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<b>Authors(s)</b>	Hogan, Vincent (Vincent Peter); Harmon, Colm
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## Paper C

# THE NON-LIFE INSURANCE MARKET IN IRELAND: PROSPECTS FOR EMPIRICAL ANALYSIS

Paper prepared on behalf of The Competition Authority<sup>1</sup>

Vincent Hogan and Colm Harmon, May 2003

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<sup>1</sup> The purpose of this paper is to explore, in practical terms, prospects for empirical analysis in the non-life insurance market in Ireland, with particular reference to Motor, Employer's Liability and Public Liability insurance. The paper is being made available to potential candidates for a consultancy contract in relation to the study on insurance being carried out jointly by the Authority and the Department of Enterprise, Trade and Employment. The contract involves the provision of industrial organisation analysis, including statistical and econometric analysis. The paper is not intended as a comprehensive guide, but as an indication of some relevant issues that could be researched and some possible sources of data. The intention is that the issues raised in this paper, and the identification of possible data sources and research methods, may help potential candidates to prepare proposals for the consultancy contract in question. The contents of this paper do not necessarily represent the views of the Authority or the Department.



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## INTRODUCTION

The purpose of this study is to set out detailed proposals to examine empirically the state of competition within the non-life insurance market in Ireland and its effects on consumers. The focus will be on motor, public liability (PL) and employer liability (EL) insurance.

The study proceeds in two sections. In section A, we examine the specific issues/questions that arise when one considers the possibility of market power in the insurance industry and its possible adverse effects on consumers. We state clearly what type of data we believe would be needed to address each particular question with any degree of accuracy and reliability. We then indicate to what extent (if any) that this data is available. Where specific data is not available in published form, but could be requested from companies or the regulator, it is, of course, taken as given that confidentiality would be accorded to the data in question unless the holder(s) of the data expressly consented to its publication.

In the second part of this study, section B, we approach the problem from the other direction. We review the major sources of data in detail; indicate what questions they could answer and what questions they cannot answer. Inevitably there is a degree of duplication between these two sections, but different presentations help clarify the issues. Finally, we summarise the material in a table that lists each question/issue, the data needed to answer it and indicates its availability.

## SECTION A

The differences between a competitive and a non-competitive industry can manifest themselves in several different ways. In this section we list 11 major market characteristics or aspects of firms' behaviour that may merit detailed examination. Each of these issues can be considered a separate line of inquiry that may shed light on the question of whether there is anti-competitive behaviour in Irish insurance markets to an extent that is detrimental to consumers.

In each subsection that follows, we discuss each issue in detail, showing how it relates to the insurance industry in particular. We show how each issue would affect, or be affected by, the degree of competition. The idea is to identify the signs of anti-competitive behaviour. Each subsection also shows what sort of data would be needed to decide the issue.

The 14 major issues that we examine are (in no particular order of importance):

1. Link Between Prices and Concentration
2. International Evidence on Prices and Concentration
3. Strategic Price Changes
4. Reaction to Taxes and Regulation
5. Rents, Economic Profits and Investment analysis
6. Rent sharing and X-inefficiency
7. Structural Analysis of Supply and Demand
8. Collusion Across Market Segments
9. Regulation as a Barrier to Entry
10. The Price of Risk
11. Wholesale and International Comparisons of Risk
12. The Insurance Company as an Investment Fund
13. Switching Costs
14. Vertical relationships

### 1. Link between prices and concentration

The most basic analysis one can perform is to see whether prices have been affected by the number of firms (or equivalently by concentration ratios). In simple terms one could run a time series regression model with the average premiums for some class of insurance as the dependent variable and various cost factors as the explanatory variables. The concentration ratio is also included as an explanatory variable. If the industry is behaving competitively

the number of firms should have no effect on the price. On the other hand, if the industry is non-competitive, one would expect to see that a decline in the number of firms (increase in concentration) leading to an increase in prices.

In principle one can perform this analysis with data publicly available in the Blue Book going back any number of years. One can easily calculate the average premium for motor, EL and PL separately. One can also calculate the concentration ratio directly for each of the markets separately. Various claims cost measures are also available from the Blue Book.

