Financial Integration and Economies of Scope: A Cross-Industry Analysis of Bancassurance in Taiwan

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Abstract: Using unique bancassurance data from Taiwan, we examine whether banks improve their scope economies by engaging in bancassurance activities. We adopt an econometric approach to identify the relation between economies of scope and bancassurance. The empirical results show that higher involvement in bancassurance helps banks improve their cost scope economies but may also lead to revenue scope diseconomies. However, the overall results indicate that banks in Taiwan realized greater gains from cost scope economies than losses from revenue scope diseconomies by engaging in bancassurance activities. In particular, banks with higher levels of bancassurance premium income and subsidiaries of financial holding companies are more likely to realize cost scope economies. On the other hand, banks with more correspondent insurers, larger numbers of branches, greater numbers of customers, a more intensive product focus, and a higher proportion of invested assets are more likely to realize revenue scope economies. *JEL Classification Numbers:* G22, G28, G34, L23, L89. [Key words: Bancassurance; economies of scope; stochastic frontier approach]

INTRODUCTION

The insurance market has been experiencing an important change as bancassurance comes to represent significant market shares in many national markets (Cummins and Dionne, 2008). Financial integration and

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bancassurance have received much attention from insurance regulators, investors, and consumers since the financial deregulations in Europe in the 1980s initiated a wave of financial integration. As bancassurance activities tapered off in the United States, incremental market shares from banks in the Asia-Pacific region began to approach European levels (Retail Banker International, 2007). In particular, bancassurance in Taiwan is growing very rapidly, which implies a significant expansion of the banking industry into the insurance market. The passage of the Financial Holding Company Act in 2001 allowed Taiwanese banks to establish insurance agent or broker subsidiaries to conduct bancassurance business; the resultant growth of insurance premiums from these banking agents now exceed premiums from traditional direct writers of insurance, a sign of the potential future development of bancassurance. For example, first-year premiums from banks accounted for 33 percent of total premiums in the insurance industry in 2007 but only 5 percent in 2002.[4] In addition, bancassurance activities in Taiwan feature different characteristics than those in European countries. For example, because banks in Taiwan could not distribute insurance products directly through their branch networks, bancassurance business practices differ from those of universal-type financial firms that provide various types of financial services. As a result, bancassurance in Taiwan offers a unique environment in which to study this issue, which may provide additional insights into financial consolidation.

Bancassurance activities can reflect several corporate strategies of banks and insurance companies,[5] though two streams of research generally address these various structural operations. The first line of research deals with the bancassurance formed through merger and acquisition (M&A) transactions (e.g., Carow, 2001a, 2001b; Fields, Fraser, and Kolari, 2007a, 2007b; Boubakri, Dionne, and Triki, 2008). The other line examines an alternative structural operation in which a subsidiary of the bank produces in-house bancassurance products (OECD, 1992, sections 20, 25). In this paper, we focus mainly on the second form and extend existing research by examining the impact of changes in the economies of scope associated with bancassurance activities by the banking industry in Taiwan.

In turn, we address two main research questions: (1) Can banks improve scope economies through integrated bank and insurance products?

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[4]Data source: the annual statistical reports of the Life Insurance Association of the Republic of China.

[5]For banks, the main structural operations for bancassurance may take the form of minority or majority holdings, full-fledged acquisition, or the creation of subsidiaries, joint ventures, or holding companies. To save space, we do not summarize all links between banks and insurance in detail. The OECD (1992) provides a detailed review.

and (2) Can banks improve their economies of scope through greater involvement in bancassurance, and if so, which types of firms are most likely to realize these scope economies? In an attempt to answer these questions, we employ a two-stage econometric approach and consider two sectors of the financial service industry. First, we estimate the cost and revenue economies of scope using a stochastic frontier approach. Second, following the methodology used by Berger, Cummins, Weiss, and Zi (2000), we conduct a regression analysis to investigate the relationship between scope economies and bancassurance.

Our findings provide new contributions to the literature related to scope economies that result from financial integration. First, most previous research studies the efficient performance of financial integration with a universal banking model, based on bancassurance activities of U.S. and European banks (e.g., Bergendahl, 1995; Carow, 2001a, 2001b; Fields, Fraser, and Kolari, 2007a, 2007b), whereas relatively few studies consider the diversification benefits of financial integration in other organizational structures. As Kalotychou and Staikouras (2007) argue, delivering bancassurance through different affiliation models may result in different outcomes. We therefore examine the scope economies banks achieve when they establish insurance agency subsidiaries rather than relying solely on a universal baking model. The special characteristics of bancassurance activities in Taiwan provide new insights by featuring the market experience of a non-universal banking model from Asian countries.

Second, no empirical consensus describes the sources of economies or diseconomies resulting from banks' expansion into insurance markets. Using Taiwan's unique bancassurance data, we examine several possible sources, including bancassurance premium income, the number of insurance specialists, insurer partners, bank branch networks, bank customers, and bancassurance capital infusion.

Third, we compare the results pertaining to both cost and revenue scope economies in terms of the effects of financial integration. Cost scope economies/diseconomies may reflect systematic differences in expenses between diversified firms and nondiversified firms, but measuring such effects in isolation may generate misleading results (Berger et al., 2000; Cummins, Weiss, and Zi, 2003). Diversified banks may incur lesser expenses than specialized banks because of the synergy bancassurance provides. However, unfavorable revenue scope diseconomies also may affect diversified banks, because customers may pay more for tailored products from specialized banks. This research examines both cost and revenue scope economies to provide a more solid analysis.

The empirical results confirm that greater involvement in bancassurance helps banks improve their cost scope economies, but it may also lead

to revenue scope diseconomies. In particular, we find that banks with a higher proportion of bancassurance income and those that are members of financial holding companies are more likely to realize cost economies of scope. If banks have more correspondent insurers, more branches, a greater number of customers, a more intense product focus, and a higher proportion of invested assets, though, they are more likely to benefit from revenue scope economies.

The remainder of this article is organized as follows: Section 2 describes the background of the banking industry and bancassurance in Taiwan. Section 3 reviews existing literature on scope economies and bancassurance and develops the hypotheses. Section 4 introduces the data description and presents the methodologies we employ to analyze the main research questions. In Section 5, we offer our empirical results, and Section 6 concludes.

BANKING INDUSTRY AND BANCASSURANCE IN TAIWAN

In the early stages, banks in Taiwan were mainly owned by the government and therefore were relatively inefficient (Chen and Yeh, 1998, 2000). After the implementation of the Commercial Bank Establishment Promotion Decree in 1991, the market conditions changed significantly, especially due to the entry of new private domestic and foreign banks. Banks in Taiwan thus faced increasing competition from the growing number of new entrants. Deregulation also resulted in serious overbanking and inefficiency problems; that is, the additional inputs did not correspond with increases in outputs (Shen, 2005). Thus, proposals suggested bancassurance activity could mitigate overcapacity and diseconomies from over-banking problems. Moreover, poor asset quality and decreasing interest rates encouraged banks to engage in bancassurance activities. To improve bank efficiency, legislators in Taiwan further issued the Merger Law of financial institutions and the Financial Holding Company Act in 2000 and 2001, respectively. The Act allows banks, insurance firms, and securities firms to affiliate under common ownership and provide a wider range of financial products and services for their existing customers, which helped facilitate the progress of bancassurance activities in Taiwan. In addition, this Act and other new regulations effectively removed the restrictions on combining banking and insurance, which could promote additional conglomeration in the bank and insurance industries. The Financial Supervisory Commission, established in 2004, supervises financial consolidations.

