

2002s-78

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M. Martin Boyer and Charles M. Nyce

Série Scientifique
Scientific Series

Montréal
Septembre 2002

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Banks as Insurance Referral Agents? The Convergence of Financial Services: Evidence from the Title Insurance Industry*

M. Martin Boyer[†] and Charles M. Nyce[‡]

Résumé / Abstract

Le but de cet article est de donner un aperçu de la structure éventuelle du marché de l'assurance IARD aux États-Unis si les banques continuent de pénétrer le marché de l'assurance IARD au même rythme qu'actuellement. À cette fin, nous étudions un marché de l'assurance où les banques ont déjà un rôle prépondérant, soit l'assurance titre de propriété. Nous comparons les canaux de distribution utilisés pour vendre l'assurance titre et les canaux utilisés par les banques pour entrer dans le marché de l'assurance IARD. Le marché de l'assurance titre est caractérisé par deux importantes barrières à l'entrée: les alliances stratégiques et les banques de transactions immobilières. Dans cet article, nous testons différents modèles de croissance développés en organisation industrielle où il existe des barrières à l'entrée. Nos tests empiriques semblent supporter le modèle de croissance basé sur le modèle circulaire de Salop. Ainsi, nous concluons que si les banques pénètrent de manière significative le marché de l'assurance IARD, nos résultats offrent un aperçu de la structure future de ce marché.

The purpose of this paper is to offer a glimpse into the potential industrial organization of the property casualty insurance (P&C) market if banks continue to penetrate it at current rates. To do so, we study an insurance market where banks are already integral in distribution: Title insurance. We draw some broad comparisons between the distribution channels used to sell title insurance and the channel used by banks entering the P&C market. The title insurance industry is characterized by two major entry barriers: Controlled business arrangements and title plants. Although title insurance has not generated much academic interest compared to other insurance products, title insurance is an insurance product wherein the distribution process banks have traditionally been heavily involved. In this paper, we test different industrial organization growth models with barriers to entry. Our empirical analysis suggests that the current title insurance industry structure fits the Salop circular-city model. Our contention is that if banks continue their current trend of market penetration in property casualty markets, the results presented herein could potentially offer an insight into the future structure of the P&C market.

Mots clés : Bancassurance, Assurance titre de propriété, Barrières à l'entrée, Alliances stratégiques.

Keywords: Bank Insurance, Title Insurance, Entry Barriers, Affiliated Agencies.

Codes JEL : G22, L85, L13

* The paper benefited from the financial help of HEC - Montréal and of the Social Sciences and Humanities Research Council of Canada (SSHRC). The authors wish to thank Robert Clark, Rob Hoyt and David Sommer for insightful comments, as well as participants at the 2001 ARIA annual meeting. The first author would like to acknowledge the continuing financial support of Cirano. Usual disclaimers apply.

[†] Department of Finance, HEC - Montréal, Université de Montréal, 3000 chemin de la Côte-Ste-Catherine, Montréal, Québec, H3T 2A7, Canada; and CIRANO, 2020 University Ave, 25th floor, Montréal, Québec, H3A 2A5, Canada; email: martin.boyer@hec.ca.

[‡] Department of Insurance, Legal Studies and Real Estate, Terry College of Business, University of Georgia, 206 Brooks Hall, Athens, GA 30602-6255; email: cnyce@terry.uga.edu.

1 Introduction and Motivation

Historically, regulatory restrictions in the United States have limited the development of financial service conglomerates by segmenting the financial services industry. As these regulatory restrictions have subsided, commercial banking firms have been able to diversify into traditionally non-commercial activities such as investment banking and insurance products and services. Berger et al. (1999) reviews the literature on both the causes and consequences of consolidation of financial services through mergers and acquisitions.¹ The advantages include informational advantages, economies of scale or scope, diversification, cross-selling and cross-marketing. Disadvantages include conflicts of interest, reduction in competition, concentration of economic or political power, difficulties in monitoring, or required expansion of the safety net.

With the decline in the traditional banking business and subsequent financial innovation and expansion into nontraditional banking areas (Allen and Santomero, 2001) banks have expanded into the insurance arena. A prime mover of financial services consolidation in this area was the Citicorp-Travelers merger in 1998. Carow (2001) provided evidence that the market believed this merger would provide the impetus to remove the barriers between banking and insurance and investors expected large banks and insurance companies to receive significant benefits. The recently announced divestiture of Travelers by Citigroup² may provide an indication that selling rather than producing insurance products will allow banks to generate many of the benefits of offering consolidated financial services without the inconvenience of pricing these services. The advantages for banks of selling insurance products, including diversification (Milbourn et al., 1999), informational advantages (Berger and Udell, 1995; Chakravarty and Scott, 1999), and complementarity in production and economies of scope (Berger et al., 1996), can all be generated without the banks actually underwriting the insurance contract.

The passing of the Gramm-Leach-Bliley/Financial Services Modernization Act in 1999 has smoothed the way for banks to enter the insurance arena and vice-versa.³ The National Association of Insurance Commissioners (NAIC) is aware of the possible implications for insurance of the Gramm-Leach-Bliley act. In a statement of intent,⁴ the NAIC vows to

¹In addition, Classens and Klingebiel (2001) provide a more international literature review of the advantages and disadvantages of integrated banking.

²While Citigroup plans to divest itself of Travelers there is still an agreement in place for cross-marketing of the two firms' products.

³Gramm-Leach-Bliley broadened the ability of banks to sell insurance products in four ways: 1- expanded the insurance sales authority for subsidiaries of national banks (no town size restrictions); 2- protects national banks and their subsidiaries from burdensome state requirements in sales and cross-marketing activities; 3- provide for uniformity in multistate licensing of agents; 4- permit a bank to affiliate with an insurance carrier (ABIA Legislative, Litigation, and Regulatory Report, Nov. 9, 1999).

⁴http://www.naic.org/GLBA/Final_Statement_of_Intent.pdf

"... undertake a thorough review of our respective state laws to determine needed regulatory or statutory changes to achieve functional regulation as contemplated by the Gramm-Leach-Bliley Act. Anti-affiliation statutes, licensure laws, demutualization statutes, and various essential consumer protections, including sales and privacy provisions, will be part of this review" (page 2).

This statement goes to the core of the insurance industry's preoccupation with banks entering insurance markets. Although affiliation is common in both title insurance and credit insurance, it is almost unheard of in other lines of insurance such as in the different property and casualty (P&C) insurance lines of business.⁵ Mutual insurance companies may be pressured to demutualize in order to be acquired by banks. The distribution of insurance will also be transformed as banks enter the market. Regulation of these three aspects needs reform. Banks account for approximately \$45 billion in insurance premiums in the year 2000. This amounts to about 6% of the total \$735 billion in premiums written that year. While most of this premium was paid to purchase annuities, growth in both commercial and personal lines of P&C insurance written by banks was more than ten times higher than the roughly 2% growth in premium that the P&C industry saw over the years 1997 to 2000. Table 1 in the Appendix (all tables are in the appendix) presents the expansion of banks in the P&C insurance market.

The 2001 American Bankers Insurance Association study shows that bank acquisitions of independent insurance agencies tends to be the preferred entrance strategy for distribution of P&C insurance products. While research has shown that bank entry into other financial services fields, such as corporate securities underwriting (see Gande, Puri and Saunders, 1999), has provided evidence that bank entry increased competition, Saunders (1999) raises the point that competitive effects may differ based on the type of entry vehicle used (de novo vs. acquisition) in the securities arena. Where de novo entry may indeed increase competition, acquisition may, however, decrease the number of competitors in the marketplace. Therefore, the form of entry would need to be closely monitored to determine the overall benefits of consolidation.

Bank entrance strategy into the P&C market bears a resemblance to controlled or affiliated business arrangements prominent in the title insurance industry. Consolidated closing services offered by the mortgage lender during real estate transactions often include a referral to a particular title insurance agent. Frequently, the mortgage lender has ownership interest in the recommended agent. This ownership interest is known as a controlled or affiliated business arrangement and acts as a barrier to entry into the title insurance market. Examination of the market structure of title

⁵The most important personal lines of business in the property and casualty insurance industry are automobile insurance and homeowner insurance.

insurance, where banks/mortgage lenders have traditionally played a large role in distribution, may shed some light on one of the potential directions that the distribution of financial services may be heading. What effect will agency acquisition have on the industrial organization of the financial services market? More specifically, how much should banks be investing in agencies similar to the controlled business arrangements prevalent in mortgage lending?

