (see EBF, 2014).

How can malinvestment in an economy be tracked most closely? The NPL is probably the most reliable indicator when evaluating malinvestment in an economy. According to Italian regulation, NPL is classified into four categories. The first of these categories is known as "bad loans"¹² and identified as "exposures to an insolvent counterparty (even if insolvency is not legally ascertained) or in

¹⁰ After Germany, the United Kingdom, and France.

¹¹ According to the ECB Bank Lending Survey, the main determiners of the tightening of credit standards for Italian banks during the second quarter of 2008 and second quarter of 2014 are as follows: 61.1 percent expectations of economic activity and industry- or firm-specific outlook, 11 percent risk on the collateral, 6.6 percent ability to access market, 1.9 percent liquidity and capital position, and -3.3 percent bank and nonbank competition.

¹² The other definitions are as follows. Substandard loans: exposures to counterparty facing temporary difficulties—defined on the basis of objective factors that are expected to be overcome within a reasonable period of time. Restructured loans: exposures in which a pool of banks or an individual bank, as a result of the deterioration of the borrower's financial situation, agrees to change the original conditions (rescheduling deadlines; reduction of interest rate), giving rise to a loss. Past due: exposures other than those classified as bad loans, substandard, or restructured exposure that are past due for more than ninety days on a continuous basis (Banca d'Italia, 2013).

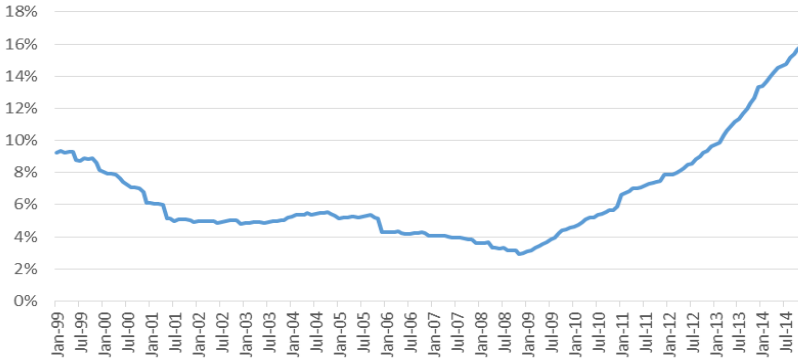
equivalent situations, regardless of any loss estimate made by the bank and irrespective of any possible collateral or guarantee” (Banca d’Italia, 2013). In other words, they are loans that banks do not expect to be repaid.

I used various time series data sets to reach the sectorial NPL ratios in this section; I gathered all data from the Banca d’Italia website. The “bad debt of domestic nonfinancial corporations” data cover the period of 2010:12–2014:12. “Bad debt” data are used to analyse malinvestment in various sectors during the same time period; according to ATECO 2007,¹³ they are classified as present in twenty-four different branches¹⁴ of economic activity. Additionally, two other sets of data, titled “loans to domestic nonfinancial enterprises” and “bad debts of domestic nonfinancial corporations,” from 1999:01 to 2014:12 are used to calculate the NPL ratio over a longer time period. Lastly, “loans to domestic nonfinancial corporations” and the “sectorial loans” series, which have the same ATECO classification, are used to calculate the sectorial NPL ratios in the Italian banking system for 2010:12–2014:12.

Figure 7 displays the NPL ratio I calculated for NFCs within the Italian banking system. When the euro currency was instituted in 1999, the NPL ratio decreased rapidly; in 2001:07, it had decreased to 5 percent and in 2008:11, it reached its minimum level of 2.9 percent. The NPL ratio increased rapidly during the global crisis as a result of increased bad loans. At the end of 2014, the NPL ratio rose to 16.2 percent. A rapid increase in bad loans indicates the presence of malinvestment in the economy.

¹³ATECO (Classification of Economic Activity) 2007: an automatic coding tool that makes it possible to assign an ATECO 2007 code according to a brief description of the economic activity supplied by the user. See www.istat.it/en/archive/17959.

