

跨產業金融感染與公司重整聲請

Inter-Industry Financial Contagion and Reorganization Filings

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摘要：公司破產重整事件為會計、經濟、財務領域中的重要議題，但目前的相關研究論述不只稀少，而且侷限於重整策略、程序、成本或者對公司股東利益之探討，對於重整事件對其他利害關係人引發的金融感染以及因而產生的財富效應等議題罕有著墨。本文由破產重整情境探討公司聲請重整的宣告事件與其債權銀行的股東財富之間的關係，主要的創新與貢獻性在於以實證方式確立公司之重整聲請事件對其最大債權銀行的跨產業金融感染效應。此外，在迴歸模型中使用的變數亦特別考慮到銀行業特性（例如，銀行多角化、借款企業規模、借款企業年資、借款企業財務品質等），以提升模型的有效性。以臺灣地區重整聲請資料之研究結果證實，借款公司的重整聲請確實對最大債權銀行造成不利的跨產業金融感染效應，然而此一跨產業效應為期不久、影響也有限。

關鍵詞：金融感染；跨產業關聯；重整聲請；債權銀行

Abstract: Corporate bankruptcy and reorganization are important issues in the areas of accounting, economics, and finance, yet this subject has attracted far less attention in the literature. Given that existing studies in this line of research focus primarily on the strategies, procedures, and costs of reorganization, or on its economic impact on shareholders' value, this empirical study, being set out to examine the inter-industry financial contagion effect of a debtor firm's

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reorganization filing on the main creditor bank's shareholder wealth, contributes to the scant but promising literature. Moreover, to enhance the usefulness of the regression model, a set of predictor variables (such as bank diversification, debtor size, debtor age, and debtor financial quality) is elaboratively organized as per the features of banking sector. An underlying analysis of the reorganization filing data in Taiwan suggests that main creditor banks experience weak but significant negative announcement returns when their debtor firms file petitions for reorganization, which proves the existence of inter-industry financial contagion in bankruptcy reorganization contexts, though such an effect is limited and short-term.

Keywords: Financial contagion; Inter-industry effect; Reorganization filing; Creditor bank

1. Introduction

A banking relationship is based on the idea that the long-term tie between the primary lenders, or main creditor banks, and their debtor firms may generate value and increase economic efficiency (Petersen and Rajan, 1995; Chi, 2009, 2010; Tang, 2010a). Extant empirical evidence on the value of the lending relationship has largely focused on documenting the benefits to the debtor firms. Contemporary banking theories assert that a durable debtor-bank relationship is beneficial to both small, informationally opaque debtor firms (Diamond, 1984; Ramakrishnan and Thakor, 1984; Petersen and Rajan, 1995; Berger and Udell, 1995; Bodenhorn, 2003; Akhavein, Goldberg, and White, 2004; Fields, Fraser, Berry, and Byers, 2006) and to large ones (Lummer and McConnell, 1989; Slovin, Sushka, and Polonchek, 1993; Elsas and Krahn, 2004; Fuss and Vermeulen, 2006).

In general, an endurable relationship leaves some room for flexibility and discretion in facilitating implicit long-term contracting which allows the utilization of subtle information, from which, debtor firms receive four potential benefits. First, debtor firms with extended relationships face lower credit costs. Second, long-term client firms are asked to provide less stringent personal

guarantees, which are an efficient alternative to stringent collateral. Third, long-standing client firms are more likely to have loan terms renegotiated in periods of a credit crunch. Fourth, a stronger relationship is associated with a lower likelihood of credit rationing (Boot, 2000; Bodenhorn, 2003; Berlin and Mester, 1999; Chi, 2010; Tang, 2010b).

To date, the literature on the advantages of such relationships for creditor banks is scarce, except for Boot (2000), Bharath, Dahiya, Saunders, and Srinivasan (2007), Chi (2009, 2010), and Tang (2010a, 2010b). These sources report that for a relationship lender, the comparative advantage via the utilization of proprietary information over a long period of time yields two potential benefits. On the one hand, a main creditor bank would be more prone to offer future information-sensitive products and multiple fee-generating services to the same debtor firm as compared to a non-relationship bank. On the other hand, it can charge a higher cost of borrowing and appropriate most of the value resulting from the use of information monopolies. However, the costs of such a relationship to a creditor bank have been largely neglected. In particular, because a reorganization bankruptcy is a judicially recognized sign of financial difficulty of the highest order, it should severely reduce the value of banking relationships (Tang, 2010b), but this subject has attracted far less attention in the literature. This study therefore attempts to add insight and clarity into the effect of a debtor's reorganization filing on the aggregate shareholder wealth of the main bank.

One possible reason for a creditor bank to support a debtor firm in financial distress is that the bank believes its distressed debtor firms will regain lost ground in their industries in the future. Another plausible reason is that the relationship bank might give the ultimate priority to help the debtor firm in financial difficulty (Isagawa and Yamashita, 2003; Tang, 2010b). Those reasons may lie in the bank's past close ties to the debtor firm, as a result of which the creditor bank knows more about its debtor firm's future prospects, as well as about alternative uses for the firm's assets (Chi, 2009). As such, the creditor bank can lend more than other less-knowledgeable banks (James, 1987; Hoshi, Kashyap, and Scharfstein, 1990). Accordingly, the creditor bank can draw on specific credit granting skills and knowledge formed over a long relationship period when it

wants to coax repayment (Rajan and Gidwitz, 2007).