Unlike banks in some European countries, Taiwanese banks cannot distribute insurance products directly through their branch networks, and insurance firms cannot offer banking activities through insurance companies. Rather, to access insurance markets, banks need downstream insurance agencies or brokers. Although banks may provide many types of financial services indirectly, they do not function in a universal-type banking system, because a single firm cannot provide both insurance and equity-related business. Thus, bancassurance business practices in Taiwan differ from those of universal financial firms. Furthermore, the banking industry in Taiwan suffered from the impact of the Asian financial crisis, but banks experienced dramatic growth in earnings from selling insurance products. As of 2007, 33 percent of total first-year insurance premium income in Taiwan came from bancassurance activities.[6] From 2001 to 2006, the number of the sales agents in insurance agencies and brokerages tripled to approximately 142,000.[7] Moreover, increased agencies and brokerages affiliated with banks accounted for 70 percent of all agencies and brokerages.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

We review previous literatures on scope economies in banking and on bancassurance and develop hypotheses in this section.

Literature on Scope Economies in Banking

Proponents of financial conglomeration contend that by operating a variety of businesses, firms can benefit from exploiting cost scope economies by sharing inputs in joint production. However, joint producers also improve revenue scope economies and provide financial "supermarket" service to customers who are willing to pay more for the convenience of "one-stop shopping"(Gallo, Apilado, and Kolari, 1996; Calomiris, 1998). For banks, the cost of offering a new insurance product declines because they share costs with prior investments in branches, employees, brand names, and fixed equipment. Banks also can increase revenue economies by selling bancassurance products to existing bank customers who are willing to pay more for the convenience of this one-stop shopping. Hence,

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[6]Data source: the statistical reports of Financial Supervisory Commission of the Republic of China.

[7] Ibid.

bancassurance enables banks to take advantage of cost and revenue economies of scope through the effects of synergy. In contrast, proponents of a focus strategy argue that firms can improve their efficiencies by concentrating on their core business or offering tailored products.

Prior empirical studies evaluate the economies of scope or diversification benefits within the banking industry and provide mixed results.[8] Pulley and Humphrey (1993) examine the cost scope economies of large U.S. banks and find that banks benefit from the joint provision of deposit and loan business. McKillop, Glass, and Morikawa (1996) investigate the cost efficiency of Japanese large banks and find that different cost function specifications lead to different results. Prior literature thus provides a relatively complete understanding of within-sector economies of scope, but the question remains largely open in a cross-industry context.

Literature Background on Bancassurance

Bancassurance can form through portfolio investment or a true direct investment by bank. Specifically, to expand into the insurance market, a bank may set up a new insurance company or buy an existing one, financially connect with an insurance company through a holding company or a joint venture, or develop a distribution contractual relationship with an insurer (OECD, 1992). As the prevalence of bancassurance increases, the question of whether it improves the economies of scope represents an important research subject. From the bank's view of point, Bergendahl (1995) argues that economic reasons for selling multiple products include the efficient use of fixed capacity resources, customer demand for products from a single channel, and product combination strategies. Diamond (1984) also contends that by spanning short- and long-term liability/asset structures and attracting and keeping individual customers and corporate clients, bank–insurance consolidation benefits both parties. However, Baumol (1982) and Baumol, Panzar, and Willig (1982) propose a contestable market theory, in which they imply that existing insurance companies gain no benefit from bank–insurance consolidation. They further argue that no industry can earn economic profits for an extended period unless barriers prevent other potential sellers from entering the industry. In terms of bancassurance, this theory implies that increased competition from banks' expansion into the insurance industry will force existing insurance companies to reduce their earning spreads. However,

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[8]See Mester (1987, 1993, 1996); Berger and Humphrey (1991); Pulley and Humphrey (1993); Jagtiani, Nathan, and Sick (1995); Berger, Humphrey, and Pulley (1996); Snape et al. (1996); McKillop, Glass, and Morikawa (1996); Rogers (1998); Berger (2000); Lewis and Webb (2007); and Mercieca, Schaeck, and Wolfe (2007).

whether banks can produce additional earnings by entering the insurance industry represents an interesting empirical question.

Previous studies of the effect of the bank consolidation (or expansion into non-traditional industries) mainly focus on the risk reduction and value enhancement effects of bank consolidation (e.g., Felgren, 1985; Saunders and Walter, 1994; Hughes et al., 1999; Carow, 2001a, 2001b; Mamun, Hassan, and Maroney, 2005). With regard to the risk diversification effect, Saunders and Walter (1994) and Hughes et al. (1999) suggest bank consolidation reduces risk. On the value enhancement effect side, Felgren (1985) argues that banks enjoy greater cost advantages from selling insurance products than do incumbent insurance companies, because they can share inputs such as labor, branches, offices, and so forth. Carow (2001b) also cites the significant increase in stock prices prompted by the Citicorp–Travelers Group merger. However, in a previous article, Carow (2001a) found that the bank's stock prices after its entry into the insurance industry did not change significantly. Bergendahl (1995) instead argues that the profitability of bancassurance depends on five key factors: the number of branches, the number of insurance specialists per branch, the number of customers, the cross-selling ratio, and the degree of learning. More recently, Fields, Fraser, and Kolari (2007a) have noted that a bancassurance combination results in positive gains for the shareholders of bidding firms, and Fields, Fraser, and Kolari (2007b) reveal a positive relationship between bidder returns in bancassurance mergers and potential economies of scope.

Another line of research pertaining to the scope economies of banks examines the relationship between the realization of scope economies and bank-specific characteristics, with a general focus on features such as organizational form, product mix, and distribution networks (e.g., Berger, Humphrey, and Pulley, 1996; Milbourn, Boot, and Thakor, 1999; Barth, Brumbaugh, and Wilcox 2000; Akhigbe and Whyte, 2001). However, little academic research considers the relationship between the realization of scope economies and joint production activities. For example, few studies examine whether economies of scope actually improve when banks become more involved in bancassurance.

Hypotheses Development

On the basis of previous studies, we develop five main hypotheses regarding the impacts of bancassurance on scope economies, corresponding to the five key factors that can evaluate the effects of bancassurance: bancassurance premium income, the number of insurance specialists per branch, the number of insurer partners, the number of bank branches, and the number of bank customers.

Recent liberalization of existing product restrictions has resulted in fierce competition in the worldwide financial service industry. In particular, declines in savings deposits and diminishing customer loyalty have tightened banks' profit. In turn, banks have turned to cost reduction and new earnings sources. Commission income earned from selling life insurance products prompts banks to devote effort in bancassurance markets. As Berger (2000) argues, the actual efficiency improvement resulting from financial integration comes from revenue efficiency gains rather than cost efficiency gains. Bergendahl (1995) also contends that rapid growth in sales commissions provides a determinant of the success of bancassurance. As a result of the reasons that motivate banks to expand into bancassurance activities, sales commissions from selling insurance products should relate to the level of banks' involvement in bancassurance activities. That is, larger sales commissions should indicate a higher level of involvement in bancassurance business.