On top of offering an insight into the possible future structure of the P&C insurance market, our paper has a double purpose. First, it documents the existence in the title insurance industry of particular entry barriers known as title plants and controlled (or affiliated) business arrangements. Second, it presents four different industrial organization growth model of the title insurance industry for which an empirical test is conducted using state level data from 1996 to 2000. This data was purchased from the National Association of Insurance Commissioners (NAIC).⁶ We find that the Salop circular city model best explains the industrial organization of the title insurance industry.

The remainder of the paper is organized as follows. The next section will discuss title insurance and the barriers to entry in the title insurance market. Section 3 presents the barrier to entry and title insurance literature. Section 4 contains the theoretical model with the associated testable hypotheses. In section 5 we present the data and the methodology used to test the hypotheses. Section 6 presents our results. Finally, we conclude with section 7.

2 The Title Insurance Industry

Growth of the real estate industry in the United States in the last decade has given rise to significant profit opportunities for companies involved in the process. Builders, mortgage lenders, and realtors have all benefited from the increased activity. Title insurance companies are another essential participant in real estate transactions. They have not, however, received as much attention in trade journals as the other participants. Banks and other mortgage lenders require borrowers to produce a valid title for the mortgaged property, as the number of real estate transactions increases, so does the business for title insurers. Although title insurance has not generated much academic interest compared to other insurance products, in terms of direct premiums written it is larger than many P&C insurance lines including medical malpractice.

Title insurance is a unique form of insurance. The premium is paid only once, at the time where the property is purchased and represents only a small fraction of closing costs associated with a mortgage. Title insurance protects buyers and their mortgage lenders against sellers who are selling assets that are not theirs, or not theirs entirely. For example, a title insurance policy

⁶The authors would like to thank HEC - Montréal for sponsoring this data purchase.

will protect the buyer against title defect such as lien or unknown property claims that the seller failed to mention, or did not know existed.

In addition, very little of the premium is reserved to cover future claims, as most of the premium is used to cover expenses incurred in the title search. Title searches require the examination of a vast number of legal documents that trace the title of the property through all the previous owners. Although some states have central offices that accumulate all the relevant information on real estate transactions, other states require that each title insurer have its own real estate transaction database; these databases are known as a **title plant**. Where they are mandatory, title plants represent a significant barrier to entry. A potential entrant into a state where a title plant is required will need to gain access to an existing title plant from an incumbent title insurer (either by purchasing the title plant or leasing it) or construct one from the bottom up.

Although the insurance literature generally agrees that minimum capital standards are entry barriers, regulators are more concerned with solvency issues than with lack of competition issues so that substantial capital becomes necessary. On top of the usual capital standards, title insurers face two other entry barriers that are arguably more important than the minimum capital standards. These two other significant barriers to entry in the title insurance market are known as title plants and controlled business arrangements. In such, any potential entrant into a title insurance market may not only need to own its own title plant, but may also need to start building arrangements with local businesses involved in real estate transactions. In the real estate industry this latter barrier is known as a controlled (or affiliated) business arrangements. Barriers associated with title plants are more unique to the title insurance industry in that some states require title insurers to own or have access to one.

2.1 Controlled or Affiliated Business Arrangements

In the real estate industry, controlled business arrangement (CBA's), are defined as the ownership of one provider in a real estate transaction by another provider (see Palomar, 1997). Affiliated Business Arrangements (AfBA's) are defined as an arrangement in which a person who is in position to refer business as part of a real estate transaction involving a federally related mortgage loan has either an affiliate relationship or direct ownership interest of more than 1% in the provider of settlement services. Under the Real Estate Settlement Procedures Act of 1974 (RESPA), controlled or affiliated business arrangements are allowed as long as the consumer is informed of the relationship among service providers and no rebates or kickbacks are exchanged between service providers.⁷ Rebates

⁷The only benefit that the person referring the business is allowed to gain is their normal ownership income from the service provider, they may not directly receive income based on their referrals.

and kickbacks are prohibited to prevent reverse competition, whereby title insurers offer substantial rebates to primary service providers (lenders or real estate agent) to induce them to use their products. These rebates increase the cost of title insurance because insurers or insurance agents need to recoup the cost of the rebates by increasing the premium charged to the consumers.

Controlled business arrangements, while facilitating one stop shopping for potential homeowners, may also discourage new entry into the title insurance industry by almost requiring partnerships with established individuals involved with the real estate transaction. Some states have limited the amount of revenue that may be generated by controlled or affiliated business arrangements for title insurers or agents.⁸

2.2 Title Plants

Title plants essentially duplicate all the public records for land property in a given locality and are the primary source of data for title searches. The title insurer (or the title agent) maintains these plants, required by statute in some states. In these title plant states, title plants must meet some minimum requirements (Koch, 1993). Title insurers competing in the title plant states may meet title plant requirements by owning, leasing or sharing title plants with other title insurers. While only seven states explicitly require title plants (see Palomar, 1997), based on reported title plant values, there appear to be 34 states in which insurers list a title plant as an asset. The other fifteen states (non-title plant states) are Alabama, Arizona, Colorado, Connecticut, Delaware, Florida, Georgia, Maryland, North Carolina, New Jersey, Ohio, Pennsylvania, South Carolina, Utah and Washington.⁹ Of the 33 title insurers in the United States that do not list any title plant as an asset in 1996, 17 are either members of a group where at least one member had a title plant or had no direct premiums written in 1996. For the remaining 16 firms, two rented title plants and 14 only wrote business in non-title plant states. Regardless of statutory requirement, ownership or access to a title plant gives title insurers a competitive advantage over competitors who do not have access.

It should also be noted that technological advances have aided in the cost effectiveness of title plants. Title insurers are becoming more automated in all aspects of operations, including order taking, title searches and policy issuance (BestWeek, 1996). These advances, along with the computerization of the public record, should enable title insurers to more efficiently maintain the title plants, increase profit margin, and reduce the barrier to entry that title plants may present.

⁸As of 1997, Kansas limited income from CBA's or AfBA's to 20%, California to 50%, Michigan to 15%, Colorado and Utah to 33 1/3%, Wyoming to 25% and Nebraska to 20% (see Palomar 1997).

⁹Although the state of New York requires title insurers to have access to a title plant, it does not allow title insurers to list the title plant as an admitted asset.

Title plants currently remain significant entry barriers as it is shown in Table 2. To construct this table we divided the states into title plant and non-title plant states and conducted a simple test on means and medians indicating the impact of title plant requirements on companies operating in a state. The profitability measure¹⁰ is the only measure that is not significant with regards to title plant requirements. We see that title plant requirements have an important impact on the structure of the different state markets for title insurance. In title plant states, there are fewer companies, fewer independent companies¹¹ and market concentration is higher than in non-title plant states. An interesting finding presented in Table 2 is the fact that title insurers seem to be substituting one barrier (title plants) for another (controlled business arrangements). Indeed, we see that title insurers seem to derive proportionally more income from controlled business arrangements in non-title plant states than in title plant states. If this measures the importance of bank referrals, this difference may indicate that consumers search less in non-title plant states, thus increasing the profitability of title insurers. Controlled business arrangements entry barriers would then compensate for easier insurer market entry into non-title plant states.

2.3 Implication for P&C insurance

The property and casualty insurance industry is similar to the title insurance industry in that consumers rarely shop around for insurance and where referrals are the most important source of new business for insurers. Berger et al. (1989) report the results of survey conducted almost 30 years ago by Cummins et al. (1974) which concluded that only 43 % of policyholder ever compared premium across companies. Berger et al. (1989) also report that less than 17 % of surveyed consumers shopped for insurance in the past year. Moreover, Cummins and Weisbart (1977) find that the most important source of new consumers for independent insurance agents seems to be referrals. Similar results were found by Schlesinger and von der Schulenburg (1993) using German data. No newer result suggest that the situation is any different now than it was then. This suggest that policyholders not only do not shop around much for the best price, but also that they seem to be influenced by the opinion of others.

The analogy with title insurance is straightforward. If banks start having strategic partnership with insurance companies, they will be in an advantageous position to recommend a particular

¹⁰Profitability is measured as one minus the loss ratio ($1 - \frac{\text{direct losses incurred}}{\text{direct premiums earned}}$). Although widely used to assess the profitability of different insurance lines, it is not a very good measure for title insurance since a majority of premiums collected are for the expenses incurred during the title search rather than losses. Unfortunately the NAIC annual statement (schedule T) does not provide expenses by state as it does for premiums and losses.

¹¹The number of companies operating per state was taken from the NAIC database. Similar to other insurance markets, however, there are groups of title insurers under common ownership. This significantly reduces the number of completely independent decision centers. Companies that were members of the same group were considered one company for the analysis presented here.

homeowner insurer during mortgage negotiations or an automobile insurer during car loan negotiations. Given the apparent high search cost of policyholders and their attitude toward recommendations, it seems logical to expect an increased value in the partnership between banks and insurers. If that indeed becomes the case, then insurers would be willing to pay a substantial amount to receive bank referrals. This practice would then be similar to White's (1994) reversed competition argument.