There is empirical evidence for treating the announcement of a debtor firm's financial distress as a low cost or even no news incident for a lender. Firstly, it is possible that by the time the financially troubled firm files a petition for reorganization, the creditor bank has already reduced its vulnerability to the filer. Secondly, the creditor bank may be capable of recovering its loan in the case of filing event due to the bank's seniority and/or collateral. This therefore implies that loan defaults should be rare events. Thirdly, the value to the debtor bank may already incorporate the petition filing news because of other announcements such as low earnings announcements or a low forecast for the filing debtor or its corresponding industry. Accordingly, the chronological sequence of disparate distress proclamations may have a prominent bearing on how market participants react to message concerning a financially troubled debtor. Therefore, this may diminish the real impact of the filing announcement on its lead lender (Kracaw and Zenner, 1996). Finally, a bank typically diversifies its loans to a large number of debtor firms, so it is likely that the loan default of any single debtor firm, or at most a few debtor firms, will have a negligible impact on the creditor bank (Isagawa and Yamashita, 2003).

Nonetheless, findings from some studies indicate that a distressed event pertaining to a debtor firm can have significant negative impacts on the main bank. Firstly, there is an explicit impact on the lender as a result of the likely default risks due to the debtor firm's suffering. Such an impact is akin to the creditor bank's exposure to the debtor. Thus, this implies that a higher level of vulnerability to the distressed debtor leads the creditor bank to have a loan portfolio which is highly risky, which is less diversified, or which increases the likelihood of regulatory interference (Kracaw and Zenner, 1996; Chi, 2009, 2010; Tang, 2010a, 2010b). Secondly, there may be an oblique influence of the debtor's distress on the shareholder value for the lending bank. For example, a distress incident generates a contagion effect because the reorganization filing conveys the sign of changes in the competitive position within an industry. In other words, distressed firms may signal unfavorable message concerning industry asset values and future prospects to which the lending bank might be exposed. Finally, the event of a

debtor firm's suffering might be inferred as an indication of inadequate loan initiation and credit supervision competence and may reflect the potential loss of reputation of the bank (Bharath *et al.*, 2007; Chi, 2009, 2010; Tang, 2010a). Despite popular sentiment that debtor-bank relationships are beneficial, there remains, however, no universal agreement on the subject, which also motivates the present study.

This analysis of the reorganization filing data over the period 1990-2006 suggests that main creditor banks experience weak but significant negative announcement returns when their debtor firms file petitions for reorganization, which proves the existence of inter-industry financial contagion in bankruptcy reorganization contexts, though such an effect is limited and short-term. These findings differ considerably from those of previous work by Chi (2009), who discriminates between lead and second lending banks and finds that the former experience negative stock price reactions whereas the latter positive. It is clear that a decision of financing a bank loan to a filer in distress reveals negative information signaling power regarding the loan portfolio quality as well as the bank's weak capital position. This may be viewed unfavorably by the investors as an implication that the average quality of the rest of a main lending bank's remaining portfolio will degenerate in consequence (Tang, 2010b).

Not only does this study shed light on the inter-industry efficiency of financial markets, but it also examines and adds insight into understanding the impacts of transaction-, bank- and debtor-specific attributes on shareholder value of the main lending bank. The findings indicate that such a spillover wealth effect varies among shareholders of main banks, and are driven by information content pertaining to the loan size of the transaction-level variables and the size, leverage, and financial quality of the characteristics of the reorganization filers.

The remainder of the paper proceeds as follows: Section 2 discusses the sampling procedure and data; Section 3 presents research methods; Section 4 describes the empirical findings; and Section 5 provides some concluding remarks.

2. Hypothesis Development

This study examines the impact on the shareholders' wealth of the main bank of cross-sectional variation in loan and lender characteristics and cross-sectional variation in financially distressed debtor firm characteristics.

The information on debtor quality is a fundamental issue for a bank to price loans and to allocate capital properly. Therefore, an extensive theoretical literature motivates the utilization of collateral as a means of ameliorating information asymmetries between the debtor firm and lender. Moreover, there is a widespread belief among bankers that collateral is associated with greater default probability (Berger and Udell, 1995). Greenbaum and Thakor (1995) go a step further to state that theoretical literature provides three main reasons for the use of collateral by banks. First, since collateral reduces potential loan loss, the creditor bank is more inclined, other things being equal, to ask for collateral from high-risk clients (Chan and Thakor, 1987.) Second, collateral can be an important cause of problems related to adverse selection in loan contracting and can substitute for information about project quality (Chan and Thakor, 1987; Manove, Padilla, and Pagano, 2001). Finally, loan collateral helps to diminish the moral hazard problem that can arise after a debtor firm has obtained a loan by decreasing its incentives to invest in projects with high risk or by maximizing its effort to assure the success of the project for which loan is granted (Boot, Thakor, and Udell, 1991). Consequently, a secured loan might be associated with a debtor firm's higher quality and a lower probability of *ex post* default risk. This study's first hypothesis is therefore stated below.

H1: It is hypothesized that the debtor firm which pledges more collateral will have less impact on the wealth of its main bank.