Furthermore, as the literature review reveals, operating a variety of businesses can benefit banks through cost scope economies derived by sharing inputs in joint production. In turn, banks may achieve cost synergies by selling more insurance through their existing labors, extensive branch systems, and fixed inputs. Moreover, banks with a higher proportion of bancassurance premium income may achieve greater cost scope economies. However, with regard to revenue scope economies, Berger, Humphrey, and Pulley (1996) find no support among U.S. banks, for the following potential reasons: (1) consumers may prefer bancassurance but competition prohibits banks from taking advantage of that demand; (2) banks may have market power but consumers may not value bancassurance; or (3) banks may lack market power, and consumers may not value bancassurance. Thus, we propose the null hypothesis, namely, that bancassurance premium income does not have any material impact on cost or revenue scope economies. Rejection of the null hypothesis would imply that bancassurance premium income influences cost or revenue scope economies.

H1: Bancassurance premium income has no impact on cost or revenue scope economies.

The number of insurance specialists per branch is another key factor that encourages bancassurance success. Bergendahl (1995) argues that a higher number of insurance specialists per branch increases the investment cost. According to Taiwanese regulations, insurance specialists must pass a series of tests and obtain a license to sell insurance products, which creates training costs for banks. Therefore, more insurance specialists imply a greater investment in personnel training and more involvement in

bancassurance activities. However, if the production of banking products leads to excess labor capacity, labor inputs can be shared across bancassurance production, and banks can enjoy efficiency gains from offering bancassurance. Carow (2001a) argues that previous investments in employees reduce the cost of providing insurance products, but additional costs are likely for hiring or training employees who can cross-sell insurance products. In line with this argument, previous studies do not offer a clear prediction about the direction of the relationship between the number of insurance specialists and cost or revenue scope economies. Thus, we advance the null hypothesis of no relationship between the number of insurance specialists per branch and cost and revenue scope economies.

H2: The number of insurance specialists per branch has no impact on cost or revenue scope economies.

Banks may enter into agreements with insurance companies to penetrate the insurance market. In general, banks' primary bancassurance activities include marketing insurance products through their branches or organizing claim settlements. The insurer partners are mainly responsible for underwriting, investing premium funds, and evaluating claims. Therefore, banks and insurers should liaise closely, and banks must engage in negotiations with insurers regarding bancassurance activities throughout the early stages to ensure that the partnership works well. Hence, a greater number of insurance partners suggests greater bank involvement in the sale of insurance.

Furthermore, when banks cooperate with more insurance companies, they may incur more coordination, training, and administrative costs, which should create greater cost diseconomies of scope. Carow (2001a, 2001b) argues that establishment of a relationship between a bank and an insurer may result in additional costs that reduce the benefits of economies of scope from bancassurance. Norman (2007) also states that the benefits from bancassurance may take longer to emerge, but a good relationship between banks and insurers can endure the tricky early stages, though such a relationship can be costly, given the inherent differences in risk profiles, capital needs, and focuses on time horizons between banks and insurers. Similarly, additional operational costs for banks may include monitoring payments among the bank, the insurer, and the customer, as Bergendahl (1995) argues. Therefore, the more partner insurers a bank has, the greater its cost should be. In addition, Morgan (1990) and Burton (1991) contend that selling of insurance products requires a specific skill, different from those required by traditional bank business. Thus, the distribution, marketing, and selling of insurance must be controlled by insurers rather than by banks. If banks have more insurer partners, those insurers may have

greater opportunity to take control of distribution of their respective insurance products. Thus, bancassurance activities may increase the coordination and administrative costs for banks that offer a broader range of products with many insurer partners and thus reduce the cost economies of scope.

Other literature implies that the presence of more insurance partners increases the scope economies. Banks enter two types of sales agreements with insurers: exclusive agreements, which seal the link between the bank and insurer, avoid multiple negotiations, and reduce transaction and training costs, and non-exclusive agreements, which provide more product flexibility and may allow banks to offer insurance products at more competitive prices (OECD, 1992). That is, when they deal with more insurance firms, banks may have greater flexibility and collect more information about insurance products and insurance operations, which could facilitate the banks' involvement in bancassurance activities. Moreover, in practice, banks with greater bancassurance business, and more insurance partners, should generate more favorable negotiating positions, which may help them generate scope economies.

These arguments therefore suggest an unclear relationship between the number of insurer partners and scope economies; in turn, we propose the following null hypothesis.

H3: The number of correspondent insurance companies with which banks partner has no impact on cost or revenue scope economies.

Bergendahl (1995) contends that with more branches, banks incur greater investment cost, but cross-selling through the extensive branch network will reduce costs. Similarly, Carow (2001b) argues that the investment cost of offering insurance products may be mitigated by previous investments in bank branches. Felgren (1985) contends that an extensive branch network provides banks with the opportunity to distribute insurance products at lower prices than traditional insurers can. Because many bank branches increase the customer base and customer knowledge, they also may offer a greater opportunity to cross-sell and greater economies of scope. Hence, the banks with more branches may have an advantage in selling insurance products, which would increase their economies of scope. Therefore, we advance the null hypothesis that the number of branches does not relate to cost and revenue scope economies.

H4: The number of branches has no impact on cost and revenue scope economies.

Finally, the number of customers reflects the size of the potential market for bancassurance. Bergendahl (1995) argues that the number of customers significantly influences bancassurance profitability, because this customer base becomes the target of insurance product sales, marketing, and product development. This number also may influence future commissions earned from selling insurance products. Thus, with more customers who may buy insurance products, the bank earns greater future revenues and greater economies of scope from bancassurance. However, if customers do not want to buy insurance from the bank or dislike one-stop shopping, bancassurance may not lead to positive cost and revenue economies of scope. Instead, banks must identify those target customers who prefer buying insurance policies through bank branches and explore which insurance products these customers want. Todd and Murray (1988) argue that banks' existing customer base and customer knowledge give them a competitive advantage in cross-selling, and Tanriverdi and Venkatraman (2005) argue that customer knowledge provides a source of synergy for multibusiness firms. That is, if the customers display similar preferences and behavior across different business units, the firm can minimize marketing and advertising costs by exchanging its existing customer knowledge. Therefore, a multibusiness bank might provide and obtain customer knowledge from its insurance partner and increase cost scope economies by selling insurance products to similar customers. Using a consumer perspective, Lymberopoulos, Chaniotakis, and Soureli (2004) examine the opportunities for banks to cross-sell insurance products and find that the opportunity derives from consumers' low awareness of bank-offered insurance products but their very high willingness to purchase insurance from banks. Therefore, we propose the following null hypothesis:

H5: The number of customers of banks has no impact on cost or revenue scope economies.

DATA AND METHODOLOGY

We provide a discussion of data and methodology in this section.