While this analysis is easy to perform, there are a number of potential problems. Firstly there may not be enough variation in the number of firms over time to enable statistical procedures to identify the link with prices even if such a link exists.<sup>2</sup> Essentially statistical modelling works by comparing prices before a change in the number of firms with prices afterwards. It does so in a sophisticated manner that allows us to control for many other factors that may be changing simultaneously, but the basic "before versus after" effect is what drives the result. In other words, our statistical procedures could erroneously report that concentration has no effect on prices, not because the market is genuinely competitive, but because there have not been enough changes in concentration i.e. not enough difference between "before" and "after". It becomes as much art as science to determine whether a negative result is due to the absence of an effect or the absence of *evidence* of an effect.

Another difficulty with this form of analysis is the issue of costs. As we will discuss in sub-section A6 below (Rent Sharing and X- Inefficiency), the cost data from a non-competitive industry may be inflated. Non-competitive firms have little incentive to remain efficient and keep costs low as barriers to entry protect them. This means that costs could be rising as concentration rises (and competition falls). This makes it difficult for the statistical procedure to separate out the effects of genuine cost increases (claims culture, generous court etc.) from the effect of firms' inefficiency.

One way of avoiding this problem might be to drop costs from the statistical model altogether. One could then focus on the effect of concentration on prices directly. Doubtless the objection would be raised that this method failed to account for the effect of increased costs on prices – erroneously attributing the effect of such cost increases to changes in concentration. But this would only be true if the increases in costs occurred at precisely the same time and in tandem with changes in concentration. This can be tested for directly, by running a regression of average claims costs on concentration. If it turns out that costs have risen with changes in the number of firms then this is highly suggestive of non-competitive behaviour manifesting itself in rent sharing and X-inefficiency.

<sup>2</sup> The MIAB reports that the number of firms offering motor insurance declined from 17 to 5 over the last decade. Using the Blue Book it will be possible to calculate a similar trend for EL and PL. It is not clear whether this variation will be enough, however.

## 2. International evidence on prices and concentration

One can expand the analysis of the behaviour of Irish insurance prices over time to include other countries. The idea here is to see whether the concentration of the industry has had an effect on price in Ireland that is different from its effect in other European countries. This analysis is potentially very interesting as there is already some evidence of considerable falls in insurance premiums in continental European countries following deregulation in the late 1990s. The studies that show this result tend to have concentrated in the big insurance markets and exclude Ireland from the analysis.<sup>3</sup> It would be interesting to see if the Irish market behaved in a systematically different way.

The data for this sort of analysis seems to be readily available at modest cost from a number of international sources (Swiss Re and the European insurers representative association see section B2 below).

An obvious objection to this sort of analysis is that comparisons across countries are invalid because the legal and social security systems are so different. One can address these objections in two ways. Firstly, one can control for the observable differences by using the technique of multiple regression as in the previous section. Objections may persist, however, that one cannot control for all those factors that are difficult or impossible to observe and measure (e.g. the willingness of judges to make high awards etc.). To meet this objection one can make use of more advanced econometric techniques such as fixed effects regression. This allows us to control for unobserved effects on prices that vary across countries in an unknown way but are fixed through time.

## 3. Strategic price changes

As an alternative to measuring the effects of concentration on average prices (premiums), one could estimate the effect of one firm's prices on another. In the industrial economics literature this is known as the "Conjectural Variation". It varies according to industry structure. In other words, firms react to each other's price changes differently depending on whether the industry is competitive or collusive. So the aim of this analysis is to see how one firm reacts to another's prices and whether this strategic action is inconsistent with competitive behaviour.

While the idea behind the analysis is clear there could be problems with the data. This analysis places high demands on the data. One needs price data on individual firms (ideally for specific products) – industry averages are of little use here. Furthermore high frequency data (monthly probably) is also needed for a long time (possibly up to 10 years).

High frequency data is required in order that one can observe one firm's prices very precisely, immediately before and immediately after a competitor firm changes its prices. If one had only annual data, one would see prices only a long time before and a long time after the competitors' changes, and the effect would probably be swamped by the effects of other variables. The data is needed for such a long period in order to observe a number of different price changes and derive the average strategic effect with some reliability.

While getting data at this level of accuracy seems like a tall order, it does appear to be available from two sources – at least for motor insurance. Both Software Vineyard, who compile data for the Irish Insurance Federation and the MIAB, and Relay, who run the online quotation service for brokers, seem to have the data. Both these datasets provide detailed information on each motor insurance contract written since 1997. This data could prove invaluable in studying various aspects of the insurance market and we discuss this in more detail below (section B1).