Kim, Kristiansen, and Vale (2006) state that loan pricing, especially for high-risk clients, follows a lifecycle pattern; more specifically, loan pricing for a client who has a higher likelihood of defaulting on a loan demonstrates larger unexplained deviations. Gan and Riddiough (2008) indicate that loan price mirrors private information about the quality of the borrowing client, and that

lending banks have an incentive to charge a uniform rate to high-credit-quality clients, and a risk-based rate to low-credit-quality ones. As a result, loan price will be an increasing function of the riskiness of debtor firms in their model. This study therefore conjectures that loan price stands for the main bank's *ex ante* expectation of the riskiness of a debtor firm. It is expected that a higher risk pool is associated with a higher loan rate, and thus a negative coefficient is expected for loan rate. The second hypothesis of this study follows.

H2: It is hypothesized that the debtor firm which is charged a higher loan rate will have more impact on the wealth of its main bank.

As is well known in the literature, debt usage consists of important signals concerning debtor quality and in consequence discloses private information (see Kracaw and Zenner, 1996). The creditor banks not only charge higher loan interest rates to high-risk debtor firms, they also exercise non-price lending terms, such as the size of the loan amount, that expedite monitoring and moderate losses more intensively when debtor firms are risky. That is, loan size is utilized as a complementary tool to help solve an information problem. Specifically, the creditor bank employs this non-price term of contract feature to mitigate liquidity or even the possibility of default at the commencement of a bank-debtor relationship, and to improve its ability to supervise the debtor firm over the course of the relationship because the size of the loan amount confines the potential vulnerability of the creditor bank (Strahan, 1999). Accordingly, creditor banks clearly lend more to more profitable debtor firms. The research discussed above supports the following hypothesis:

H3: It is hypothesized that the debtor firm which is granted a larger loan amount will have less impact on the wealth of its main bank.

In response to the increased pressure caused by global competition, it seems inevitable that banks are searching for ways to widen their range of products and services, with the aim of accomplishing a higher level of economic welfare and economic efficiency. Following the traditional portfolio theory, a larger coverage of products and services, under the condition of imperfectly correlated risks and

the effect of firm inter-dependencies on systemic risk, is likely to improve bank safety (Acharya, Hasan, and Saunders, 2006). That is, a more diversified bank would turn out to be more stable and hence less prone to a crisis. This study would therefore expect a positive coefficient on a bank's diversification and its welfare effect.

H4: It is hypothesized that the main bank is more diversified in its assets and that there will be less impact on its wealth when its financially distressed debtor firms file a reorganization petition.

3. Sample Selection and Data Collection

This section describes the sampling procedure as well as the analysis results of data on the sample firms which filed petitions for reorganization over the study period of 1990-2006. The filings are double checked and replenished with information from various sources, including the Taiwan Stock Exchange (TWSE) Market Observation Post System, the Key Number and Digest System of ROC Law, as well as a variety of non-public news sources (such as the Verification and Disclosure Databank of Material Information of Listed Companies, the Extemporaneous Newspaper Headline & Index database, and the Infotimes database), which yields an initial list of 169 filings. Following the same procedure used by Tang (2010b), the initial sample is filtered by removing filing firms for which the court-related information essential to the analyses are missing (23) or where dissimilarities cannot be settled (2), or which have insufficient accounting materials for the year preceding their announcements (30), or which have no main bank counterpart (19). These eradications have resulted in there being no filing records for the period 1991 to 1994. Besides, when two or more sources yield discrepant dates, this study uses the earliest one.

As to the sample distribution, over fifty percent of reorganization filing cases is clustered in the four-year period from 1999 to 2002, which is congruent with the timing of the shock of the Asian financial crisis and the global economic downturn at that time. As a result of that, the economic condition in Taiwan was

severe, with a depression manifested in deflationary load on goods and asset markets. The government was unable to prevent private-sector confidence from plunging and expenditure from being put off (Hsu and Lin, 2003). Additionally, the feebleness in export markets and a continuing credit crunch resulted in production diminutions and a downward spiral in market values.

Industry groups are based on the TWSE's industry classifications. The current study reveals that the most filings (29) occurred in the electronics and computer industry, followed by textiles, construction, and miscellaneous industries with 9 filers each. Food and steel/iron industries are in a third place with 8 filers each.

The median and mean transaction sizes for the default sample are respectively NT\$387.50 million and NT\$802.51 million. The debtors filing petitions for reorganization are partitioned by the fixed/floating loan rate of the transaction. On average, debtors firms paid a fixed rate of 6.63% (median 6.86%). The median and mean lowest loan rates on the floating-rate portion are respectively 6.10% and 5.76%, while the median and mean highest loan rates are respectively 7.27% and 7.02%. 83.70% of the loan tractions were collateralized.

In this second phase of the sampling design, a main bank, defined as the lead lending bank having the largest loan to the debtor filer among all creditor banks, is selected for each filing firm. Data from the Long- and Short-Term Borrowings Details (LSTBD) database of the Taiwan Economic Journal (TEJ) databank are employed to obtain information of loan transactions, as well as the characteristics of the relationship between filers and their main creditor banks. The LSTBD database includes transaction-explicit information concerning the name of the main bank(s), the loan amount, loan currency, start and maturity dates, loan price, fixed/floating rate, collateral, type of collateral, syndicate information, and credit limit. These data are especially valuable in examining the effect of a debtor's reorganization filing on its main bank, through which the characteristics of the main banks and debtor firms can be identified. Additionally, this study identifies whether a loan was outstanding at the time of filing by checking the corresponding start and maturity dates.