¹⁴The branches: (1) motor-vehicle manufacturing; (2) alimentary products, food and beverage; (3) textile companies, paper manufacturing, and printing; (4) wood-products manufacturing; (5) pharmaceutical or chemical manufacturing; (6) metal and metallurgy-products manufacturing; (7) hardware manufacturing; (8) industry and electronic devices; (9) other manufacturing companies; (10) plastics and rubber-products manufacturing; (11) manufacture of machinery and equipment n.e.c. (1–11) manufacturing; (12) all remaining activities; (13) agriculture, forestry, and fishing; (14) mining and quarrying; (15) electricity, gas, steam, and AC supply; (16) water supply, sewerage, waste management, etc.; (17) construction; (18) wholesale and retail trade; (19) transportation and storage; (20) accommodation and food services; (21) information and communication; (22) real estate activities; (23) professional, scientific, and technical activities; (24) administrative and support-service activities.

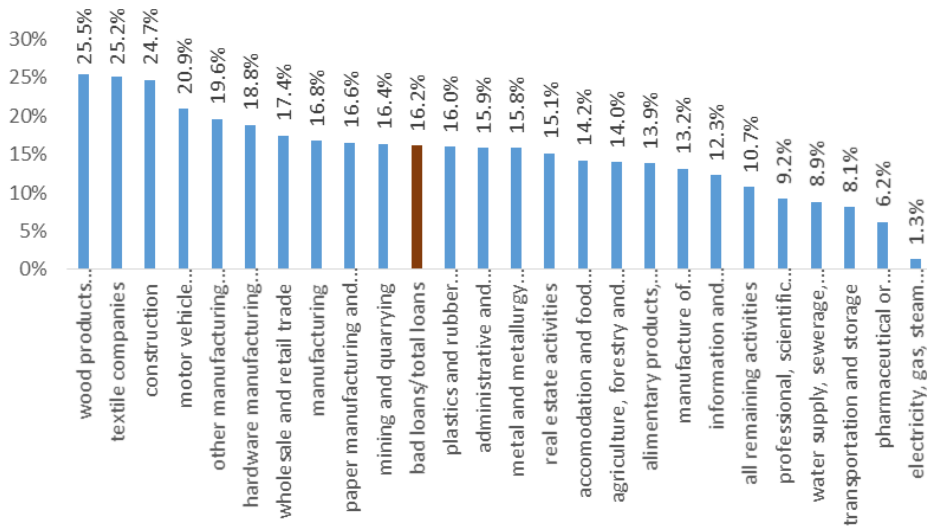
Fig. 7: NPL ratio for NFCs in Italy for 1999:01–2014:12

Source: Authorial computation.

Considering that it is possible to acquire data on bad loans by analysing the various stages of production, we might be better able to examine the malinvestment. However, statistics are not being compiled according to the different stages of production. ATECO 2007 classification provides the most appropriate set of data to analyse malinvestment in the Italian economy through its categorization of twenty-four different branches of economic activity, the first eleven of which are manufacturing sectors. It would be most ideal to compare sectorial bad-loans data from the beginning of the 2008 global crisis to the end of 2014, but since no data was compiled before 2010, data on sectorial bad loans from December 2010 and December 2014 are compared in this study in terms of percentage changes and sectorial shares (see appendix A, table A).

At the end of 2014, four sectors had 83.1 percent of NFCs' bad loans. Construction had 27.3 percent and manufacturing, consisting of eleven subsectors, had 26 percent of the total of bad loans. Wholesale and retail trade had 16.3 percent, and the percentage for real estate activities was 13.5 percent. The concentration of bad loans in construction and real estate sectors is what I expected, considering the relationship between the global crisis and mortgage sector. Manufacturing is a significant component in industrial production; thus, the emergence of bad loans in manufacturing is a natural consequence of lengthening the production process with cheap credits—in other words, a natural consequence of malinvestment. The two branches of manufacturing with the greatest number of bad loans were metal and metallurgy products with 6.5 percent and textile companies with 4.1 percent (see appendix A, table A).