## 4. Reaction to taxes, regulation and cost factors

One other way of discerning the level of competition in the insurance industry is to identify the reaction of price (premiums) to changes in the tax system. The economic theory of taxation states that firms in a competitive industry will react differently to changes in taxation from firms in oligopolistic or monopolistic industries. One can probably detect this in a regression framework of the kind discussed above. The main problem with this approach is that there may not be enough changes in taxation through time to identify the effect. Just as with the effect of concentration on prices, one needs sufficient observations before and after changes in taxation.

A variation on this theme is to look at the effects of changes in regulation on premiums. Regulations are not the same as taxes from a legal point of view but can have very similar economic effects. For example, a requirement that insurance companies keep a portion of their capital in safe liquid assets leads to lower returns on their investments. This is equivalent to a tax on investment income.

More generally, if one can identify some change that is known to have affected firms cost structure in a particular way, one can trace the effect of this change on prices and deduce the effect on the mark-up. Wolfram (2001) adopted this strategy in assessing the oligopoly power of the UK electricity industry. The trick is to identify some change that affects costs in a known way. A change in the regulatory environment may suffice.

We have not yet been able to discern whether there have been many changes to the tax system faced by insurance firms.

<sup>3</sup> See Sigma (2000)

However, it should be possible to request such information from the regulator or even from the firms themselves. We would expect it to be easier to verify changes in the regulatory framework. Changes are indicated in the Blue Book and more detailed information would surely be available from the regulator. There were a series of EU directives during the 1990s, which considerably changed the regulatory framework. We have already cited evidence that this had dramatic effects in continental Europe (see section A2 above).

Wages are another possible source of exogenous variation. Compensation for loss of earnings forms the largest single component of the claims cost for EL and is a significant component of motor and PL claims. There is clear evidence that wages have risen in recent years and this increase can be precisely measured from CSO data. It would be interesting to see to what extent this increase fed through into claims costs and premiums and whether it was consistent with competitive behaviour on the part of insurance companies.

Finally, the terrorist attack on the World Trade Centre may also provide a way to estimate the mark-up. The terrorist attack affected the cost structures of insurance firms throughout the world. It would be interesting to see if Irish premiums reacted differently to this cost shock than premiums in other EU countries. This could easily be done within the context of a fixed effects regression as discussed in section A2.

## 5. Rents, economic profits and investment analysis

A direct way of assessing the competitive structure of the insurance industry is to check whether firms appear to be making excess profits (also known as "Super Normal Profits" or "Economic Rents") i.e. profits over and above what a competitive firm would make providing the same service and paying for its inputs at opportunity cost.<sup>4</sup>

Although this is a very simple question to ask it is extremely difficult to answer in practice. Most economists regard direct measures of profits with great suspicion. Accounting standards of profit do not coincide with economic standards (valuing assets at historical price rather than replacement cost for example). In addition, self-reported profits are obviously open to manipulation, either downward to minimise tax bills or even upwards to boost share prices.

A way around this is to apply the techniques of investment analysis. This analysis, typically employed in stock brokers or investment banks, tries to take the public accounts of a company and back out a measure of the true economic profit by stripping away the effect of arbitrary accounting policies. The idea is that the resulting measure of "true"

profit is used to make a recommendation to buy, hold or sell the companies shares. The practice of investment analysis has suffered from a battered reputation in the aftermath of the US stock market bubble and the various scandals at Enron etc. However, in principle the technique is valid, once it is performed by a genuinely independent analyst.

As most of the companies providing insurance in Ireland are now subsidiaries of major international groups, no investment analysis is publicly available (such as those produced by Standard and Poors etc.). However, the techniques of investment analysis could be applied to the returns of insurance companies reported in the Blue Book. Furthermore the Blue Book contains information over and above what is typically contained in published accounts making this sort of analysis unusually accurate. In fact there is anecdotal evidence that insurance companies use the Blue Book to perform precisely this sort of analysis on their competitors.

Furthermore, the regulator is in possession of, or can get, detailed actuarial reports as to the solvency of the insurance firms. One would expect these reports to contain similar sorts of analysis to that provided by full investment analysis. If the study were to proceed down the road of investment analysis, these reports would be an obvious starting point. They may have to be requested directly from IFSRA by the Authority or, alternatively, by duly appointed consultants from the companies rather than from the regulator.