The large number of mergers and acquisitions (M&A) in the Taiwanese

banking industry during the research period poses special considerations. To cope with the difficulties caused by M&A, similar to Chi (2009, 2010) and Tang (2010b), selected data from the TEJ's Company Attributes database are hand-matched to those from the Infotimes database to build a chronology of banking M&A, and in doing so, this study traces banking relationships through time even though original creditor banks no longer exist because of being merged or acquired. This procedure creates an initial list of 4,271 loan transactions that involve debtor firms filing reorganization petitions. To ensure that loan transactions included are reasonably assumed to be outstanding, the initial bank sample is diminished by taking in only transactions entered into on and before the release date of the announcement and having a maturity date after the announcement. With this selection criterion, 3,279 transactions remain in the sample.

Moreover, this study locates the main creditor bank for these transactions by calculating the largest loan to the debtor firm among all creditor banks. This study further eliminates those transactions having a non-bank financial institution or a foreign bank as the primary creditor. The final sample underlying this study comprises 23 main creditor banks. Data on the attributes of debtor firms and main creditor banks are obtained from the TEJ's LSTBD database, Finance-General database, BANK database, and Financial Statement and Analysis database. Meantime, daily stock returns for main lenders are primarily drawn from the TEJ Equity database. Where necessary data were inexistent, they were augmented by information derived from the annual reports, the TWSE, and the Gre Tai Securities Market.

4. Methodology

4.1. Market Model

In order to examine the impact of each of these filing announcements on a debtor's main creditor bank, this study employs a standard event study method. An abnormal return to shareholders of main banks around the date of filing is

estimated utilizing the daily prediction error technique. For a detailed discussion of this method, the reader is referred to the paper by Dodd and Warner (1983). The daily prediction error (PE_{jt}) for the main lender j on date t is defined as

$$PE_{jt} = R_{jt} - \hat{\alpha}_j - \hat{\beta}_j R_{mt} \quad (1)$$

In this study, α_j and β_j are estimated market model parameters obtained by using the pre-estimation period -241 to -61 days relative to the date of filing ($t = 0$). R_{jt} is the return on bank j at time t , and R_{mt} is the return on the market at time t proxied by the value-weighted market index from the TWSE.

The cumulative prediction error (CPE) for bank j (for a given interval of time for T_{1j} to T_{2j}) is computed as follows:

$$CPE_j = \sum_{t=T_{1j}}^{T_{2j}} PE_{jt} \quad (2)$$

The anticipated value of the PE or CPE is zero in the lack of excess performance. The test statistics are referred utilizing the standardized cross-sectional method developed by Boehmer, Musumeci, and Poulsen (1991), which allows for cross-sectional heteroscedasticity and also makes a cross-sectional variance adjustment. The procedure also explicitly adjusts for the time serial standard deviation of abnormal returns within the event interval (Mais *et al.*, 1989). The test statistics are assumed to be distributed unit normal in the lack of excess returns. Following Chi and Tang (2007a) and Tang (2010c), the generalized sign test is employed, which differs from the simple sign test in that the fractions of negative and positive PE s (CPE s) under the null hypothesis are established by the fractions observed in the estimation period rather than fixed at 50%.

4.2. The Model and Empirical Proxies

This study employs a unique data set of bank loans to examine the wealth effects on a main bank while its financially distressed debtor firms file a reorganization petition. A pooled cross-sectional regression model has been evaluated after controlling for the impact of other variables that are related to

lender attributes. The regression equation is given by

$$CPE = \alpha_0 + \alpha_1 \text{COLLATERAL} + \alpha_2 \text{PRICE} + \alpha_3 \text{LOANSIZE} + \alpha_4 \text{DIVERSIFICATION} + \alpha_5 \text{CNTRLVAR}(X) + \varepsilon \quad (3)$$

where,

CPE: a proxy for the measure of the wealth effect for the main bank

COLLATERAL: a dummy variable, taking a value of one if the loan facility to a given reorganized debtor firm is collateralized, and zero otherwise

PRICE: the loan interest rate charged to a given reorganized debtor firm

LOANSIZE: the natural log of one plus the NT\$ amount of the loan facility to a given reorganized debtor firm (in NT\$ million)

DIVERSIFICATION: the degree of diversity of activities conducted by the main banks, the calculation of which is calculated as below (Laeven and Levine, 2007):

$$\text{DIVERSIFICATION} = 1 - \left| \frac{\text{Net interest income} - \text{Other operating income}}{\text{Total operating income}} \right| \quad (4)$$

CNTRLVAR: control variables for debtor attributes, which consist of debtor size (*DEBTORSIZE*, as gauged by the natural log of the debtor's total assets), cash flow ratio (*CASHFLOW*, as estimated by operating cash flow / current liabilities), leverage (*LEVERAGE*, as gauged by total liabilities / total assets), business sector (*SECTOR*, a dummy variable that takes a value of one if the debtor firm is classified as a high tech firm), debtor age (*DEBTORAGE*, the natural log of the number of years since its establishment), historical stock returns (*STOCK RETURN*, a six-month holding-period return preceding the date of filing) (Indro, Leach, and Lee, 1999; Chi and Tang, 2007b), and return on assets (*PROFITABILITY*)

ε : Error term

The expected sign for each coefficient is as follows: $\alpha_1 > 0$, $\alpha_2 < 0$, $\alpha_3 > 0$, $\alpha_4 > 0$.