In the event that P&C insurers start behaving as title insurers in using banks as their main referral service and consumers do not shop for better prices more than they are now (or if consumers are willing to pay more for one stop shopping for all financial services), one should expect insurers to compete for the referrals even if that competition increases the cost of insurance policies for end users. In other words, if insurers compete for bank referrals by investing a sizeable amount of money on those strategic partnerships, insurers will need to charge greater premiums to policyholders to finance such investments. This means that total premiums collected by insurers will be driven up at the same time as their loss ratio (Loss incurred divided by premiums earned) is driven down. It would then appear to insurance regulators that insurance companies have increased their profit margin after the integration of financial services since they are collecting more premiums for the same loss. Such an analysis may be erroneous, however, since the insurers' expense ratio (total expenses divided by premiums written) may be driven up. Regulators would then be faced with an interesting situation where insurers are collecting more in premiums, incurring the same losses, but paying more in expenses. Although outside of the scope of the present paper, a potential test of such an hypothesis would be to compare the expense and loss ratio of insurance companies that have invested in controlled business arrangements with the expense and loss ratio of insurance companies that have not.

As it becomes more evident, the end question of banks selling insurance in their branches will be whether such partnerships increase or decrease competition. An increase in competition is probable if banks create their own insurance companies to compete with incumbent insurers. On the other hand, if banks restrict their insurance operations to offering contracts of existing insurance companies (in effect becoming insurance agents), then one must wonder if such an integration of financial services will not come to the detriment of consumers. As in Saunders (1999), the method chosen by banks to enter the P&C insurance industry will have an important impact of the competitive nature of the industry. Our paper sheds light on that debate by observing what happens in an insurance line whose operations is closely intertwined with that of banks.

3 Literature Review

3.1 Barrier to Entry Literature

The impact of entry barriers on firm profitability has been well documented in the literature, starting with Stackelberg (1934), Bain (1956) and Stigler (1968). Barriers to entry are often seen as a prerequisite for a firm to gain monopoly power in a market. Without entry barriers, no non natural monopoly would be sustainable. The seminal approach to testing empirically entry barriers has been developed by Orr (1974) using the Canadian manufacturing market as its data source. Recent studies by Burton et al. (1999) and Neumann et al. (2001) have reexamined the method used by Orr, developed a new measure, or used a different approach to measuring the strength of the entry barriers. The work by Kang and Lee (2001) resembles more the problem faced in the title insurance industry where a lot of the same players are competing against one another in many different markets, some in which entry barriers are important, and others where entry barriers are less important. Using a model similar to Katz and Tokatlidu (1996) and Baik and Lee (2000), they show that eliminating entry barriers can sometimes reduce welfare for consumers as the resources expanded during the entry contest can exceed the gain from lowering entry barriers.

Based on early work by Bain (1966) and Pryor (1972) who documented that firm concentration was in no way smaller in large markets as in smaller markets, one could have asserted that the level of firm concentration in a market is independent of the size and growth of these markets. A recent study by Neumann et al. (2001) finds the opposite since it concludes that market concentration is significantly smaller in larger markets, given potential entry. This is due to the fact that larger markets can accommodate more entry, which reduces the market power of any individual firm, and thus the size of the incumbent firms. The study also finds that concentration declines as a result of market growth. In fact, depending on the type of market growth (a higher willingness to pay by consumers, or a higher number of consumers), the number of firms may increase, thus reducing concentration. When entry is not possible, they find that concentration does not change.

Another approach used in the literature is to study the entry-inducing impact of mergers between incumbents. Using merger simulations in randomly generated industries as in Kydland and Prescott (1996), Werden and Loeb (1998) find that mergers may not create enough incentives for entry. In fact, given that entry may not be induced by these mergers, large merging firms may expect large increases in profit.

3.2 Title Insurance Literature

Contrary to the literature pertaining to barriers to entry and to the other insurance lines, the title insurance literature numbers but a few papers. A possible reason may be that consumers pay little attention to the title insurance component of the real estate transaction. Because the title insurance premium represents only a small fraction of closing costs, let alone of the purchase price of a real estate property, rate changes and/or increased entry barriers are not likely to be followed by any adverse consumer response. State regulation may then be the only tool left to protect consumer welfare. Unfortunately, recent research has found that this may not be enough. Bajtelsmit and Bouzouita (1998) show that for the private passenger automobile insurance industry firm concentration and profitability are positively related regardless of state regulatory rate restrictions. Nyce and Boyer (1998) show that the title insurance industry is relatively concentrated at the state level. The market share of the top 5 decision centers by state is never below 70 percent. As for the market share of the top 3 title insurance decision centers, only once is it below 50 percent (Texas). In addition, the title insurance Herfindahl index is significantly greater than larger lines of business of P&C insurers (Nyce and Boyer 1998), as shown in Table 3.

There has been very little recent literature on title insurance. Prior to Nyce and Boyer (1998), the most recent academic work was White (1984) who advocated the use of controlled business arrangements in the absence of price competition in the industry. White (1984) argues that the absence of price competition is a fundamental problem in the title insurance industry and that controlled business arrangements and reverse competition (rebates and kickbacks) are symptoms of that problem. White further argues that as long as price competition remains absent, controlled business arrangements should be encouraged. He notes that since home buyers are perceived to have little knowledge of title insurance and rely heavily on the recommendation of others involved in the real estate transaction (recommenders), the title insurers focus their competitive efforts on attracting the recommenders rather than price competition directed at attracting the homeowners. Therefore, title insurers are competing, but through non-price means.

4 Models

The real estate market has grown in the United States in the last ten years; not only the number of transactions, but also the dollar value of those transactions. This means that not only was there a greater demand for title insurance services (because there were more transactions), but also that the type of service demanded has changed because the transactions are becoming larger and larger. In industrial organization terms, the title insurance industry has benefited from horizontal growth

(more demand for the same good) and from vertical growth (changes in preferences, because of, say, greater wealth). The two types of market growth will not have the same impact on market concentration depending on the type of industrial organization model used.

To find what basic type of industrial organization model fits the title insurance industry best, we develop four models used extensively in the industrial organization literature. We first present the traditional Nash-Cournot game where firms compete in quantities. We then move on to a Bertrand competition in a circular city (the Salop model) followed by a model where markets are perfectly segmented so that each firm has local monopoly power. Finally, we present a Cournot-Nash model where entry and exit are prohibited, so that the number of firms is always the same.¹²

In every model, we will assume a linear demand function. The inverse demand function will then be given by $p = a - bQ$, where $Q = \sum_{i=1}^n q_i$ is the total market supply. An increase in the willingness to pay for any quantity (what is called a **vertical market growth**) is associated with a higher intercept a (the inverse demand function shifts up), whereas an increase in the number of consumers for a particular good (what is called a **horizontal market growth**) is associated with a lower slope $-b$ (the inverse demand function tilts counterclockwise). All firms are assumed to be the same in the models.

Because there are two types of fixed costs in title insurance (title plants and control business arrangements), a firm need to consider these two fixed costs in its decision. Let F represent the controlled business arrangements fixed cost. Suppose that the more a firm invests in controlled business arrangements the lower the marginal cost of operating the title insurer. In other words, we let the marginal cost depend on F such that $c'(F) < 0$ and $c''(F) > 0$, and $c'(\infty) = 0$ and $c''(\infty) = \infty$. In other words, investment in control business arrangements reduces marginal costs, but that the reduction in marginal cost is decreasing with additional investment. The second fixed cost corresponds to the entry cost necessary for setting up a title plant in a state. Whereas the amount invested in controlled business arrangements is an endogenous firm decision, the cost of setting up or acquiring a title plant entry is fixed for all. We shall let ϕ represent the cost of setting up a title plant.

4.1 Cournot Competition

In our first model, we use the Neumann et al. (2001) approach to Cournot Competition with possible entry. The maximization problem for each firm i is then

$$\max_{q_i, F_i} \Pi_i = (a - bQ) q_i - c(F_i) q_i - F_i - \phi \quad (1)$$

¹²Although these four models are not the only industrial organization models we could have used, there have the advantage of being simple and of offering different testable predictions.