Two caveats are necessary. First, while this sort of investment analysis is grounded in economics, economists and statisticians are not specifically trained in its techniques. It is probably best performed by professional invest analysts. Such analysts come with a fee and a possible conflict of interest, as some of their biggest customers are likely to be insurance companies. Secondly, it is important that the firms' costs are measured in terms of opportunity cost and not the actual cost. As shown below, there are good reasons to expect non-competitive firms to have excessive costs.

## 6. Rent sharing and x-inefficiency

Even if one cannot calculate the size of excess profits directly one may be able to deduce their presence indirectly. Economic theory tells us that when firms make excess profits they will often agree to share those rents with other stakeholders who co-operate with the rent extraction process.

So, for example, in the case of the insurance industry one might think that the industry shares the rents with the legal profession by paying fees that are above the minimum required to receive legal services. In principle one could examine this by comparing legal fees here with legal fees in other jurisdictions as in the MIAB report. However, if higher

<sup>4</sup> By evaluating inputs at opportunity cost we mean the minimum cost it takes to supply the input, i.e. excluding from the calculation of costs all rent sharing and X-inefficiency (see next section).



fees are detected in Ireland, it could be suggested that this is indicative of anti-competitive behaviour in the legal profession rather than the insurance industry. To get around this, one could look at the growth in legal fees paid by insurance companies over time relative to growth in the fees earned by other legal specialities (criminal law, family law etc.). If there is evidence that fees for insurance cases have grown faster than fees for other cases, this could be taken as evidence of rent sharing. And for rent sharing to occur, there have to be rents in the first place.<sup>5</sup>

It is not clear what data is available to examine this question. The best hope seems the data held by legal cost accountants (see section B4 below). It is worth noting that this data could also be useful in the Authority's on-going investigation of the legal profession. Captive insurance companies and self-insurers may also be willing and able to help (see section B7).

One problem with the rent sharing analysis is that it is one sided. If evidence of rent sharing is found then we have evidence of anti-competitive behaviour. On the other hand, if there is no evidence of rent sharing then it does not follow that the industry is competitive. It could still be the case that there are rents, but that the insurance industry does not need to share them with lawyers if, for example, lawyers have no market power over firms.

The issue of X-inefficiency is related to rent sharing. Rent sharing means sharing profits with other vested interests, X-inefficiency means sharing profits with the internal bureaucracy of the firm. This occurs in terms over staffing, lax procedures, and excessive administrative costs --- a general failure to trim the excess fat in the firm. There is anecdotal evidence that the procedures that some insurers use to assess risk in Ireland are fairly primitive by international standards. For example, it seems that few firms employ actuaries on non-life business. Also it appears that relatively few factors are taken into account when assessing the risk of EL and PL contracts. It appears that not much use, if any, is made of the facility allowed by the insurance block exemption to establish common risk premiums based on collectively ascertained statistics on the number of claims. It is difficult, however, to provide formal independent evidence of X-inefficiency. Although one could ask individual companies and/or IIF for formal statements of their risk assessment procedures and compare them to best practice (details available from CEA or Swiss Re). Of course it is unlikely that any company will admit to implementing anything other than best practice.

It might be possible to get formal evidence of X-inefficiency by looking at labour productivity. In other words do employment figures (controlling for firm size) differ systematically in Ireland from other European countries? This sort of data would be available from the CEA or Swiss Re datasets already mentioned.

An objection to both X-inefficiency and rent sharing is that no profit maximising company would pay more than it has to for inputs. This would surely be the industry's response. In their reply to the MIAB report, they blamed the legal profession for high costs necessitating high premiums.

The counter argument is that the industry may not even know that it is rent sharing. Rent sharing and X-inefficiency can occur simply because it is easier for management that way, not necessarily as a result of a deliberate conspiracy. Providing the business is earning decent profits why rock the boat by angering stakeholders inside the firm (X-inefficiency) or outside the firm (rent sharing)? Of course such reasoning could not work in a competitive industry. A new entrant could secure business by cutting internal costs (eliminating X-inefficiency) and seeking cheaper suppliers. Competition not only drives down prices, but it drives down costs also and puts incompetent firms out of business.

The insurance industry might object that it has no control over legal costs. But it is not clear that it has tried every avenue to exert control. For example, it could employ lawyers directly or limit the number of lawyers it employs on each case, seek arbitration as opposed to courts, and aggressively contest dubious claims, complain to the Competition Authority etc. There is some anecdotal evidence that insurance companies are unwilling to contest claims even when the insured party is.