Data

To estimate the scope economies for sample banks, we use input and output data obtained from the financial statements provided by Financial Supervisory Commission of the Executive Yuan (FSCEY) of Taiwan from 2004 to 2005.[9] We also collect employment data from the *Taiwan Economic Journal*'s (*TEJ*) financial database. The bancassurance data, obtained from

the annual statements that banks, insurance agents, and insurance broker subsidiaries reported to the FSCEY during 2004 and 2005, define the bancassurance variables. Banks with downstream insurance agents or insurance broker subsidiaries appear in the sample, but we exclude foreign banks, thrifts, mutuals, and post offices. Thus, the final sample in our analysis consists of 26 domestic banks, which account for a market share of 52.79% in the banking industry.

Stochastic Frontier Function

The principal methods for estimating efficient frontiers are the econometric approach and the mathematical programming approach.[10] The former separates random error from inefficiency and allows decision-making units to miss the best-practice frontier because of random error or inefficiency. However, it also entails potential specification error for function selection. The mathematical programming approach features no possibility of specification error, but it counts the random error as inefficiency. Because bancassurance performance may be influenced by random error, such as customer behavior or financial system changes, we use the econometric approach and thereby separate random error from inefficiency.

We estimate cost and revenue functions econometrically using a stochastic frontier approach.[11] Similar to prior studies, we adopt the translog function to estimate the cost and revenue frontier models (e.g., Kim, 1986; Mester, 1987; Hunter et al., 1990; Muldur and Sassenou, 1993; Pulley and Humphrey, 1993).

For our analyses, we also use one of the input prices to normalize the dependent variable and the other input prices,[12] because linear homogeneity is a necessary condition for the cost functions in the input prices.

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[9]Detailed bancassurance data are difficult to assemble. Some regulatory data are not publicly available and must be hand collected. We do not include data from 2006, which use an alternative statistic definition for some bancassurance variables. In addition, given the considerations regarding structural convergence, corporate strategy, and bancassurance product development, bancassurance activities represent significant endeavors. Their benefits may take time to emerge, as Norman (2007) argues, so we include two years of panel data.

[10]Cummins and Weiss (2000) provide more detailed discussion of these two methodologies.

[11]For details about the stochastic frontier approach, see Coelli et al. (1998) and Kumbhakar and Lovell (2000).

[12]No difference results when input prices are used to normalize the equation (Schmidt and Lovell, 1979).

The traditional translog cost function may be specified as follows:

$$ln(C) = \alpha_0 + \sum_{i=1}^{n} \beta_i ln(y_i) + \sum_{j=1}^{m} \gamma_j ln(w_i) + \frac{1}{2} \sum_{i=1}^{n} \sum_{h=1}^{n} \beta_{ih} ln(y_i) ln(y_h) \qquad (1)$$

$$+ \frac{1}{2} \sum_{j=1}^{m} \sum_{k=1}^{m} \gamma_{jk} ln(w_j) ln(w_k) + \sum_{i=1}^{n} \sum_{j=1}^{m} \delta_{ij} ln(y_i) ln(w_j) + (v + u)$$

where lnC is the logarithm of cost; y_i are outputs, $i = 1, \ldots,$ n; w_j are input prices, $j = 1, \ldots,$ m; v is random disturbance, which is assumed to be normally distributed and independent of u; and u is cost inefficiency, which represents the deviation from the cost frontier and is assumed to follow half-normal distribution.

Cost efficiency may be estimated through a translog cost function or its variants (e.g., Berger and Mester, 1997; Mester, 1992; DeYoung, 1997). The translog function allows for the possibility of a U-shaped cost curve, with returns to scale changing with the output or input proportions (Cummins and Weiss, 2000). Moreover, the translog cost function is well-behaved with negative own-price elasticities and positive cross-price elasticities for the capital and labor inputs (Mester, 1997). However, as Berger et al. (1993) argue, the main problem with the translog function occurs when an evaluation has zero outputs. The common solution to this problem is to specify a minimum level of each output ε_i, below which the output cannot be evaluated.[13] We follow Kim (1986) and Mester (1996) and use 10 percent of the average output to calculate this minimum value.

To measure economies of scope, Panzar and Willig (1981) introduce the concept of economies of scope. Most analyses use econometric methodology (e.g., Grace and Timme, 1992; Berger et al., 2000), though some use a non-parametric approach (e.g., Cummins et al., 2003). Empirical studies typically assume that specialists and joint producers use the same technology and extrapolate from the cost function of joint producers to predict the results of specialists. Mester (1996) estimates within-sample scope economies to address this extrapolation issue, whereas Meador et al. (2000) uses an alternative methodology and examines scope economies for multiproduct firms according to the relationship between firms' product Herfindahl index and X-efficiency. Fields, Fraser, Kolari (2007a) use an event study

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[13]Other solutions to this problem include the Box-Cox functional form (Pulley and Humphrey, 1993), quadratic functional form (Baumol et al., 1982), and composite functional form (Pulley and Braunstein, 1992).

technique to investigate bidder wealth gains from economies of scope in bancassurance. We adopt the econometric model, which is used most widely in previous papers to estimate the scope economies, and then estimate the cost complementarities to verify the existence of economies of scope.[14]

The measure of cost economies of scope between product lines 1 and 2 is typically specified as

$$SC = \frac{C^*(Y_i - \varepsilon_1, \varepsilon_2) + C^*(\varepsilon_1, Y_2 - \varepsilon_2) - C^*(Y_1, Y_2)}{C^*(Y_1, Y_2)} \tag{2}$$

where C^* is a continuous cost function estimated using the stochastic frontier approach, and ε_i = 10% of the sample mean value of Y_i. Cost economies of scope may be measured as proportionate increases in costs, resulting from a shift from diversification to specialization production in product lines 1 and 2.

With regard to cost complementarities, Baumol et al. (1982) note that they may imply the presence of economies of scope. The measure of cost complementarities is typically specified as:

$$C^*_{ij} = \sum_i \frac{\partial^2 C(y,p)}{\partial y_i \partial y_j} . \tag{3}$$

Cost complementarities also exist when joint production lowers aggregate costs. As banks move from the sole production of banking products to the production of both insurance and banking products, the aggregate costs decrease if cost complementarities exist. Cost complementarities reflect the presence of economies of scope if $C^*_{ij} < 0$, whereas $C^*_{ij} > 0$ implies diseconomies of scope. When $C^*_{ij} = 0$, additive costs exist.

Revenue scope economies are defined similarly; traditional measures of revenue economies of scope are given by

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[14]Other approaches test for economies of scope. Berger, Hanweck, and Humphrey (1987) suggest alternative expansion path subadditivity, which allows all outputs to change at the same time. Hunter et al. (1990) modify the grid-search method to address product mix economies.

$$SR = \frac{R^*(Y_1,Y_2) - R^*(Y_1 - \alpha_1,\alpha_2) - R^*(\alpha_1,Y_2 - \alpha_2)}{R^*(Y_1,Y_2)}, \qquad (4)$$

where R^* is a revenue function estimated using a similar stochastic frontier model, and $\alpha_i = 10\%$ of the sample mean value of Y_i. A positive value of SR implies the existence of revenue economies of scope, whereas a negative value indicates revenue diseconomies. The measure of revenue complementarities is identical to that of cost complementarities, except that cost is replaced by revenue. We use the same form and independent variables for the cost and revenue functions, which ensures that our estimated cost and revenue scope economies are not confounded by differences between the functional forms.