Fig. 8: Sectoral NPL ratios in Italy (December 2014)



Source: Authorial computation.

Sectorial NPL ratios (sectorial bad debt / sectorial loans) are highly important as they indicate how many loans given to a sector are bad loans (see figure 8). The average bad-debt ratio for NFCs was 16.2 percent in December 2014. The sectors with an average NPL ratio of 16.2 percent are wood-products manufacturing (25.5 percent), textile companies (25.2 percent), construction (24.7 percent), motor-vehicle manufacturing (20.9 percent), other manufacturing companies (19.6 percent), hardware-manufacturing and electronic devices (18.8 percent), wholesale and retail trade (17.4 percent), manufacturing (16.8 percent), paper manufacturing and printing (16.6 percent), and mining and quarrying (16.4 percent). The remaining sectors that are below the average NPL ratio demonstrate good performance relative to the aforementioned sectors, but their NPL ratios are still high; the only exception to this pattern is the electricity, gas, steam, and AC supply sector, with the lowest NPL ratio, at 1.3 percent. The sector with the second-lowest NPL ratio is pharmaceutical and chemical manufacturing, at 6.3 percent.

Generally, high NPL ratios and high sectorial NPL ratios influence banks to behave more conservatively in their lending decisions. This is especially true if the levels and ratios of NPLs are continuously rising and if general expectations about economic growth are low. Banks avoid providing loans to the real sector because of high credit risk despite the presence of low interest rates and unconventional monetary actions; for example, the ECB instituted very low interest rates after the global crisis and also gave funds to banks through long-term refinancing

operations (LTROs) with a three-year maturity and 1 percent interest rate. Because of high credit risk (i.e., high default rates and high NPL ratios), the low interest rates are not a significant variable for banks when lending loans. Banks fear the loss of principal since such a loss would directly affect the bank's equity; this fear is the main component banks take into consideration when deciding whether to provide loans in a period of high credit risk. Despite all the ECB's efforts, the high credit risk in question is the primary reason for the lack of loans provided in countries like Italy that have malinvestment.

6 Conclusion

This study argues that increasing malinvestment in an economy, via low interest rates and cheap credits, raises the actual credit risk but not the calculated credit risk (such as nonperforming-loan rates, default rates, Value at Risk models) until the economy hits a depression. To this end, I analysed the relationship between credit risk and malinvestment for the NFCs of Germany, Spain, and Italy, three significant countries within the euro area. The credit risk indicator acquired for each country's NFCs reflects average spreads on the yield of NFCs' bonds relative to the yield on German federal-government securities. Malinvestment is measured as the annual logarithmic growth rate of NFCs' loans for Germany, Italy, and Spain. Despite excessive loan growth in Italy and Spain, we see both countries had low credit risks before the 2008 global crisis. The primary reason for this low credit risk is the ECB's low-interest-rate policy between 2002 and 2006 and the implicit credit guarantee it provided as a lender of last resort. Under the ECB's implicit credit guarantee and with its expansionary monetary policy, providers of funds could not see a significant difference in credit risk among Italian, Spanish, and German corporations. The funds on the market were directed towards countries including Italy and Spain and amounted to cheap credits. As Mises (1963:559) indicated, the continued issuance of credits misguides investors and banks, resulting in misguided growth.