## 7. Structural model of supply and demand

One way of calculating the mark-up of firms is to estimate it directly in the context of a fully specified model of the supply and demand sides of the market.<sup>6</sup> To do so, the econometrician has to estimate a statistical model of consumer behaviour (the demand side) and also a model of firm behaviour (the supply side). Estimates of the elasticity (i.e. sensitivity of consumers to prices) can be derived from the demand side, while estimates of the conjectural variation can be derived from the supply side model. Both the elasticity and the conjectural variation can be combined to give an estimate of the mark-up.

Furthermore, estimating a fully specified structural model enables the analyst to simulate the effects of various changes on the market. In fact, these models are usually estimated in order to analyse the effect of regulatory changes, mergers or increases in costs of inputs etc. In this way, the structural modelling procedure combines the analyses of sections A1, A3, A4, A8 and A9.

There are two problems with the structural approach. Firstly, it is complicated. Not only must one derive a model of consumer behaviour and a model of firm behaviour but one must specify the link between them. This complication

<sup>5</sup> Rose (1987) used this sort of analysis to detect the presence of rents in the US trucking industry before deregulation.

<sup>6</sup> For a general discussion of this approach see Reiss and Wolak (2002)

implies that non-standard statistical procedures may have to be used when these models are applied to the data. The second problem is one of "Garbage In, Garbage Out". The structural approach involves making assumptions about the nature of firms' interactions and consumers' preferences. If those assumptions are not accurate, then resulting estimates will be meaningless as will any predictions/simulations based on those estimates.

Nevertheless, this sort of analysis could be carried out for the Irish insurance market. The method of Feenstra and Levinsohn (1995) could be applied to data at the level of the policyholder (i.e. the MIAB/Software Vineyard data or the Relay data). Alternatively, the method of Berry, Levinsohn and Pakes (1995) could be applied to data aggregated to market-segment level.

Note that both of these methodologies involve making assumptions about the nature of competition in the market. Essentially both assume that firms engage in Bertrand competition over differentiated products. This assumption also seems plausible for the Irish insurance market. But to the extent that it is not true (i.e. if competition is really Cournot or Stackleberg etc.), the methodology would need to be amended appropriately; otherwise the results could be highly misleading.

Overall, given the complexity of the methodology (and the consequent expense) and also the sensitivity of conclusions to initial assumptions, we suggest that this mode of analysis may not represent good value for money (see also section C3).

## 8. Collusion across market segments

There is anecdotal evidence that all firms do not compete in all segments of the market. In the case of motor insurance, the MIAB report was able to show that some firms effectively did not provide insurance for young male drivers and one seemed to specialise in young female drivers. No detailed information on EL and PL is currently available but the Professional Insurance Brokers Association (PIBA) reports similar specialisation for no apparent reason. This raises the prospect that the Irish insurance market could be even more concentrated than the aggregate data suggests. Instead of five main companies competing aggressively everywhere, we have each firm behaving as a monopoly in a set of segments.

Can one identify whether this is true in general for EL and PL in the manner that it appears to be true for motor insurance? If policyholder data is available for PL and EL on the lines of the data eventually secured by the MIAB, then the question could be answered directly. It is not clear that such data exists in a central location, however.

As an alternative, associations of insurance brokers, e.g., the Professional Insurance Brokers' Association (PIBA) and the Insurance Brokers' Association, could be asked to conduct surveys of members. Presumably they could easily identify the nature of any market segmentation and the particular companies operating in each segment. The disadvantage of this data is that it is somewhat less rigorous than the full policyholder data. Note also that the Blue Book does not contain data for market segments. The most disaggregated data that the regulator possesses separates the non-life industry into motor, PL, EL etc.

When market segments have been identified, one can calculate segment specific concentration ratios. Then if one has segment specific prices for a number of years (which can be directly calculated from policyholder level data) the analysis of section A1 can be replicated for each segment separately. If those segments that are systematically more concentrated also have relatively higher premiums, then this will be evidence of anti competitive behaviour.

If the insurance market is indeed segmented, that raises the question of why it is so. More specifically, if some firms are very profitable in some sectors why don't other firms enter that sector? Whatever barriers to entry may exist for entry to the insurance market overall, there would seem to be very few barriers to moving from one segment to another. For example, if a company is selling insurance to young female drivers, it does not need regulatory approval or indeed additional expertise to sell insurance to male drivers. Male drivers may well be more risky. But this suggests that you charge them more, not that you don't enter the market segment. Notably the IIF could not provide a precise explanation as to why some firms didn't compete in some segments, but supposed that it was something to do with asymmetric information (see below).