Estimation of Translog Function

To estimate the translog function, we use cost and revenue as the dependent variables in Equation (1). Total costs (Cost) equal the sum of all costs, and the revenue measure reflects the net revenues. Adopting an intermediation approach, we consider banks' financial intermediaries, which use loaned funds from customers (X_1), labor (X_2), and capital (X_3) to produce loans (Y_1) and investments (Y_2), including government and corporate securities. Because our central focus is estimating the effect of bancassurance production on economies of scope, we employ the insurance premium from the banks' insurance agents as the third output (Y_3). Specifically, loaned funds (X_1) include all deposits, CDs, borrowed money, and so on. Labor (X_2) equals the number of full-time employees on the payroll at the end of year, and capital (X_3) is the book value of the premises and fixed assets. With regard to the input price, we measure the price of loaned funds (P_1) as the ratio of the sum of interest expenses in all loaned funds to total loaned funds. The input price of labor (P_2) equals the ratio of total expenditures on employees to the total number of employees, and the price of capital (P_3) is the ratio of total expenditures on premises and fixed assets to the book value. We measure all monetary variables in millions of New Taiwan (NT) dollars, deflated by the consumer price index with a base year of 2001.

The summary statistics of input and output variables used in the stochastic frontier approach appear in Table 1.

Regression Analysis

As noted, measuring only the cost effect or the revenue effect alone may generate biased results. Therefore, we take both costs and revenues

into account and compare their respective results. We test our hypotheses by conducting two regression analyses, with scope economies as the dependent variables and bancassurance characteristics as explanatory variables. The two ordinary least square regression equations are specified as:

$$SC_{it} = \beta_0 + \beta_1 BANCINS_{it} + \beta_2 SPECIALIST_{it} + \beta_3 NUM_{it} + \qquad (5)$$
$$\beta_4 BRANCH_{it} + \beta_5 CUSTOMER_{it} + \beta_6 CAP_{it} + \beta_7 AGN_{it} +$$
$$\beta_8 FOCUS_{it} + \beta_9 SHARE_{it} + \beta_{10} GOV_{it} + \beta_{11} SUB_{it} +$$
$$\beta_{12} IA_{it} + \beta_{13} YEAR_{it} + \varepsilon_{it}$$

and
$$SR_{it} = \beta_0 + \beta_1 BANCINS_{it} + \beta_2 SPECIALIST_{it} + \beta_3 NUM_{it} + \qquad (6)$$
$$\beta_4 BRANCH_{it} + \beta_5 CUSTOMER_{it} + \beta_6 CAP_{it} + \beta_7 AGN_{it} +$$
$$\beta_8 FOCUS_{it} + \beta_9 SHARE_{it} + \beta_{10} GOV_{it} + \beta_{11} SUB_{it} +$$
$$\beta_{12} IA_{it} + \beta_{13} YEAR_{it} + \varepsilon_{it}.$$

The dependent variables in Equations (5) and (6) are cost scope economies (SC_{it}) and revenue scope economies (SR_{it}), respectively. To test our first hypothesis pertaining to the relationship between banks' bancassurance premium income and scope economies, we employ three variables as proxies for the percentage of income from bancassurance (BANCINS): the ratio of commissions to administration fees, the ratio of commissions to non-interest revenues, and the ratio of commissions to consumer banking revenues. With the number of insurance specialists per branch (SPECIALIST), we test the second null hypothesis, which predicts no relationship between this number and economies of scope. To test our third hypothesis regarding the relationship between scope economies and the number of insurer partners, we include the number of correspondent insurance firms (NUM). The number of branches (BRANCH) enables us to test our fourth null hypothesis, which predicts no relationship between this number and economies of scope. Finally, to test the relationship between the number of customers and scope economies, we use the number of ATM cards (CUSTOMER) as a proxy for the number of customers who own bank savings accounts.[15] The effects of the year are captured in the year dummy variable (YEAR), which equals 1 if it is 2004.

In addition to the features identified in our hypotheses, other firm characteristics may be associated with greater or lesser economies of scope. Therefore, first, we use the capital infusion that banks invest in insurance

Table 1. Summary Statistics of Input and Output Variables

Variables	Means	Standard Deviation	Maximum	Minimum
Total cost	15,547	12,330	53,760	1,783
Revenue	16,664	19,670	98,348	45
Output				
Y_1	77,214	97,744	394,539	2,451
Y_2	346,156	307,461	1,239,927	35,214
Y_3	6,450	8,626	37,099	2
Input				
X_1	438,517	394,888	1,585,550	53,906
X_2	3,126	2,117	8,215	549
X_3	9,963	8,992	33,599	970
Input price				
P_1	0.022	0.011	0.047	0.010
P_2	944.367	264.584	1838.495	517.064
P_3	0.366	0.219	1.466	0.107

Notes: Total costs = the sum of all costs; Revenue = net revenues; Y_1 = loan outputs; Y_2 = investment outputs; Y_3 = the insurance premium; X_1 = loaned funds from customers; X_2 = labor input; X_3 = equity capital; P_1 = price of loaned funds from customers = the ratio of the sum of interest expenses to loaned funds; P_2 = input price of labor input = the ratio of total expenditures on employees to the total number of employees; P_3 = input price of equity capital = the ratio of total expenditures on premises and fixed assets to the book value. All monetary variables are measured in millions of New Taiwan (NT) dollars and are deflated by the consumer price index with the base year of 2001.

agency subsidiaries as a control variable that captures the effect of capital infusion on the economies of scope. As mentioned previously, according to the regulatory rules governing financial integration in Taiwan, many banks infuse additional capital to set up insurance subsidiaries (i.e., insurance agencies or insurance brokers) to engage in bancassurance activities,

[15]The rationale for using the number of ATM cards as a proxy for the number of customers holds that, in practice, banking customers usually possess ATM cards; furthermore, customers with deposit accounts, more than customers who own checking accounts, tend to be targets of insurance product sales in Taiwan.

which produces a diversification cost. The cost of capital also may create diseconomies of scope because of diversification; as Jensen (1986) and Stulz (1990) argue, overinvestments may result in value loss from diversification. The stock of capital thus is costly for banks because they encounter the additional cost of raising capital. Yet Bergendahl (1995) asserts that inadequate set-up costs hinder the success probabilities for bancassurance. Prior studies (e.g., Teece, 1980) also suggest that exploiting existing resources, rather than additional ones, with excess capacity to generate revenue from joint production, offers the best strategy. Thus, banks that spend fewer additional resources and use existing resources should realize more profits, and the greater the capital infusion that banks invest in insurance agency subsidiaries, the smaller their scope economies should be.

Second, we consider labor inputs. Banks may earn positive scope economies by sharing labor inputs in their bancassurance activities. Carow (2001b) argues for a lower cost of providing bancassurance products because banks can reuse their prior employee investments for their bancassurance activities. If manufacturing bank products leaves excess capacity in terms of labor inputs, and such human capital is freely available for bancassurance production, then banks can obtain efficiency gains through shared labor inputs. Taiwanese banks offer insurance products mainly through their existing branch employees, so bank employees who sell insurance represent a relatively high proportion of their total employees (see Table 3). When banks become more involved in bancassurance, the ratio of insurance salespeople to branch employees increases. The proportion of insurance salespeople should relate positively to scope economies, similar to the effect of the number of insurance specialists per branch, because both variables represent the level of banks' labor input to bancassurance.[16] The former measures the proportion of the workforce that banks employ to distribute bancassurance products, whereas the latter measures how many insurance specialists each branch uses to sell bancassurance products.