All analyses measuring credit risk, ranging from the most basic to the most complex, utilize financial variables and ratios, such as default rates, interest rates, and prices. If these financial variables and ratios reflect the boom period created by cheap credit, even when the calculated credit risk is statistically correct, the actual credit risk is different. Because of increasing income and profits in an expanding economy under malinvestment, calculated credit risk is lower than the actual credit risk until the economy falls into a depression. The ideal solution to malinvestment is to avoid implementing an artificially low-interest-rate policy by central banks; however, in practice this does not occur. Instead, banks should recognize that the actual credit risk is higher than the calculated credit risk during artificially boom periods and include malinvestment as a subcomponent of credit risk. If the banks were able to measure the malinvestment in the economy, or more

specifically in the subsector of their interest, they could put the measure into the feasibility analysis or credit risk models and better avoid misguided investment decisions. This conclusion underscores that malinvestment should be explained more empirically. The only way of including malinvestment in credit risk models is to identify malinvestment in a calculation such as a malinvestment index, much like a customer price index or industrial production index.

Because of high credit risk, the low short-term interest rates are not a significant variable for banks when lending loans. Banks fear the loss of principal since such a loss would directly affect the bank's equity; this fear is the main thing banks take into consideration when deciding whether to provide loans in a period of high credit risk. Despite all of the ECB's efforts, the high credit risk in question is the primary reason for the lack of loans provided in countries like Italy that face malinvestment. Furthermore, because of the reshaping of consumer preferences and the time-consuming reallocation of capital goods, the solution to credit risk is not an expansionary monetary policy. An expansionary monetary policy can only reduce liquidity risk in the short-term; a reduction in credit risk is both a long-term concern and a concern strongly tied to malinvestment.

Among the three case studies, the Italian economy was affected most by malinvestment as a result of having the strongest loan growth on a relative scale, thus warranting its own section in this study. The availability of extensive data on Italy's sectorial nonperforming loans enabled us to analyse malinvestment on a sectorial basis. According to the sectorial NPL ratios for the end of 2014, the average NPL ratio was 16.2 percent, resulting in heavy malinvestment in the Italian economy. All sectors had high NPL ratios, with the exception of the electricity, gas, steam, and AC supply sector, whose NPL ratio was 1.3 percent; sectors with the highest NPL ratios were wood-products manufacturing (25.5 percent), textile companies (25.2 percent), and construction (24.7 percent). To better see and calculate the effects of malinvestment on the economy, it is highly recommended that statistical institutions collect loan-related data in accordance to the stage of production.

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Appendix A**Table A. Shares of Economic Activities in Bad Loans and Percent Change between 2010:12–2014:12**

Italian Banking Sector	% share (2014:12)	% change (2010:12– 2014:12)
Bad Debt of Domestic Non-financial Corporations	100%	157.2%
(1) motor vehicle manufacturing	1.3%	55.6%
(2) alimentary products, food and beverage	3.2%	123.9%
(3) textile companies	4.1%	60.2%
(4) paper manufacturing and printing	1.2%	96.6%
(5) wood products manufacturing	2.6%	158.3%
(6) pharmaceutical or chemical manufacturing	0.7%	110.0%
(7) metal and metallurgy products manufacturing	6.5%	125.7%
(8) hardware manufacturing industry and electronic devices	1.7%	67.7%
(9) other manufacturing companies	1.2%	79.8%
(10) plastics and rubber products manufacturing	1.3%	117.1%
(11) manufacture of machinery and equipment n.e.c.	2.2%	78.5%
<i>(1–11) manufacturing</i>	<i>26.0%</i>	<i>97.3%</i>
(12) all remaining activities	2.0%	45.9%
(13) agriculture, forestry and fishing	2.0%	136.6%
(14) mining and quarrying	0.3%	282.8%
(15) electricity, gas, steam and ac supply	0.3%	739.2%
(16) water supply, sewerage, waste management etc	0.6%	151.7%
(17) construction	27.3%	263.8%
(18) wholesale and retail trade	16.3%	144.2%
(19) transportation and storage	2.6%	143.2%
(20) accommodation and food services	3.4%	137.5%
(21) information and communication	1.4%	122.6%
(22) real estate activities	13.5%	233.6%
(23) professional, scientific and technical activities	2.0%	163.2%
(24) administrative and support service activities	2.2%	118.5%

Source: Authorial computation.