This yields first order conditions

$$\frac{\partial \Pi_i}{\partial q_i} = a - bQ - c(F_i) - bq_i = 0 \quad (2)$$

$$= a - b(n+1)q_i - c(F_i) = 0 \quad (3)$$

and

$$\frac{\partial \Pi_i}{\partial F_i} = -c'(F_i)q_i - 1 = 0 \quad (4)$$

Only n identical firms will enter the market if

$$(a - bnq_i - c(F_i))q_i - F_i - \phi = 0$$

The first order conditions may then be rewritten as

$$a - c(F_i) - b(n+1)q_i = 0 \quad (5)$$

$$-c'(F_i)q_i - 1 = 0 \quad (6)$$

$$(a - bnq - c(F_i))q_i - F_i - \phi = 0 \quad (7)$$

What we want to do is find the impact of a change in the market (parameters a , b and ϕ) on the number of firms (n) on the production of each firm (q) and on the amount invested in controlled business arrangements (F). Totally differentiating these first order conditions yields

$$\begin{pmatrix} -bq_i & -b(n+1) & -c' \\ 0 & -c' & -c''q_i \\ -bq_i^2 & 0 & 0 \end{pmatrix} \begin{pmatrix} dn \\ dq_i \\ dF \end{pmatrix} = - \begin{pmatrix} 1 & -(n+1)q_i & 0 \\ 0 & 0 & 0 \\ q_i & -nq_i^2 & -1 \end{pmatrix} \begin{pmatrix} da \\ db \\ d\phi \end{pmatrix} \quad (8)$$

Inverting the first matrix, we have

$$\begin{pmatrix} dn \\ dq_i \\ dF \end{pmatrix} = - \begin{pmatrix} -bq_i & -b(n+1) & -c' \\ 0 & -c' & -c''q_i \\ -bq_i^2 & 0 & 0 \end{pmatrix}^{-1} \begin{pmatrix} 1 & -(n+1)q_i & 0 \\ 0 & 0 & 0 \\ q_i & -nq_i^2 & -1 \end{pmatrix} \begin{pmatrix} da \\ db \\ d\phi \end{pmatrix} \quad (9)$$

Let $\omega = b(n+1)c''q_i - (c')^2 > 0$.¹³ The determinant of the matrix is then negative: $\Delta = -bq_i^2\omega$.

Solving, we have

$$\begin{pmatrix} dn \\ dq_i \\ dF \end{pmatrix} = \begin{pmatrix} 0 & 0 & \frac{1}{bq_i^2} \\ c''\frac{q_i}{\omega} & -\frac{c'}{\omega} & -\frac{c''}{\omega} \\ -\frac{c'}{\omega} & b\frac{n+1}{\omega} & \frac{1}{q_i}\frac{c'}{\omega} \end{pmatrix} \begin{pmatrix} 1 & -(n+1)q_i & 0 \\ 0 & 0 & 0 \\ q_i & -nq_i^2 & -1 \end{pmatrix} \begin{pmatrix} da \\ db \\ d\phi \end{pmatrix} \quad (10)$$

¹³With F sufficiently large, ω is indeed positive since $c''(\infty) = \infty$ by assumption and $c'(\infty) = 0$. Another way to see it, as is graphically presented in Neumann et al (2001), is by noting that slope $\frac{b(n+1)}{-c''} > 0$ is greater than slope $\frac{-c'}{q_i} > 0$. These two slopes are obtained by finding $\frac{dF}{dq}$ for the two first order conditions of the maximization problem. This implies that $\omega > 0$.

This gives us

$$\begin{pmatrix} dn \\ dq_i \\ dF \end{pmatrix} = \begin{pmatrix} \frac{1}{bq_i} & -\frac{n}{b}q_i & -\frac{1}{bq_i} \\ 0 & -q_i^2 \frac{c''}{\omega} & \frac{c''}{\omega} \\ 0 & q_i \frac{c'}{\omega} & -\frac{1}{q_i} \frac{c'}{\omega} \end{pmatrix} \begin{pmatrix} da \\ db \\ d\phi \end{pmatrix} \quad (11)$$

Unfortunately, the data does not allow us to look at quantities sold by a firm since quantities are hard to define in an insurance contract. Instead we have to rely on a firm's revenue (or income), which is a product of price and quantity ($R = pq_i$). This value is easily available in insurance under the heading "direct premium written". Firm revenue is given by $R = (a - bq_i - b(n-1)q)q_i$ which yields $\frac{dR}{da} = q_i + (a - b(n+1)q)\frac{dq_i}{da} > 0$, $\frac{dR}{db} = -nq_i^2 + (a - b(n+1)q)\frac{dq_i}{db} < 0$ and $\frac{dR}{d\phi} = (a - b(n+1)q)\frac{dq_i}{d\phi} > 0$. We therefore have the following predic-

	$\frac{dn}{da} > 0$	$\frac{dn}{db} < 0$	$\frac{dn}{d\phi} < 0$	
	$\frac{dq_i}{da} = 0$	$\frac{dq_i}{db} < 0$	$\frac{dq_i}{d\phi} > 0$	
tion matrix	$\frac{dR}{da} > 0$	$\frac{dR}{db} < 0$	$\frac{dR}{d\phi} > 0$	from which we are able to draw three testable hypotheses.
	$\frac{dF}{da} = 0$	$\frac{dF}{db} < 0$	$\frac{dF}{d\phi} > 0$	

Hypothesis A.1: A vertical increase in demand ($+\Delta a$) will have no impact on the number of units produced nor on the amount invested in controlled business arrangements, but the number of firms will increase as will a firm's revenue.

Hypothesis A.2: An horizontal increase in demand ($-\Delta b$) will increase the number of units produced, the amount invested in controlled business arrangements, a firm's revenue and the number of firms.

Hypothesis A.3: A greater entry barrier ($+\Delta\phi$) will increase the number of units produced, a firm's revenue and the amount invested in controlled business arrangements, but it will reduce the number of firms.

4.2 Bertrand competition with differentiated product: The circular city

It has often been suggested that insurers do not compete in quantities, but rather in prices. Given all the different insurers and their reliance on Bests' (and Moody's) solvency ratings, it could be argued that not all insurers offer the same service. This means that insurers compete in prices over differentiated products. Using the Salop (1979) model, we have that each of the n firms face the following demand function

$$q_i = \frac{p_j + \frac{t}{n} - p_i}{t} = \frac{p_j + \frac{t}{n}}{t} - \frac{1}{t}p_i \quad (12)$$

where t is the distance from a consumer to firm i and p_j is the closest other firm's price.

Suppose for now that the travel cost depends on two parameters, a and b , which we will discuss later. The firm's maximization problem is then

$$\max_{p_i, F_i} \Pi_i = (p_i - c(F_i)) \left(\frac{p_j + \frac{t(a,b)}{n} - p_i}{t(a,b)} \right) - F_i - \phi \quad (13)$$

This yields first order conditions

$$\frac{\partial \Pi_i}{\partial p_i} = \left(\frac{p_j + \frac{t(a,b)}{n} - p_i}{t(a,b)} \right) - (p_i - c(F_i)) \frac{1}{t(a,b)} = 0 \quad (14)$$

and

$$\frac{\partial \Pi_i}{\partial F_i} = -c'(F_i) \left(\frac{p_j + \frac{t(a,b)}{n} - p_i}{t(a,b)} \right) - 1 = 0 \quad (15)$$

With all firms alike, we have ($p_i = p_j = p$) and

$$-p + \frac{t(a,b)}{n} + c(F_i) = 0 \quad (16)$$

$$-c'(F_i) \frac{1}{n} - 1 = 0 \quad (17)$$

Only n firm will enter the market if

$$(p_i - c(F_i)) \left(\frac{p_j + \frac{t(a,b)}{n} - p_i}{t(a,b)} \right) - F_i - \phi = 0 \quad (18)$$

The first order conditions may then be rewritten as

$$-p + \frac{t(a,b)}{n} + c(F_i) = 0 \quad (19)$$

$$-c'(F_i) \frac{1}{n} - 1 = 0 \quad (20)$$

$$(p_i - c(F_i)) \frac{1}{n} - F_i - \phi = 0 \quad (21)$$

What we want to do is find the impact of a change in the market (parameters a , b and ϕ). This requires a functional form for $t(a, b)$.

We know that the circumference of the circular city if all n firms are the same is given by $nt = 2\pi r$. Suppose that r represents the price in the inverse demand function when all quantities are taken into account.¹⁴ In other words, let $r = P = a - bQ$, where $Q = nq_i$ since all n firms are the same and sell the same quantity. This yields $t = 2\pi \left(\frac{a}{n} - bq_i \right)$. We then find $\frac{\partial t}{\partial a} = 2\pi \frac{1}{n}$ and $\frac{\partial t}{\partial b} = -2\pi q$.

¹⁴ Assuming that the size of the city (as measured by its circumference) is related to the price is logical. Indeed as a city becomes larger, the number of consumers or the travel time will increase, thus increasing the price of the good for which the circular city is a good model.