Third, we address the possibility that economies of scope may relate negatively to bank product concentration, as measured by the Herfindahl index. Meador et al. (2000) reveal that a diversification strategy across different lines of business results in greater X-efficiency than a specification strategy. Moreover, previous research provides empirical results that indicate that diversification leads to more efficient performance (e.g., Kellner

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[16]Although the ratio of insurance salespeople to branch employees is similar to that of insurance specialists per branch, and though we use both variables in the regression analysis, a test of their variance inflation factors shows no significant correlation between these independent variables.

and Mathewson, 1983). Accordingly, we expect that the Herfindahl index of bank products relates negatively to economies of scope.

Fourth, prior studies of efficiency and profitability suggest a positive relationship between market concentration and profitability (Berger and Humphrey, 1997), possibly in line with market power explanations that indicate that firms in concentrated markets exercise greater market power in terms of pricing and therefore earn more profits. Moreover, the efficient structure model links concentration to higher profitability through efficiency (Demsetz, 1973), because more efficient firms are more aggressive in gaining dominant market shares and earn higher profits because of their low production costs. Therefore, efficiency and market share should relate positively. Gardner and Grace (1993) and Meador et al. (2000) further argue that firms with higher market share realize market power in pricing, which improves their profitability and efficiency performance. On the basis of prior literature, we anticipate that bank market share relates positively to economies of scope.

Fifth, government-owned banks in Taiwan usually are larger in scale than are local banks, so they should enjoy greater economies of scope than private banks. We include an ownership structure dummy variable that indicates whether the bank is a member of a financial holding company (FHC).[17] Banks that are members of FHCs may have superior access to cross-selling opportunities and capital resources, which should improve their economies of scope. Furthermore, such banks may have different mechanisms for monitoring and controlling managerial performance (Shrieves and Dahl, 1992), which would reduce unnecessary managerial expenses and increase cost efficiencies. Accordingly, we anticipate that a bank that is a member of an FHC has greater opportunities to realize economies of scope. We also include the proportion of invested assets in the regression analysis, because in addition to loans, banks use invested assets to earn revenues or profits, so these invested assets should correlate closely with revenue scope economies.

Table 2 summarizes the definitions of the variables we use in this study. Table 3 presents the summary statistics for the variables included in the regressions.

EMPIRICAL RESULTS

We first present the evaluations of the economies of scope, based on the stochastic approach, and then analyze the regression results to examine

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[17]As of 2007, there were 14 FHCs in Taiwan.

Table 2. Variable Definition for Regression

Variables	Definition
Dependent variables	
Cost scope economies	The proportional increase in production costs, given output from producing by banks engaging in bancassurance versus banks not engaging in bancassurance.
Revenue scope economies	The proportional reduction in production revenue, given output from producing by banks not engaging in bancassurance versus banks engaging in bancassurance.
Independent variables	
BANCINS	$BANCINS_1$ = ratio of commission to administration fee; $BANCINS_2$ = ratio of commission to non-interest revenue; $BANCINS_3$ = ratio of commission to consumer banking revenue.*
SPECIALIST	The number of insurance specialists per branch.
NUM	The number of correspondent insurance firms.
BRANCH	The number of branches.
CUSTOMER	The number of ATM cards to the bank.
Control variables	
CAP	Log of capital infusion for insurance agency.
AGN	Proportion of insurance salespeople of banks.
FOCUS	Product Herfindahl index.
SHARE	Market share of loan.
GOV	Organizational dummy that equals 1 if banks are owned by government; 0 otherwise.
SUB	Subsidiaries dummy that equals 1 if banks are subsidiaries of financial holding company; 0 otherwise.
IA	Proportion of invested assets.
YEAR	Year dummy that equals 1 if it is year 2004, 0 otherwise.

*The administration fees and consumer banking revenue do not include the commission from bancassurance activities, whereas non-interest revenue includes the commission from bancassurance activities.

whether banks' scope economies actually improve because of their greater involvement in bancassurance.

Economies of Scope Analysis

The estimated pairwise cost complementary estimates appear, according to ownership structure, in Table 4. Panels A and B in Table 4 present

Table 3. Summary Statistics on Sample Banks

Independent variable	Means	Standard deviation	Minimum	Maximum
$BANCINS_1$	0.151	0.099	0.008	0.473
$BANCINS_2$	0.073	0.050	0.005	0.190
$BANCINS_3$	1.732	1.129	0.083	6.175
SPECIALIST	23.842	15.861	2.187	91.294
NUM	14.222	9.674	1.000	34.000
BRANCH	82.000	45.268	26.000	181.000
CUSTOMER (thousands)	1,482	1,259	175	4,432
CAP	16.116	1.573	14.509	21.057
AGN	0.613	0.333	0.045	1
FOCUS	0.540	0.053	0.500	0.703
SHARE	0.022	0.017	0.004	0.058
GOV	0.192	0.398	0.000	1.000
SUB	0.346	0.480	0.000	1.000
IA	0.139	0.080	0.017	0.385

Notes: $BANCINS_1$ = ratio of commission to administration fee; $BANCINS_2$ = ratio of commission to non-interest revenue; $BANCINS_3$ = ratio of commission to consumer banking revenue. SPECIALIST = number of insurance specialists per branch. NUM = number of correspondent insurance firms. BRANCH = number of branches. CUSTOMER = number of ATM cards of the bank. CAP = log of capital infusion for insurance agency. AGN = proportion of insurance salespeople. FOCUS = product Herfindahl index. SHARE = market share of loan. GOV = 1 if banks are owned by government; 0 otherwise. SUB = 1 if banks are subsidiaries of financial holding company; 0 otherwise. IA = proportion of invested assets.

the pairwise output combinations of the cost and revenue complementary estimates, respectively. The overall results in the last column of Panel A of Table 4 show that the output pairs of bank investment and bancassurance (IB) suggest significant cost-saving complementarities. In addition, the results in the last column of Panel B show that the output pairs of bank investment and bancassurance indicate significant negative revenue complementarities. Consistent with Berger et al. (1996), we find no significant positive revenue complementarities. The results also imply that significant cost complementarities may exist for private banks.

In Table 5, we display the cost and revenue economies of scope by ownership structure. We find a positive value of 1.047 for the overall cost scope of economies, which implies that banks in Taiwan benefit from cost scope economy gains when they provide multiple products through their

Table 4. Complementarities by Ownership Structure

Pair-wise outputs	Ownership structure		Overall
	Gov. banks	Private banks	
Panel A: Cost complementarities			
IL	–0.375	–3.611	–2.989
	(–0.55)	(–1.28)	(–1.30)
IB	–0.522	–1.645***	–1.429***
	(–1.53)	(–3.29)	(–3.43)
LB	0.063	0.086	0.081
	(2.45)	(1.73)	(2.03)
Panel B: Revenue complementarities			
IL	–0.783	–4.532	–3.811
	(–0.48)	(–0.57)	(–0.59)
IB	–0.824	–3.209***	–2.750***
	(–1.57)	(–3.03)	(–3.14)
LB	0.132*	0.121	0.123
	(2.76)	(1.12)	(1.41)

Notes: Gov. banks = government-owned banks; IL = bank investment and bank loan; IB = bank investment and bancassurance; LB = bank loan and bancassurance. T-statistics are in the parentheses.
*** Significant at the 1% level; ** significant at the 5% level; *significant at the 10% level.

bancassurance activities. Consistent with the cost complementarities results, we find that private banks have higher cost economies of scope than do government-owned banks. The cost complementarities and cost economies of scope we uncover are consistent with the results of Felgren (1985) and Todd and Murray (1988). In summary, the results provide strong evidence that one-stop banking improves cost scope economies.