5. Empirical Findings

5.1. Market Reaction of Main Banks to Filing Announcements by their Debtor Firms

If the announcement of one of its debtor firms' reorganization filing is negative news for the main creditor bank, then this study expects to find adverse information transfer in the shareholder wealth of the main bank surrounding the date of the filing ($t = 0$). The results reported below are largely in accordance with this negative effect conjecture of reorganization bankruptcy.

Tables 1 and 2 reveal the stock price responses of the main creditors to the release of reorganization filing news by their debtor firms. The PE s turn negative and gradually drift down during the period from day -3 to day -1, though insignificantly except for day -3, implying that there is small pre-announcement information leakage. The lowest PE during pre-filing period is on day -3 (-0.267%), followed by day -2 (-0.074%), then day -1 (-0.024%). The main banks suffer stock price declines of -0.229% on day 0 (though not significantly), with a binomial z -statistic of -1.217. These results contradict our previous series of paper (refer to Chi, 2009), which finds a significant wealth loss for the creditor banks on day 0. The proportion of PE^+ (positive PE) banks to the entire main banks is 43.62%; PE^- (negative PE) creditor banks arrive PE^+ ones by 1.29 to 1 in response to debtor firms distress, statistically significant at the 0.1 level (generalized sign z -statistic = -6.326). Whilst the results indicate that it is not significant for the bulk PE s, there does appear to be some pre- and post-announcement downward drift.

It can be inferred from the above results that market investors would undoubtedly adjust the value of those lenders likely to be bound up in financing issues, and accordingly the shareholder wealth of the average main bank is adversely affected by these filing announcements. However, it is worth noting that the vast majority of PE s in the stock market over this study period are not significantly different from zero, which is not consistent with the evidence of Chi (2009). A conceivable explication for the insignificant valuation effects might be

the positive reaction and negative reaction among the aggregate sample of lenders counteract each other, as well as the lead and second lending banks cancel each other out. Because the market may not know with certainty which bank is involved in the financing in at least some of the 95 loan cases in this sample, it is possible that they have to make an educated guess about which banks are the most likely participants in the financing of the loan to the filer.

Table 2 shows the results for various event windows, from which weak but significant negative financial contagion surrounding the date of the filing can be identified. Specifically, the aggregate sample of main banks experience decreases in *CPEs* over all selected intervals ranging from -0.058% to -0.617%, and this was especially so in $CPE_{-1 \text{ to } 0}$ with a significant *z*-statistic of -1.654 ($p = 0.1$). The finding implies that the filing announcement is expected or conceived a day prior to the event date, which leads to small but significant negative announcement returns. This falls within the typical research event interval $[-1, 0]$ (*i.e.*, in the two days at and before the time of filing). Accordingly, this study concludes that the reorganization filing of a debtor has a weak inter-industry financial contagion effect on the market value of its main bank. Such a weak market reaction may reflect the fact that the prior chronological order of various distress announcements, such as low earning announcements or a low forecast for the filer or its industry, may diminish the informational content of subsequent filing announcements by their debtor firms (Kracaw and Zenner, 1996).

The decision of financing loans to distressed filers might convey negative information to the capital market regarding the nettlesome issues in bank loan portfolios, as well as the lender's weak capital position. Indeed, this may be interpreted unfavorably by investors as an indication that the quality of a main bank's remaining portfolio could deteriorate sharply, because there may be a concern that a reorganization filing reflects industry- or economy-wide factors (Tang, 2010b). An announcement of reorganization filing inflicts rigorous repercussions on the corresponding industry for it signals important adverse information about industry asset values and future prospects (Lang and Stulz, 1992; Chi, 2009, 2010; Tang, 2010b).

Finally, the results of generalized sign test show that the percentage of positive to negative *PEs* (*CPEs*) is unequal to the ratio in the underlying period for all selected event windows. Based on the nonparametric Wilcoxon rank-sum test and binomial test, the return differences and mean portfolios of the *PEs* and *CPEs* between the positive-effect bank and negative-effect bank all reach a level of statistical significance ($p = 0.01$).

Table 1
***PEs* for the Main Creditor Banks on the Announcement of Reorganization Filing by their Debtor Firms**