Totally differentiating the first order conditions presented in equations 19, 20 and 21, and letting $t = 2\pi \left(\frac{a}{n} - bq_i\right)$ yields

$$\begin{pmatrix} -\frac{t}{n^2} & -1 & c' \\ c' \frac{1}{n^2} & 0 & -c'' \frac{1}{n} \\ -(p-c) \frac{1}{n^2} & 0 & 0 \end{pmatrix} \begin{pmatrix} dn \\ dp \\ dF \end{pmatrix} = - \begin{pmatrix} 2\pi \frac{1}{n^2} & -2\pi q \frac{1}{n} & 0 \\ 0 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix} \begin{pmatrix} da \\ db \\ d\phi \end{pmatrix} \quad (22)$$

The determinant of the first matrix is $\Delta = -\frac{p-c}{n^3} c''$ which is clearly negative since $c'' > 0$. Inverting the first matrix, we find

$$\begin{pmatrix} dn \\ dp \\ dF \end{pmatrix} = \begin{pmatrix} 0 & 0 & -\frac{n^2}{p-c} \\ -1 & -c' \frac{n}{c''} & \frac{tc'' - (c')^2 n}{(p-c)c''} \\ 0 & -\frac{n}{c''} & -c' \frac{n}{(p-c)c''} \end{pmatrix} \begin{pmatrix} -2\pi \frac{1}{n^2} & 2\pi q \frac{1}{n} & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} da \\ db \\ d\phi \end{pmatrix} \quad (23)$$

and

$$\begin{pmatrix} dn \\ dp \\ dF \end{pmatrix} = \begin{pmatrix} 0 & 0 & -\frac{n^2}{p-c} \\ 2\pi \frac{1}{n^2} & -2\pi q \frac{1}{n} & \frac{tc'' - (c')^2 n}{(p-c)c''} \\ 0 & 0 & -c' \frac{n}{(p-c)c''} \end{pmatrix} \begin{pmatrix} da \\ db \\ d\phi \end{pmatrix} \quad (24)$$

A firm's revenue is again given by the product of price and quantities: $R = p_i \left(\frac{p_i - p_i}{t} + \frac{1}{n}\right) = p_i \frac{1}{n}$. The impact of a variation in the travel cost on revenues is then given by $\frac{dR}{dt} = \left(\frac{dp}{dt} n - p \frac{dn}{dt}\right) \left(\frac{1}{n}\right)^2$. With $\frac{dp}{dt} = \frac{1}{n}$ and $\frac{dn}{dt} = 0$, we have $\frac{dR}{dt} = \left(\frac{1}{n}\right)^2 > 0$, which means that $\frac{dR}{da} = \frac{dR}{dt} \frac{dt}{da} > 0$ and $\frac{dR}{db} = \frac{dR}{dt} \frac{dt}{db} < 0$. As for the impact of an increase in entry barriers, we find $\frac{dR}{d\phi} = \left(\frac{dp}{d\phi} n - p \frac{dn}{d\phi}\right) \left(\frac{1}{n}\right)^2$. Substituting for $\frac{dp}{d\phi} = \frac{tc'' - (c')^2 n}{(p-c)c''}$, $\frac{dn}{d\phi} = -\frac{n^2}{p-c}$ and $p = \frac{t}{n} + c$ yields $\frac{dR}{d\phi} = (c')^2 \frac{cn^2}{c''t^2} + 1 > 0$. Thus,

$$\begin{array}{lll} \frac{dn}{da} = 0 & \frac{dn}{db} = 0 & \frac{dn}{d\phi} < 0 \\ \frac{dp}{da} > 0 & \frac{dp}{db} < 0 & \frac{dp}{d\phi} = ? \\ \frac{dR}{da} > 0 & \frac{dR}{db} < 0 & \frac{dR}{d\phi} > 0 \end{array} . \text{ We are now able to state our testable hypotheses.}$$

$$\frac{dF}{da} = 0 \quad \frac{dF}{db} = 0 \quad \frac{dF}{d\phi} > 0$$

Hypothesis B.1: As travel costs increase (following either a vertical increase in demand, $+\Delta a$, and an horizontal increase in demand, $-\Delta b$) the price per unit will increase and so will a firm's revenue, but neither the number of firms nor the amount invested in controlled business arrangements will change.

Hypothesis B.2: A greater entry barrier will reduce the number of firms, increase a firm's revenue and increase the amount invested in controlled business arrangements; unfortunately, the impact on the price per unit is unknown.

4.3 Bertrand competition under monopolistic competition

Suppose now that each insurer's product is so differentiated that each firm has a local monopoly power. This means that each firm faces the demand function $q = \frac{\alpha}{n} - \beta p$, over which each firm

exercises monopoly power.¹⁵ Given that it is a monopoly, there is no loss in generality to suppose that quantities are chosen instead of prices, so that the inverse demand function of firm i is given by $p_i = \frac{a}{n} - bq_i$.

The maximization problem for firm i is then

$$\max_{q_i, F_i} \Pi_i = q_i \left(\frac{a}{n} - bq_i \right) - q_i c(F_i) - F_i - \phi \quad (25)$$

This yields first order conditions

$$\frac{\partial \Pi_i}{\partial q_i} = \frac{a}{n} - 2bq_i - c(F_i) = 0 \quad (26)$$

and

$$\frac{\partial \Pi_i}{\partial F_i} = -c'(F_i) q_i - 1 = 0 \quad (27)$$

Only n firms will enter the market if

$$q_i \left(\frac{a}{n} - bq_i \right) - q_i c(F_i) - F_i - \phi = 0 \quad (28)$$

The first order conditions may then be rewritten as

$$\frac{a}{n} - 2bq_i - c(F_i) = 0 \quad (29)$$

$$-c'(F_i) q_i - 1 = 0 \quad (30)$$

$$q_i \left(\frac{a}{n} - bq_i \right) - q_i c(F_i) - F_i - \phi = 0 \quad (31)$$

Totally differentiating these first order conditions, we have

$$\begin{pmatrix} -\frac{a}{n^2} & -2b & -c' \\ 0 & -c' & -c''q \\ -q\frac{a}{n^2} & 0 & 0 \end{pmatrix} \begin{pmatrix} dn \\ dq \\ dF \end{pmatrix} = - \begin{pmatrix} \frac{1}{n} & -2q & 0 \\ 0 & 0 & 0 \\ \frac{q}{n} & -q^2 & -1 \end{pmatrix} \begin{pmatrix} da \\ db \\ d\phi \end{pmatrix} \quad (32)$$

Letting $\omega = 2bc''q - (c')^2 > 0$ (for the same reason as in the Cournot case), the determinant of the first matrix is $\Delta = -q\frac{a}{n^2}\omega < 0$. Solving we find

$$\begin{pmatrix} dn \\ dq \\ dF \end{pmatrix} = \begin{pmatrix} \frac{1}{a}n & -\frac{1}{a}n^2q & -\frac{1}{qa}n^2 \\ 0 & -\frac{c''}{\omega}q^2 & \frac{c''}{\omega} \\ 0 & q\frac{c'}{\omega} & -\frac{c'}{q\omega} \end{pmatrix} \begin{pmatrix} da \\ db \\ d\phi \end{pmatrix} \quad (33)$$

Looking at total revenues ($R = pq_i = (\frac{a}{n} - bq)q$), we see that $\frac{dR}{da} = \frac{1}{n}q(1 - \frac{a}{n}\frac{dn}{da}) + (\frac{a}{n} - 2bq)\frac{dq}{da} = 0$, since $\frac{dq}{da} = 0$ and $\frac{a}{n}\frac{dn}{da} = 1$. Also, $\frac{dR}{db} = (\frac{a}{n} - 2bq)\frac{dq}{db} < 0$ and $\frac{dR}{d\phi} = \frac{1}{a} + (\frac{a}{n} - 2bq)\frac{dq}{d\phi} > 0$. This

gives us $\begin{matrix} \frac{dn}{da} > 0 & \frac{dn}{db} < 0 & \frac{dn}{d\phi} < 0 \\ \frac{dq}{da} = 0 & \frac{dq}{db} < 0 & \frac{dq}{d\phi} > 0 \\ \frac{dR}{da} = 0 & \frac{dR}{db} < 0 & \frac{dR}{d\phi} > 0 \\ \frac{dF}{da} = 0 & \frac{dF}{db} < 0 & \frac{dF}{d\phi} > 0 \end{matrix}$. We are now able to state our testable hypotheses.

¹⁵We assume here that the number of firms in the market reduces the intercept of the demand curve, but that is has no impact on the slope of the curve.