In contrast, the results in Table 5 also reveal a negative value of –0.171 for the overall revenue scope of diseconomies, which implies that banks suffer revenue diseconomies when they provide multiple products. These results, similar to those for the revenue complementarities, again are consistent with the results of Berger et al. (1996, 2000). Several factors may lead to revenue diseconomies. For example, (1) consumers may prefer bancassurance, but competition prohibits banks from taking advantage of this demand; (2) banks may have market power, but consumers may not value bancassurance; or (3) banks may lack market power, and consumers may not value bancassurance. The competitiveness of the market likely

Table 5. Economies of Scope by Ownership Structure

Economies of scope	Ownership structure		Overall
	Gov. banks	Private banks	
Cost	0.485	1.181***	1.047***
	(1.85)	(12.310)	(9.950)
Revenue	0.223	–0.265***	–0.171**
	(1.15)	(–3.260)	(–2.060)

Notes: Gov. banks = government-owned banks. T-statistics are in parentheses.
*** Significant at the 1% level; ** significant at the 5% level; *significant at the 10% level.

limits the market power of banks in Taiwan, which means they cannot set market prices or take advantage of revenue scope economy gains.[18] In general, private banks suffer significantly higher revenue diseconomies of scope than do government-owned banks. However, the overall results show that bancassurance helps banks in Taiwan realize cost scope economies gains that are greater than the revenue scope diseconomies losses that are caused. This evidence may suggest that cost scope economies are the main driving force that motivates Taiwanese banks to expand into the insurance segment.

Regression Results

We regress the estimated scope economies on various bancassurance factors to test the determinants of these scope economies. In Table 6, we provide the results for the cost scope economies for the banks, and in Table 7, we offer the results for revenue scope economies. We test for multicollinearity using variance inflation factors and find that the assumptions behind these regressions are not violated.

As we have discussed, bancassurance provides banks with substantial new sources of earnings, and rapid sales commissions growth encourages the success of bancassurance. From Table 6, we note that the effects of bancassurance business on cost economies of scope appear mainly in the bancassurance premium income proxies ($BANCINS_1$, $BANCINS_2$, and $BANCINS_3$). Banks with more bancassurance premium income indicate more involvement in bancassurance and obtain greater cost scope economies. Thus, the results in Table 6 reject our first null hypothesis, namely,

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[18]According to the summary statistics in Table 3, the market share of banks in Taiwan tends to be small.

Table 6. Cost Economies of Scope Regression for Taiwan Local Banks

Independent variables	Model 1		Model 2		Model 3	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Intercept	3.767	2.28**	2.931	1.45	2.955	1.72*
$BANCINS_1$	0.340	4.88***				
$BANCINS_2$			4.478	2.19**		
$BANCINS_3$					3.129	4.38***
SPECIALIST	−0.003	−0.42	0.000	0.01	0.002	0.18
NUM	−0.028	−2.87***	−0.019	−1.64	−0.018	−1.83*
BRANCH	0.001	0.17	0.000	0.09	0.003	0.70
CUSTOMER	0.000	−1.02	0.000	−0.7	0.000	−1.09
CAP	0.011	0.22	0.035	0.01	0.007	0.13
AGN	−0.113	−0.28	−0.383	−0.75	−0.549	−1.28
FOCUS	−4.631	−1.64	−3.893	−1.12	−3.350	−1.13
SHARE	−2.654	−0.18	7.830	0.44	5.409	0.36
GOV	0.161	0.38	−0.205	−0.4	−0.260	−0.61
SUB	0.429	2.17**	0.225	0.94	0.243	1.26
IA	−1.535	−1.49	−0.593	−0.46	−0.755	−0.70
YEAR	−0.187	−1.57	−0.174	−1.19	−0.198	−1.59
Adjusted R-square	0.5275		0.2961		0.4862	

Notes: $BANCINS_1$ = ratio of commission to administration fee; $BANCINS_2$ = ratio of commission to non-interest revenue; $BANCINS_3$ = ratio of commission to consumer banking revenue. SPECIALIST = number of insurance specialists per branch. NUM = number of correspondent insurance firms. BRANCH = number of branches. CUSTOMER = number of ATM cards of the bank. CAP = log of capital infusion for insurance agency. AGN = proportion of insurance salespeople. FOCUS = product Herfindahl index. SHARE = market share of loan. GOV = 1 if banks are owned by government; 0 otherwise. SUB = 1 if banks are subsidiaries of financial holding company; 0 otherwise. IA = proportion of invested assets. The YEAR dummy equals 1 if it is 2004.
*** Statistically significant difference at 1% level or better; **statistically significant difference at 5% level; *statistically significant difference at 10% level.

that bancassurance premium income has no impact on cost scope economies. The coefficients for the three bancassurance income variables are significantly positive in all equations; thus, banks with more bancassurance premium income attain greater cost scope economies. These results are robust, independent of the model specification, and confirm Felgren's (1985) and Todd and Murray's (1988) arguments that banks gain more cost advantages by selling insurance products. This finding is also consistent

with Bergendahl's (1995) contention that a rapid growth in bancassurance premium income is one of the elements that results in the success of bancassurance.

The coefficients of the number of partner insurers are significantly negative, which implies that banks that enter into agreements with more insurance companies attain lower cost economies of scope, so the results resulted in the rejection of our third null hypothesis, that the number of insurance partners has no impact on cost scope economies. When banks have more insurance partners, they appear to incur more coordination, training, and administrative costs from selling insurance products, which reduce the cost economies of scope. As Carow (2001a, 2001b) and Bergendahl (1995) argue, a relationship between the bank and insurance companies may incur additional costs, which make positive cost scope economies less likely. With regard to the control variables, the significantly positive coefficient for FHCs (SUB) is consistent with our predication that members of FHCs have greater economies of scope due to their superior access to cross-selling opportunities and capital resources.

The results in Table 7 show that the bancassurance income coefficients are significantly negative; that is, bancassurance premium income influences revenue scope economies, and thus our fourth null hypothesis, that the number of branches has no impact on revenue scope economies, does not receive support. This result also is consistent with findings of Berger et al. (1996) and with the overall revenue diseconomies of scope in Table 5. Potential explanations for this finding might include banks' inability to take advantage of customers' demand for bancassurance, customers' lack of interest in bancassurance, or some combination; in addition, bancassurance prices might not sufficiently support revenue economies of scope during our short sample period. Revenue diseconomies also imply that some customers prefer and pay more for the services of a specialized firm, which can tailor products to meet their needs better (Berger et al., 2000). However, data limitations prevent us from differentiating among these possibilities.