Event day	All banks					Banks with positive <i>PE</i>				Banks with negative <i>PE</i>	
	PE_t (%)	$z(PE_t)$	# Positive ¹	# Negative ²	Generalized sign test	PE_t (%)	$z(PE_t)$	PE_t (%)	$z(PE_t)$	Difference (%)	Wilcoxon rank-sum test
-5	0.030	0.179	41	54	-6.247 ^c	1.002	3.495 ^c	-0.708	-5.695 ^c	1.710	-5.579 ^c
-4	0.160	0.897	41	54	-6.247 ^c	1.156	3.490 ^c	-0.596	-5.462 ^c	1.752	-5.579 ^c
-3	-0.267	-2.177 ^b	39	56	-6.085 ^c	0.550	4.584 ^c	-0.835	-5.597 ^c	1.385	-5.442 ^c
-2	-0.074	-0.490	31	64	-5.388 ^c	1.179	4.485 ^c	-0.680	-5.341 ^c	1.859	-4.860 ^c
-1	-0.024	-0.120	38	57	-6.002 ^c	1.185	3.366 ^c	-0.831	-4.702 ^c	2.016	-5.373 ^c
0	-0.229	-1.217	41	53	-6.326 ^c	0.911	3.610 ^c	-1.133	-5.679 ^c	2.044	-5.645 ^c
+1	0.171	0.955	45	50	-6.559 ^c	1.161	4.199 ^c	-0.720	-4.952 ^c	1.881	-5.841 ^c
+2	0.007	0.043	35	60	-5.747 ^c	1.316	4.613 ^c	-0.756	-5.244 ^c	2.072	-5.159 ^c
+3	-0.122	-0.753	37	58	-5.918 ^c	1.094	4.569 ^c	-0.898	-6.224 ^c	1.992	-5.303 ^c
+4	-0.034	-0.264	52	43	-6.405 ^c	0.663	5.458 ^c	-0.878	-4.955 ^c	1.541	-5.711 ^c
+5	-0.235	-1.649 ^a	40	54	-6.247 ^c	0.636	3.545 ^c	-0.896	-5.598 ^c	1.532	-5.579 ^c

¹ number of main banks with positive *PE*

² number of main banks with negative *PE*

^{a, b, c} denote statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Table 2
CPEs for the Main Creditor Banks on the Announcement of Reorganization Filing by their Debtor Firms

Event interval	All banks					Banks with positive CPE				Banks with negative CPE	
	CPE_t (%)	$z(CPE_t)$	# Positive ¹	# Negative ²	Generalized sign test	CPE_t (%)	$z(CPE_t)$	CPE_t (%)	$z(CPE_t)$	Difference (%)	Wilcoxon rank-sum test
[-5, +5]	-0.617	-1.352	41	54	-6.247 ^c	10.461	4.069 ^c	-9.027	-5.478 ^c	19.488	-5.579 ^c
[-2, +2]	-0.149	-1.169	39	56	-6.085 ^c	5.591	4.021 ^c	-4.147	-5.260 ^c	9.738	-5.442 ^c
[-1, +1]	-0.083	-1.147	42	53	-6.326 ^c	3.227	3.772 ^c	-2.706	-5.212 ^c	5.933	-5.645 ^c
[-1, 0]	-0.254	-1.654 ^a	41	54	-6.247 ^c	2.032	3.491 ^c	-1.990	-5.247 ^c	4.022	-5.579 ^c
[0, +1]	-0.058	-1.161	44	51	-6.482 ^c	2.057	3.962 ^c	-1.883	-5.488 ^c	3.940	-5.777 ^c

¹ number of main banks with positive CPE

² number of main banks with negative CPE

^{a, b, c} denote statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

5.2. Main Banks and Debtor Firms' Specific Characteristics

This section examines the extent to which the announcement effect on a main bank is associated with transaction-, bank- and debtor-specific characteristics. As shown in Table 3, the PRICE variable, as measured by loan interest rate, is essential in influencing shareholder value of the main bank. As expected, results indicate that lower leverage, higher cash flow ratio, and higher profitability are significantly related to lower rates charged on bank loans. Also, the loan contract variable for collateral should be viewed as the reduced form for loan interest rate, and this could also be inferred as echoing the connection between the collateral and the risk of the loan, as reflected in its price.

In addition, the debtor firm's industry sector is found to be another important explanatory factor. The sample mean of this dummy variable is 0.300, which suggests that most debtors in this sample are not high tech firms. The result of this study confirms the argument by Hotchkiss (1995) that industry sector is considered as a contributing determinant in a firm's financial demise. In a similar vein, Cheng and McDonald (1996) and Chi and Tang (2007b) deliver consistent

Table 3
Summary Statistics of Main Bank Characteristics in the Year Prior to Filing

Variables	All banks	<i>CPE</i> ⁻ banks	<i>CPE</i> ⁺ banks	Difference in means test (<i>t</i> statistic)	χ^2 for Friedman rank sum test
COLLATERAL	0.739	0.679	0.806	-0.626	-0.632
PRICE	6.234	6.222	6.079	3.117 ^b	-2.859 ^a
LOANSIZE	18.511	18.376	18.196	0.161	-0.232
DIVERSIFICATION	0.594	0.593	0.556	0.037	-1.363
CNTRLVAR					
DEBTORSIZE	14.020	13.765	13.617	1.182	-1.029
CASHFLOW	-0.455	-2.542	2.644	-0.095	-0.381
LEVERAGE	0.724	0.747	0.651	1.405	-0.813
SECTOR	0.300	0.260	0.290	-0.030 ^b	-3.571 ^b
DEBTORAGE	1.944	2.063	1.778	0.285	-0.784
STOCK RETURN	-0.455	-0.404	-0.205	-0.199	-0.118
PROFITABILITY	-11.432	-11.498	-10.701	-0.617	-0.051

The variables are defined as follows: COLLATERAL is binary, taking a value of one if the loan facility to a given reorganized debtor firm is collateralized, and zero otherwise. PRICE is loan rate. LOANSIZE stands for the natural log of one plus the NT\$ amount of the loan facility to a given reorganized debtor firm (in NT\$ million). DIVERSIFICATION is the degree of diversity of activities conducted by the main banks. CNTRLVAR is a set of control variables for debtor characteristics. These include firm size (DEBTORSIZE), cash flow ratio (CASHFLOW), leverage (LEVERAGE), and business sector (SECTOR, a dummy variable that takes a value of one if the debtor firm is classified as a high tech firm), debtor age (DEBTORAGE, the natural log of the number of years since its establishment), and historical stock returns (STOCK RETURN, a six-month holding-period return prior to the date of filing). In addition, this study includes return on assets to control for debtor financial quality (PROFITABILITY).