Hypothesis C.1: A vertical increase in demand ($+\Delta a$) will increase the number of firms, but it will have no impact on the number of units produced, on a firm's revenue nor on the amount invested in controlled business arrangements.

Hypothesis C.2: An horizontal increase in demand ($-\Delta b$) will increase the number of firms, the number of units produced, a firm's revenue and the amount invested in controlled business arrangements.

Hypothesis C.3: A greater entry barrier ($+\Delta\phi$) will reduce the number of firms, but increase the number of units produced, a firm's revenue and the amount invested in controlled business arrangements.

4.4 Blockaded entry

One final model we will look at is the cournot competition where entry into the market is not possible. In other words, entry is blockaded. In that case it is clear that changes in demand will have no impact on the number of firms since the number of firms is fixed at its current level. Using the

same approach as in the other three cases we find the following matrix

$$\begin{matrix} \frac{dn}{da} = 0 & \frac{dn}{db} = 0 & \frac{dn}{d\phi} = 0 \\ \frac{dq_i}{da} > 0 & \frac{dq_i}{db} < 0 & \frac{dq_i}{d\phi} = 0 \\ \frac{dR}{da} > 0 & \frac{dR}{db} < 0 & \frac{dR}{d\phi} = 0 \\ \frac{dF}{da} > 0 & \frac{dF}{db} < 0 & \frac{dF}{d\phi} = 0 \end{matrix} .$$

We are now able to state our testable hypotheses.

Hypothesis D.1: A vertical increase in demand ($+\Delta a$) will increase the number of units produced, a firm's revenue and the amount invested in controlled business arrangements.

Hypothesis D.2: An horizontal increase in demand ($-\Delta b$) will increase the number of units produced, a firm's revenue and the amount invested in controlled business arrangements.

Hypothesis D.3: A greater entry barrier ($+\Delta\phi$) will have no impact on any of firm's decisions.

4.5 Competing models

The four models offer different predictions as to what impact demand shifts and entry barriers have on the number of insurers, insurer revenue and investment in control business arrangements. We

summarize in the following matrix the four competing models we test in this paper.

Cournot Competition			Circular City		
$\frac{dn}{da} > 0$	$\frac{dn}{db} < 0$	$\frac{dn}{d\phi} < 0$	$\frac{dn}{da} = 0$	$\frac{dn}{db} = 0$	$\frac{dn}{d\phi} < 0$
$\frac{dR}{da} > 0$	$\frac{dR}{db} < 0$	$\frac{dR}{d\phi} > 0$	$\frac{dR}{da} > 0$	$\frac{dR}{db} < 0$	$\frac{dR}{d\phi} > 0$
$\frac{dF}{da} = 0$	$\frac{dF}{db} < 0$	$\frac{dF}{d\phi} > 0$	$\frac{dF}{da} = 0$	$\frac{dF}{db} = 0$	$\frac{dF}{d\phi} > 0$
Monopolistic Competition			Blockaded Entry		
$\frac{dn}{da} > 0$	$\frac{dn}{db} < 0$	$\frac{dn}{d\phi} < 0$	$\frac{dn}{da} = 0$	$\frac{dn}{db} = 0$	$\frac{dn}{d\phi} = 0$
$\frac{dR}{da} = 0$	$\frac{dR}{db} < 0$	$\frac{dR}{d\phi} > 0$	$\frac{dR}{da} > 0$	$\frac{dR}{db} < 0$	$\frac{dR}{d\phi} = 0$
$\frac{dF}{da} = 0$	$\frac{dF}{db} < 0$	$\frac{dF}{d\phi} > 0$	$\frac{dF}{da} > 0$	$\frac{dF}{db} < 0$	$\frac{dF}{d\phi} = 0$

Looking at the four models' nine predictions, we see that one is the same in every model. Indeed, $\frac{dR}{db}$ is always predicted to be negative. This means that there are really only eight degrees of freedom left to differentiate the four models. It is interesting to observe in the circular city model that investment in controlled business arrangements should not be affected by market growth, as opposed to the other three models. Another interesting aspect of the models under study is that the impact of the title plant requirement is the same for the three models where entry is possible. Indeed, we have that title plant requirements should decrease the number of firms, increase firm revenue and increase the amount invested in controlled business arrangements.

5 Data and Methodology

5.1 Data

The title insurance data was obtained from the National Association of Insurance Commissioners. It spans all 50 states and the District of Columbia from 1996 through 2000 inclusively.¹⁶ Iowa and the District of Columbia were removed from the dataset.¹⁷ The NAIC database provides direct premium written (from affiliated as well as non-affiliated operations), other income, and direct losses (paid and incurred) by state. This database was supplemented with mortgage information and median home prices by state from the Federal Housing Finance Board Monthly Interest Rate Survey (MIRS). In addition, single-family building permits and population by state from the U. S. Bureau of the Census and the Real Estate Center at Texas A&M University were utilized. Table 4 contains the descriptive statistics for the variables used in the analysis.

From the theoretical models presented in the previous section, the three dependent variables needed for analysis are the number of insurers operating in a state, average revenue by insurer and the amount of business derived from controlled business arrangements. The number of companies

¹⁶The NAIC began compiling the title insurance database in 1996.

¹⁷According to Burke (2000), lawyers were able to successfully lobby the Iowa legislation to prohibit the sale of title insurance in Iowa. The District of Columbia is missing data necessary for the analysis.

operating per state was taken from the NAIC database. Similar to other insurance markets, however, there are groups of title insurers under common ownership. This significantly reduces the number of completely independent decision centers. Companies that were members of the same group were considered one company for the analysis presented here. For average revenues, we divided total premiums written by the number of firms in the state. Finally, we approximated the percentage of business derived from controlled business arrangements by the ration of direct premiums written originating from affiliated operations over total direct premiums written.¹⁸

To test for the impact of horizontal market growth and vertical market growth, we will use the number of new building permits by state by year, and the average value of each permit. These are proxies for the total number of real estate transactions in a state and for the total value of such transactions. A better measure would be the actual number of transactions and the average value of each transaction, but these measures do not seem to be available by state.¹⁹ For the state of Texas, where building permit and total real estate transaction measures are available, the average correlation since 1989 between the average value of housing starts and the average value of housing sales is 98%, whereas the correlation between the number of real estate transactions and the number of new building permits is 96%.

Given the linear demand curve, variations in the number of new building permits represents a horizontal market growth, whereas variations in the average value of new houses represents a vertical market growth (change in the intercept). Using the number of new building contracts to represent the slope of our linear demand curve is logical as more people need to purchase title insurance (change in the slope of the demand curve). An increase in the number of new homes is therefore represented by a flatter demand curve ($-b$ decreases). As for vertical market growth, we use the average value of each new dwelling constructed following the emission of new building permits because consumers who are willing to purchase a more expensive home may not have the same price-elasticity as those who want to purchase a less expensive home.

The theoretical models we developed herein suppose the existence of entry barriers. One entry barrier in title insurance is the title plant. Some states maintain a public title plant so that every title insurer has open access to it. Most states, however, require that each insurer maintain its own title plants; this represents a significant entry barrier into the market. Because of this, we will let the entry barrier cost in our model be represented by a dummy variable for this title plant

¹⁸As noted in section 3.2, RESPA requires that consumers are notified of CBA's but places no requirement of reporting income from these arrangements. The NAIC annual statements however do provide at least a proxy for revenue generated by CBA's by reporting direct premiums written from a subsidiary, controlled or affiliated company or agency.

¹⁹Fannie Mae and Freddie Mac also provide housing price inflation indices that are aggregated at the state level. Unfortunately, these indices are only available starting in 1997.

requirement.

5.2 Methodology

The empirical testing of the theoretical models is done in two stages. First we estimate an ordered probit model (equation M1) using the number of title insurers in the state as the dependent variable. Depending on the theoretical model we examine, horizontal (*hgrowth*) and vertical (*vgrowth*) market growth may have an impact on the number of companies operating in a state. In addition, the requirement to maintain a title plant (*plant*) may also influence the number of firms operating in a state. The testable equation is thus

$$\# \text{ of companies} = f_1(\text{hgrowth}, \text{vgrowth}, \text{plant}, \text{CBAlimits}, \text{population}) \quad (\text{M1})$$

As we can see in this equation, we also control for state population and legal limits imposed on the proportion of income originating from controlled business arrangements. We want to control for population because larger states are more likely to be able to sustain a large number of companies. We also include whether a state imposes limits to the proportion of business originating from controlled business arrangements. To account for regulatory limitations on the development of controlled business arrangements, a control variable (*CBAlimits*) identifying the states that impose limits on the proportion of business originating from CBA's is included. The variable takes on the value of the limit percentage in place in that state (as noted in footnote 8). This variable may affect results in two ways. The most common theory would be that limits on income from CBA's would reduce that income relative to other states. An alternative hypothesis would be that only states that felt the income from CBA's was too high would institute limitations. Univariate analysis of percentage of income from CBA's (see Table 5) provides evidence that the second hypothesis may be true.