The number of insurer partners also appears in the revenue economies of scope regression to capture the effect of bancassurance partnerships on efficiency consequences. Banks with more insurer partners acquire more flexibility that enables customers to choose various insurance products. The coefficients for partner insurance companies are positive and statistically significant, which suggests that banks that cooperate with more insurance companies gain greater involvement in bancassurance activities.

We also consider the effect of the number of branches on revenue scope economies; the results lead to rejection of our fourth null hypothesis. Specifically, coefficients for the number of branches are positive and statis-

Table 7. Revenue Economies of Scope Regression for Taiwan Local Banks

Independent variables	Model 1		Model 2		Model 3	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
Intercept	–2.747	–3.57***	–2.452	–3.05***	–2.509	–3.29***
BANCINS$_1$	–0.094	–2.90***				
BANCINS$_2$			–1.848	–2.28**		
BANCINS$_3$					–0.959	–3.03***
SPECIALIST	0.000	0.08	–0.001	–0.16	–0.001	–0.30
NUM	0.018	3.94***	0.016	3.53***	0.015	3.54***
BRANCH	0.004	2.09**	0.004	2.19**	0.003	1.80*
CUSTOMER	0.000	2.04**	0.000	1.92*	0.000	2.16**
CAP	–0.049	–2.09**	–0.055	–2.27**	–0.047	–2.01*
AGN	0.087	0.47	0.205	1.02	0.222	1.17
FOCUS	4.678	3.55***	4.348	3.15***	4.280	3.26***
SHARE	4.489	0.67	1.112	0.16	2.224	0.33
GOV	–0.888	–4.48***	–0.820	–4.06***	–0.777	–4.12***
SUB	–0.267	–2.90***	–0.242	–2.54**	–0.223	–2.61**
IA	2.368	4.94***	2.018	3.94***	2.137	4.48***
YEAR	–0.012	–0.22	–0.010	–0.17	–0.007	–0.13
Adjusted R-square	0.8069		0.7910		0.8103	

Notes: BANCINS$_1$ = ratio of commission to administration fee; BANCINS$_2$ = ratio of commission to non-interest revenue; BANCINS$_3$ = ratio of commission to consumer banking revenue. SPECIALIST = number of insurance specialists per branch. NUM = number of correspondent insurance firms. BRANCH = number of branches. CUSTOMER = number of ATM cards of the bank. CAP = log of capital infusion for insurance agency. AGN = proportion of insurance salespeople. FOCUS = product Herfindahl index. SHARE = market share of loan. GOV = 1 if banks are owned by government; 0 otherwise. SUB = 1 if banks are subsidiaries of financial holding company; 0 otherwise. IA = proportion of invested assets. The YEAR dummy equals 1 if it is 2004.
*** Statistically significant difference at 1% level or better; **statistically significant difference at 5% level; *statistically significant difference at 10% level.

tically significant, such that bancassurance benefits increase when banks have more extensive bank branches. Again, this finding is consistent with previous research, such as Felgren's (1985) argument that the existence of more bank branches provides the means to distribute insurance products. Bancassurance further appears to provide convenience and satisfy the needs of customers, who may be willing to pay more to receive this

convenience. The coefficients for the number of bank customers are positive and statistically significant; that is, banks with more customers are more likely to realize revenue scope economies. Thus, our fifth null hypothesis, that the number of customers of banks has no impact on revenue scope economies, is rejected. This evidence is consistent with prior arguments that the number of existing customers has a positive impact on the success of the bancassurance business (e.g., Todd and Murray, 1988; Bergendahl, 1995; Tanriverdi and Venkatraman, 2005).

With regard to the control variables, the coefficient on capital infusion is significantly negative, suggesting that costly capital infusion emerges as a source of diseconomies of scope. Product concentration is positive and significant; banks earn greater revenue economies of scope when their product focus increases. Government-owned banks have smaller revenue economies of scope, as do those banks that are FHC subsidiaries. As Berger et al. (2000) argue, joint production may exacerbate agency problems by allowing cross-subsidization or additional free cash flow to weak subsidiaries. Thus, cross-subsidiaries appear to deteriorate revenue economies of scope, whereas banks with a higher proportion of invested assets enjoy greater revenue economies of scope.

Overall, banks with more correspondent insurers, a larger number of branches, more customers, a greater product focus, and a higher proportion of invested assets are more likely to realize revenue scope economies. In addition, banks with more correspondent insurers, a larger number of branches, a greater number of customers, a more intensive product focus, and a higher proportion of invested assets are more likely to realize revenue scope economies.

CONCLUSIONS

The worldwide financial service industry is experiencing waves of financial integration, so interest in the efficiency consequences of these mergers continues to increase. Although considerable efforts provide evidence about the efficiency consequences of financial integration within the same institution, little attention addresses the efficiency consequences of financial integration from a cross-industry perspective. To fill this gap, we examine the impact of financial integration on economies of scope in the Taiwanese banking industry from a cross-industry perspective. Using unique bancassurance data from Taiwan, this study examines the scope economies of banks as a result of financial integration when they establish insurance agency subsidiaries rather than relying solely on the universal banking model. The special characteristics of bancassurance activities in

Taiwan provide new insights by adding the market experience of a non-universal banking model from Asian countries. Moreover, we examine and compare both cost and revenue scope economies of banks to provide a more solid analysis and adopt a regression analysis to identify the relationship between economies of scope and bancassurance.

With regard to our first research question—whether banks can improve their scope economies through integration of their bank and insurance products—the overall results indicate that higher involvement in bancassurance helps banks improve their cost scope economies. We find that banks in Taiwan realize greater cost scope economies gains than revenue scope diseconomies losses when they engage in bancassurance activities. This evidence may suggest that cost scope economies are the main driving force motivating Taiwanese banks to expand into the insurance segment. However, due to the highly competitive marketplace and overbanking problems, banks in Taiwan may lack sufficient market power to set market prices, which prevents them from taking advantage of revenue scope economy gains.

For the second set of research questions—whether scope economies of banks improve because of their higher degree of involvement in bancassurance and which types of firms are more likely to realize these scope economies—the regression results generally indicate that bancassurance helps banks improve their cost scope economies but not their revenue scope economies. In particular, banks with higher levels of bancassurance premium income and those that are subsidiaries of FHCs are more likely to realize cost scope economies, whereas banks with more correspondent insurers, a larger number of branches, a greater number of customers, a more intensive product focus, and a higher proportion of invested assets are more likely to benefit from revenue scope economies.

Our analyses in turn suggest some avenues for further research. Greater or longer experience in bancassurance activities may enable banks to realize cost or revenue economies of scope in the long run. Therefore, additional research should use longer sample periods to determine if our findings about revenue diseconomies of scope from bancassurance for the overall market represent empirical regularities. Another extension might test the robustness of our results by using alternative cost and revenue functional forms. Studies on joint production should identify the crucial determinants of banks' scope economies. Finally, it may be important to extend our analysis by using joint production data from other financial service industries, such as banks and securities, because ongoing financial consolidation in other industries may significantly alter our findings regarding economies of scope.

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