^{a, b} denote statistical significance at the 5% and 1% confidence levels, respectively.

results that every individual firm strives to maximize its profit so as to strive for a competitive advantage over its industry counterparts. The intensity of rivalry among firms varies from industry to industry. Bowonder and Sailesh (2005) go a step further to state that most of the low tech industries are less competitive in the market place owing to lack of technology inputs for modernization and the absence of skill development efforts. As a result, the contagion effect would be more pronounced in industries that are characterized by low levels of competition (Erwin and Miller, 1998). Explicitly, the less competition, the more pronounced the negative contagion effect is.

5.3. Cross-Sectional Analysis of the Effect of a Debtor's Filing on the Shareholder Value of the Main Bank

Any decision to invest in reorganization filer may contain information about the quality of the bank's loan portfolio. Basically this is a loan decision under uncertainty and this may be interpreted unfavorably by investors as suggesting that the average quality of remaining loan portfolios for the main bank will suffer as a result. An appropriate design is essential with a view to modeling a main bank selection-over-time mechanism to distinguish creditworthy borrowers from uncreditworthy ones. This is similar to the survivorship effect described in Berger and Udell (1995). For example, banks acquire and accumulate information during their relationships with debtor firms in a high-risk pool that helps them refine the contract terms to debtor firms. Accordingly, financially-troubled debtor firms with a long-term relationship may suffer prohibitively expensive rates or have different collateral requirements on average than firms with a shorter relationship.

In this study, the output variable, *CPE*, is the two-day [-1, 0] cumulative abnormal return ($CPE_{-1 \text{ to } 0}$) for the main lending bank. $CPE_{-1 \text{ to } 0}$ is used as a proxy for the magnitude of the evaluation effect of reorganization filing announcements for it is the only significant event interval over all the selected window periods. Given that the variance inflation factor (VIF) are depicted to assess the extent of multicollinearity, the results for the cross-sectional analysis, displayed in Table 4, indicate that the values of VIF range from 1.004 to 1.836, which suggests the regression coefficients are not influenced by multicollinearity. Then a multiple regression model is employed to examine the variables underlying this study, which can explain about 34.1% of the variation in the observed inter-industry shareholder wealth effects for the main bank in response to the debtor's reorganization filing. The model tested achieves a level of significance based on the *F*-statistic.

The PRICE variable is interestingly positively related to the two-day *CPEs*. This finding is in line with the argument that banks are specialists in providing contractual flexibility and reducing the costs of financial distress for debtor firms (e.g., Gilson *et al.*, 1990; Preece and Mullineaux, 1996; Cantillo and Wright, 1997;

Tang, 2010b). Bank loan rates also seem to move in a smoother fashion than do market interest rates, which is similar to the evidence of implicit risk-sharing agreements in Berger and Udell (1992). However, the effect of the loan interest rate on the cumulative abnormal returns for main bank is not robust.

The positive coefficient on the amount of the loan facility implies that the larger of the bank loan, the higher of abnormal returns for the creditor bank. It, in some way, supports the argument by Berger and Udell (1992, 1995) and Boot (2000) that large scale loans are likely to undergo much more rigorous screening, hence resulting in a lower credit risk. Along the same lines, Jiménez and Saurina (2004) contend that as the loan amount augments, the authority to delegate responsibility for the loan is more limited and the credit granting decisions are made further up the management hierarchy of the lending bank. The involvement of a bigger number of lending officers and their superior experience in the credit granting are crucial to reduce credit risks. Therefore, the larger the loan amount, the less negative the contagion effect.

The coefficient of DEBTORSIZE variable (debtor size) is significant but negatively related to the CPE_{-1} to 0. This suggests that small firms are not monitored by the market as closely as are large firms. Thus, the larger the filing firm, the larger the expected information transfer and therefore the greater the negative impact on the main bank.

As expected, the coefficient for total liabilities to total assets is negative, with a t -statistic of -1.904 which is significant at the 0.1 level. Andrade and Kaplan (1998) indicate that high leverage is the primary cause of distress. Thus, the debtor with higher leverage has higher overall credit risk. Accordingly, this rationale suggests less negative bank returns to the low-leverage debtor.

The coefficient of PROFITABILITY variable, as measured by return on assets ratio, is positive and significant. Since expected profitability is an important determinant of investors' perceptions of a firm, past profitability is usually regarded as a useful predictor of future profitability, and thus can be a guide to comparing firms' financial performance (Tang, 2010c). The findings imply that

debtor firms with greater profitability should less negatively impact on the loss of wealth of a main bank.