In the second stage, we use a simultaneous equations model (equation M2) to explain the average firm revenue by state and the proportion of business generated by controlled business arrangements. The instruments included in the simultaneous equations model are similar to the ordered probit model's where the theoretical model predicts the effects of horizontal and vertical growth as well as title plant requirements. The testable equation then becomes

$$\begin{aligned} \text{average revenues} &= f_2 \left(\begin{array}{l} \% \text{income from CBAs, hgrowth, vgrowth, plant,} \\ \text{interest rates, population, \# of companies} \end{array} \right) \\ \% \text{ income from CBAs} &= f_3 (\text{revenues, hgrowth, vgrowth, plant, CBAlimits, \# of companies}) \end{aligned} \quad (\text{M2})$$

Again we want to control for state level variation in variables that may affect real estate transactions and thus title insurers. Control variables include the previously mentioned CBA limits,

state population, and state level interest rates.²⁰

6 Results

Table 5 contains the empirical results of equations M1 and M2; the number of companies, an insurer’s revenue, and the proportion of revenues due to Controlled Business Arrangements. The three independent variables that are more interesting to us are the number of new building permits per person (horizontal growth), the average value of new construction (vertical growth), and whether a state is a title plant state.

We can summarize our main empirical results presented in Table 6 using the following matrix:

$$\begin{array}{ccc} \frac{dn}{da} < 0 & \frac{dn}{db} = 0 & \frac{dn}{d\phi} < 0 \\ \frac{dR}{da} > 0 & \frac{dR}{db} < 0 & \frac{dR}{d\phi} = 0 \\ \frac{dF}{da} = 0 & \frac{dF}{db} = 0 & \frac{dF}{d\phi} > 0 \end{array}$$

. For seven of the nine cells, this empirical model seems to imply that the circular city approach, where the diameter of the circle is determined by the inverse demand function, is best suited to explain the market structure of the title insurance industry. Moreover all three cells regarding CBA’s fit the circular city model. The two cells that are off are $\frac{dn}{da}$, which was predicted to be zero yet empirically is negative and significant, and $\frac{dR}{d\phi}$, which was predicted to be positive yet it is not significantly different from zero.

When we look at our four competing theoretical models, we note that all predict that $\frac{dR}{db}$ should be negative, which we show to be true empirically. This suggests that there are really only eight degrees of freedom that we need to test. Our empirical results suggest that $\frac{dn}{da} < 0$, which is inconsistent with any of the models. Indeed, two of our theoretical models (Cournot competition and Monopolistic competition) suggested that the number of companies should increase as the vertical demand increases. The two other theoretical models (Circular city and Blockaded entry) predicted no impact on the number of firms of such a change in the taste of consumer or their purchasing power. Although none of the four theoretical models predict a negative sign for $\frac{dn}{da}$, which suggest that none fit the data, we may be able to say that the latter two are less wrong than the former two as the difference between the theoretical model and the empirical results is smaller.

Let us look at the other cell that seems to contradict the Salop circular city model. In that

²⁰Given that our panel dataset, a fixed effects model may be optimal. Unfortunately, the title plant requirements and limitations on income from CBA’s vary by state but not over time. Thus using state dummies in a fixed effects model would capture any impact title plant requirements and limitations on CBA income. Our solution is to include time and regional dummies in the analysis for fixed effects and keep the title plant and limits on income from CBA variables in our analysis. One alternative model the authors attempted was to include the herfindahl index in place of the title plant dummy and use a fixed effects model with state dummies rather than regional dummies. We felt this was a viable alternative given the significant differences in concentration between states with different title plant requirements (see Table 4). The results did not vary much with those reported in Table 5, with six of the nine cells matching the circular city model.

cell, it was theoretically predicted that $\frac{dR}{d\phi}$ be positive. The empirical results suggest, however, that entry barriers have no impact on total revenues. The only theoretical model that seems to support this empirical result is the Blockaded entry model; the other three models predict a positive impact of entry barriers on total revenues. Although this result appears to support the Blockaded entry model it does not take into account the fact that of the eight other model predictions, including $\frac{dR}{db}$ which is predicted to be negative in all the models and found to be so empirically, and $\frac{dn}{da}$ which is never predicted to be negative in any model but is empirically, five are not supported by the empirical results. It may then be fair to say that the Blockaded entry model is rejected by the data.

For the three other models (Cournot, Salop and Monopolistic), the only predictions that vary from one model to the next is $\frac{dn}{da}$, $\frac{dn}{db}$, $\frac{dR}{da}$ and $\frac{dF}{db}$. It is interesting to note that the three remaining models yield the same predictions regarding the impact of entry barriers: Smaller number of companies, more revenue and more investment in controlled business arrangements. The differences between the Cournot and the Salop models rest on the impact of horizontal growth on the number of companies ($\frac{dn}{db}$) and on the amount invested in controlled business arrangements ($\frac{dF}{db}$), and on the impact of a vertical market growth on the number of companies ($\frac{dn}{da}$). The Salop model predicts that none should have an impact. On the other hand the Cournot model predicts $\frac{dn}{da}$ is to be positive and the other two to be negative. We know from an earlier discussion that the empirical results regarding $\frac{dn}{da}$ do not support either model since it is negative. With respect to the other two predictions, however, the empirical results seems to support the Salop model since $\frac{dn}{db}$ and $\frac{dF}{db}$ are not statistically different from zero.²¹ We can then probably say that the Salop model better illustrates the industrial organization of the title insurance industry than the Cournot model especially with respect to the amount invested in CBA's.

Finally, when we compare the Monopolistic competition model with the Salop circular city model, we note that the two models differ with respect to all four cells $\frac{dn}{da}$, $\frac{dn}{db}$, $\frac{dR}{da}$ and $\frac{dF}{db}$. Again, one must conclude that the Salop model fits better since three of those four predictions are supported empirically, compared to zero for the Monopolistic model.

Table 7 summarizes our findings. We can conclude that the Blockaded model and the Monopolistic competition model fit the worst the empirical results as they correctly predict only four of the nine cells. The Cournot competition correctly predicts five of the nine cells. The Salop model seem to be the best model to represent the Title insurance market as seven of the nine cells are correctly predicted, including the three cells regarding CBA's. The only two cells that are not correctly predicted are the $\frac{dn}{da}$ cell, which is never predicted to be negative in any model but is so empirically, and the $\frac{dR}{d\phi}$ cell, which is correctly predicted to be zero only in the Blockaded entry

²¹Incidentally, the joint test for these two predictions cannot reject the fact that they are both zero.

model that otherwise does not appear to predict the results very well.

7 Conclusion and Discussion

The goal of this paper was two-fold. First we wanted to study the industrial organization of the title insurance industry. To do so we tested four theoretical models used in the industrial organization literature. These four models are known as Cournot, Salop's circular city, Monopolistic competition and Blockaded entry. We tested these four models using title insurance industry data from 1996-2000. Our empirical results suggest that while taking into account regional and year fixed effects, the model that best explains the industrial organization of the title insurance industry appears to be Salop's circular city model where the diameter of the circle is determined by the inverse demand function.

The second and most important goal of the paper in terms of public policy, was to offer a glimpse at what the property and casualty insurance industry structure may look like if banks are allowed to become insurance referral agents, insurance agents or direct providers of insurance. As it is becoming more and more apparent, banks are expanding significantly into the insurance arena. The growth of the banking sector in the insurance industry does not come necessarily from the banks' better underwriting or pricing technology. Rather banks can become insurance agents that could refer clients to their insurer when negotiating mortgages or car loans. The recently announced divestiture of Travelers by Citigroup may provide the indication that selling rather than underwriting insurance products provides banks with many of the benefits of offering consolidated financial services (diversification, informational advantages, complementarity in production, economies of scope, etc.) without having to price those contracts or assume their risk. The American Bankers Insurance Association 2001 Study of Leading Banks in Insurance shows that bank acquisitions of independent insurance agencies tends to be the preferred entrance strategy for distribution of property/casualty insurance products. This entrance strategy bears a resemblance to controlled or affiliated business arrangements prominent in the title insurance industry. Consolidated closing services offered by the mortgage lender during real estate transactions often include a referral to a title insurance agent in which the mortgage lender has an ownership interest. This ownership interest is known as a controlled or affiliated business arrangement and acts as a barrier to entry into the title insurance market. Examination of the market structure of title insurance, where banks/mortgage lenders have traditionally played a large role in distribution, may shed some light on one of the potential directions that the distribution of financial services may be heading.