Table 4
Summary Statistics of Regression Variables for the Two-Day *CPEs of Main Banks**

Variables	Sign	Coefficient	<i>t</i> -statistic	VIF
Intercept		2.496	1.973 ^a	
COLLATERAL	+	0.007	0.014	1.154
PRICE	−	0.176	0.218	1.449
LOANSIZE	+	0.400	2.208 ^b	1.517
DIVERSIFICATION	+	-0.392	-0.495	1.744
CNTRLVAR				
DEBTORSIZE	+	-0.290	-2.410 ^b	1.008
CASHFLOW	+	0.208	1.510	1.237
LEVERAGE	−	-0.352	-1.904 ^a	1.836
SECTOR	+	0.008	0.061	1.004
DEBTORAGE	+	-0.127	-1.010	1.020
STOCK RETURN	+	0.101	0.798	1.024
PROFITABILITY	+	0.428	2.516 ^c	1.692
Sample		92		
<i>F</i> -value		6.377 ^c		
Adjusted <i>R</i> ²		0.341		

$$*CPE = \alpha_0 + \alpha_1 \text{COLLATERAL} + \alpha_2 \text{PRICE} + \alpha_3 \text{LOANSIZE} + \alpha_4 \text{DIVERSIFICATION} + \alpha_5 \text{CNTRLVAR}(X) + \varepsilon$$

The variables are defined as follows: *CPE* is a proxy for the magnitude of the wealth effect for the main bank. COLLATERAL is binary, taking a value of one if the loan facility to a given reorganized debtor firm is collateralized, and zero otherwise. PRICE is loan rate. LOANSIZE stands for the natural log of one plus the NT\$ amount of the loan facility to a given reorganized debtor firm (in NT\$ million). DIVERSIFICATION is the degree of diversity of activities conducted by the main banks. CNTRLVAR is a set of control variables for debtor characteristics. These include firm size (DEBTORSIZE), cash flow ratio (CASHFLOW), leverage (LEVERAGE), and business sector (SECTOR, a dummy variable that takes a value of one if the debtor firm is classified as a high tech firm), debtor age (DEBTORAGE, the natural log of the number of years since its establishment), and historical stock returns (STOCK RETURN, a six-month holding-period return prior to the date of filing). In addition, this study includes return on assets to control for debtor financial quality (PROFITABILITY).

^{a, b, c} denote statistical significance at the 10%, 5%, and 1% confidence levels.

6. Conclusions

Financially distressed debtor firms particularly need more funds and expertise to solve their problems. This may well turn into a matter of survival for financially-troubled debtors. However, which creditor or investor is willing to prop up a weak firm, put up more funds or reschedule a loan? A distressed firm normally has no access to capital markets, and has to count on existing lending relationships with banks. In some countries, Germany, Japan, and Taiwan in particular, it seems to be common practice that the main creditor bank may attempt to rescue its debtor firms from bankruptcy and become its last resort by supplying additional liquidity (Elsas and Krahen, 2004; Chi, 2009).

Corporate bankruptcy and reorganization are important issues in the areas of accounting, economics, and finance, yet this subject has attracted far less attention in the literature. Given that existing studies in this line of research focus primarily on the strategies, procedures and costs of reorganization, or on its economic impact on shareholders' value, this innovative study, being set out to examine the inter-industry financial contagion effect of a debtor firm's reorganization filing on the main creditor bank's shareholder wealth, contributes to the scant but promising literature.

A unique data set of bank loans underlying this study is used to examine the wealth effects on main banks. The results support the claim that the decision to prop up a weak debtor firm undermines the interests of bank shareholders. Specifically, the results show that there exist small pre- and post-announcement downward drifts in the stock price. Main creditor banks experience weak but significant negative announcement returns when their debtor firms file petitions for reorganization, proving the existence of inter-industry financial contagion in bankruptcy reorganization contexts, though such an effect is limited and short-term.

The announcement of reorganization filing appears to carry an inverse signal to the market, which is to some extent the mirror image of the finding of Chi (2009, 2010). Thus the decision to invest in the reorganization filer may convey new information to the market regarding the quality of a main bank's loan

portfolios as well as affect, among other things, its reputation and relationships with other loan debtor firms. In this regard, similar to Chi's (2010) and Tang's (2010b) proposition, this study concludes that investors adversely adjust the value of the main bank that has a close funding relationship with the debtor firm filing a reorganization plan.

Moreover, to better enhance the efficacy of the regression model, a set of predictor variables (such as bank diversification, debtor size, debtor age, and debtor financial quality) is elaboratively organized as per the features of banking sector. The regression results show that the amount of the loan facility of the transaction-level variable is relevant in the context of determinant composition and is essential for the explanation of the wealth effect of the main bank. Besides, there are direct relationships between the wealth loss of the main bank and debtor determinants relating to the firm size, leverage, and financial quality. Furthermore, the creditor bank charging a higher rate on the loan is found to have higher wealth loss. That is to say the loan interest rate conveys information about the debtor firm. Alternatively, a high loan rate is interpreted negatively by investors as a reflection that the average quality of a loan portfolio for the creditor bank needs to be improved. This study reveals the association between the inter-industry contagion and the debtor firm's business sector, *i.e.*, the negative financial contagion is more pronounced in low tech industry.

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