With respect to this aspect of banks as insurance agents, we were particularly interested in the controlled business arrangements aspect of the title insurance industry; our contention be-

ing that controlled or affiliated business arrangements would probably be the preferred method of entry of banks into the insurance arena (see Sauders, 1999). With respect to the impact of controlled business arrangements our empirical results indicate that: 1- Vertical increases in demand (increased willingness-to-pay for example) have no impact on the amount invested in controlled business arrangements; 2- Horizontal increases in demand (more potential clients) increase the amount invested in controlled business arrangements; and 3- Greater entry barriers (title plant requirements) increase the amount invested in controlled business arrangements. Of the four theoretical models we presented, only the Salop circular city model predicted all three of these findings.

While bank sales of property/casualty products is still relatively small (approximately 3% of total sales), the growth in bank sales is about ten times that of growth in the overall market. It may then only be a matter of time before banks become an important player in the insurance industry, just as in France and Germany where the financial sector is more integrated than in the United States. Although the ownership of insurers by banks may be one way to integrate the two financial sectors, the Citigroup-Travelers experience may tell us that any profit from integration may come from banks distributing insurance products rather than from banks underwriting insurance contracts. If gains from integration do come from distribution rather than underwriting, we may see the emergence of controlled business arrangements between banks and P&C insurers where banks become the preferred referral service for insurers. Such a practice already exists in the title insurance industry where mortgage lenders may refer clients to a particular title insurance agents during closing.

Some caveats are in order with respect to the transposition of the title insurance industrial organisation to P&C industry. Given the ratio of title insurance premium to a mortgage is an order of magnitude different from the ratio of automobile premium to car loan, the relative gain from shopping for title insurance may be a lot less than the gain from shopping for automobile insurance. Therefore consumers may not be willing to spend so much time shopping for title insurance as they are for automobile insurance. This means that banks may have less power recommending a P&C insurer compared to a title insurer. Another important difference is that title insurance is purchased only once, at the time a mortgage is signed, whereas P&C contracts must be renewed every year. The repeated relationship between P&C insurers and policyholders will necessarily lead to a different behavior on the part of the different players involved compared with the once-and-for-all aspect of title insurance. Another important aspect of title insurance is that banks will not agree to the mortgage loan if the consumer does not produce a valid title. This may not be the case for P&C insurance where the bank does not have as much power over the consumer (even for a car loan) especially since P&C contracts must be purchased every year.

Although most P&C contracts must be renewed every year, consumers rarely change insurers more than four or five times in their lifetime. Given that the length of real estate property ownership in the U.S. is approximately 15 years, the average consumer can probably expect to purchase title insurance three times during their adult life. This is comparable to the number of times consumers change automobile and homeowner insurance company.

Notwithstanding these caveats, one must be aware of the possible changes that may take place in the P&C industry as banks become important players in the distribution of insurance policies. These changes will be important whether banks become insurance agents or only referral partners. Our paper suggest one possible avenue of development as convergence of financial services increases.

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9 Appendix

Table 1: Premiums generated by banks

	Estimated 2000 Premiums Written by Banks (in Billion of \$)	Compound Annual Growth Rate 1997-2000
Annuities	31	18%
Commercial Lines	5.4	24%
Personal Lines	3.7	23%
Individual Life/Health	2.1	17%

Source: 2001 American Bankers Insurance Association (ABIA) Study of Leading Banks in Insurance.

**TABLE 2: Differences in means and in medians.
Title plant states versus Non-title plant states.**

	Non-Title Plant States (15 states)		Title Plant States (34 states)	
	Mean ^a	Median ^b	Mean	Median
Number of Companies	11.83 (2.64)	11	8.41 (1.97)	8
Number of Independent Companies	3.74 (2.29)	3	1.33 (1.19)	1
Herfindahl Index	0.189 (0.04)	0.189	0.240 (0.067)	0.230
Top-3 Market Share	0.667 (0.087)	0.670	0.740 (0.104)	0.746
Top-5 Market Share	0.860 (0.075)	0.867	0.921 (0.066)	0.928
Independent Companies Market Share	0.083 (0.090)	0.062	0.045 (0.058)	0.016
Profitability	0.946 (0.030)	0.956	0.947 (0.045)	0.954
Proportion of Income from CBAs	0.233 (0.233)	0.1322	0.104 (0.134)	0.047

a— All t-tests for statistical differences in means were significant at the 1% level except for Profitability. All variances are statistically different between the two samples except for Top-3 Market Share and Top-5 Market Share.

b— Two-sided Median Two-Sample tests are significant at the 1% level for all except Independent Companies Market Share (5% level) and Profitability (not significant).

TABLE 3: 1996 Herfindahl indices from selected lines

	Title	Homeowners	Private Passenger Auto Liability	Private Auto Physical Damage
Herfindahl	0.1286	0.0740	0.0644	0.0600

Source: NAIC P&C Insurers database, NAIC 1996 Title Insurers database.

TABLE 4: Descriptive statistics per state.

Variable	Mean	Median	Standard deviation	Min	Max
Number of Companies	9.31	9	2.64	5	18
Price (\$ '000)	160.17	152.10	38.88	82.6	300.2
Building Permits (\$ '000)	23.35	16.29	24.00	1.26	108.61
State Population ('000 000)	5.47	3.90	5.96	0.48	33.87
State Revenues (\$ '000 000)	135.11	59.93	227.44	2.30	1470.60
Proportion ²² of Income from CBAs	0.1273	0.0604	0.1639	0	0.7950
Interest Rates %	7.47	7.49	0.3785	6.65	8.31

**TABLE 5: Differences in means and in medians.
States with CBA limits versus States without CBA limits.**

	States with CBA limits		States without any limits	
	Mean ^a	Median ^b	Mean	Median
Proportion of Income from CBAs	0.233 (0.233)	0.1322	0.104 (0.134)	0.047

a– All t-tests for statistical differences in means were significant at the 1% level except.

b– Two-sided Median Two-Sample tests are significant at the 1% level for all except.

²²Just for comparison, where as controlled business arrangements accounted for about 13 % of title insurance sales, bank sales of property and casualty insurance averaged around 3 % in 2000.

TABLE 6: Regression Results.**The determinants of the number of companies, average revenue and the importance of affiliated business.**

The number of companies is found using an ordered probit regression. The regressions for the average company revenue and the percentage of affiliated business in total revenues uses a simultaneous equation approach.

Variable	Number of companies	Average company revenue	Percentage of affiliated business to total revenues
Constant		-70.19** (33.13)	-20.70*** (11.80)
Vertical Growth (Median Price)	-0.015*** (0.002)	0.078*** (0.023)	0.008 (0.040)
Horizontal Growth (Building Permits)	-0.029 (0.033)	-2.491*** (0.451)	0.140 (0.825)
Title Plant	-2.662*** (0.240)	-3.566 (2.193)	12.58*** (2.84)
Percentage of affiliated business to total revenues		0.081 (0.186)	
Average Company Revenue			0.836*** (0.298)
Number of Companies		0.100 (0.376)	0.845 (0.592)
State Population	0.168*** (0.016)	0.572** (0.185)	
State Limits on CBA Income	-0.010*** (0.003)		0.109*** (0.032)
Interest Rates		7.053* (3.830)	
# of Significant Year Dummies	2 of 4	2 of 4	1 of 4
# of Significant Regional Dummies	3 of 5	3 of 5	1 of 5
Number of Observations	245	245	245
Log-likelihood Value	-388.20		
Adjusted R^2		0.692	0.541

Value of coefficient, standard error in parentheses.

*** significant at the 1% level, ** at the 5% level and * at the 10% level.

TABLE 7: Comparison of Empirical Results with Model Hypotheses.

The first sign in each box is the empirical finding. The second sign is the hypothesized sign for the Cournot model. The third, fourth and fifth sign are the hypothesized signs for the Circular city, the Monopolistic competition and the Blockaded entry models. The vertical explanatory variable is assumed to have no impact (\emptyset) on the horizontal explained variable if its sign is not significant at the 5 % level or better are presented; the symbols + and - mean that the variable has a significant (5 % level or better) positive or negative impact.

Explanatory	Explained	Number of companies	Average company revenue	Percentage of affiliated business to total revenues
Vertical Growth (Median Price)	- + \emptyset + \emptyset	\emptyset + + \emptyset +	\emptyset \emptyset \emptyset \emptyset +	
Horizontal Growth (Building Permits)	\emptyset - \emptyset - \emptyset	- - - - -	\emptyset - \emptyset - -	
Title Plant	- - - - \emptyset	\emptyset + + + \emptyset	+ + + + \emptyset	