Note also that the IIF reply to the apparent over-charging of female drivers identified by the MIAB by saying that there was cross subsidization from female drivers to male drivers. But this cannot be the case if different firms dominate the two different market segments. This is something that is easy to check with policyholder level data.

On a general level, there are two possible rational explanations for such failure to compete: collusion and asymmetric information. We deal with collusion first.

There may be collusion between firms who deliberately avoid "treading on each other toes" i.e. firms have agreed to allow each other act as monopolists in different segments. This kind of collusion need not be the result of a formal conspiracy -- it could be tacit. In other words, one firm simply avoids entering a market segment. A firm with a presence in that segment observes this self-restraint and as informal quid pro quo, avoids entering one of the segments

that is important to the first firm. Firms know that entering a segment dominated by another firm will probably lead to a price war in that segment and maybe even a counter attack in another segment. This will lead to lower profit all round. Thus "Mutually Assured Destruction" can maintain discipline of a cartel even in the absence of an explicit agreement.

Gathering evidence for this sort of process is difficult. But if one has policyholder data over time one could track the market share of different firms in each segment. If we observe increasing specialisation through time (i.e. firms exit some segments and don't enter others) then we will have evidence of a process of tacit collusion.

The alternative explanation is that asymmetric information creates a barrier to entry. Dell'Arriccia and Marquez (2003) show how information can give an incumbent firm an advantage over a new entrant even if the latter is more efficient. Essentially, the incumbent firm has more information about the nature of risk in that segment than the new comers simply because the incumbent has been there for some time. Using this information advantage the incumbent will in general be able to offer deals to customers whose risk it knows more accurately. The new entrant is faced with the choice of leaving the market or matching the incumbent's price to customers whose risk it cannot accurately assess.

This explanation is possible. But it doesn't seem that likely in the motor insurance market at least. Firms do not have access to each other's policy records that are provided to Software Vineyard. But they are able to observe each other's quotes in the market through the relay system and probably other informal mechanisms. In any case, if asymmetric information does count as a barrier to entry, it cannot explain why firms exit a market segment. In fact if information is valuable, there is an incentive to never leave a segment as to do so is to render valueless the information you have built up over the years and make it difficult to return to the segment at some time in the future.

In any case it is possible to test directly for the presence of informational asymmetries using the method of Cohen (2003) who found evidence of such asymmetries in Israel using policy level data. One can duplicate her work for Ireland using the policyholder data such as the MIAB data or the Relay data.

Finally, if information does constitute a barrier to entry, then it constitutes a barrier than can easily be removed or reduced if firms are granted access to information about every market segment. This would not have to be at the level of policyholder data (i.e. the software vineyard data) summary statistics would suffice. On this issue note that the IIF states that firms do not see the MIAB data of competitors. But for PL they typically see the claims history with previous insurers. It is still possible, however, for firms to check prices of competitors motor insurance via the Relay programme.

## 9. Regulation as a barrier to entry

Regulation can act as a barrier to entry. Indeed it is supposed to act as barrier to the entry of financially unreliable firms. There is a possibility however, that such prudential regulation may operate against the interest of consumers by preventing the entry of competitors to a non-competitive market.

In an earlier section we commented on how changes in regulation can be used as a statistical device to ascertain the reaction of firms to changes in costs and hence to deduce their competitive behaviour. One can also look at the effects of regulation directly to see if it creates a barrier to entry in practice. There are several reasons to suggest that it does and that a formal analysis of this issue is worthwhile. Firstly, a study by Swiss Re pointed out how deregulation in Europe was followed by dramatic falls in premiums – dramatic falls that didn't occur in Ireland. Suponcic and Tennyson (1995) show that US states with more stringent regulator regimes seemed to have less competitive insurance industries. Hausman (1997) showed that regulation in the US telecoms sector acted as a tax on consumers but had welfare cost far in excess of normal taxes.

Secondly, there is anecdotal evidence that the Irish regulatory requirements are more stringent than the European average. Following the reforms of the 1990s, regulation of insurance companies takes place within the same framework throughout Europe. However national authorities are free to a certain extent to choose their own parameters (reserve ratios etc.). The Irish authorities have chosen to have more stringent reserve ratios in general. Furthermore, the reserve ratios are increased substantially for new entrants during their first few years of operation, creating a very explicit barrier to new entry.

One can analyse these issues formally in the context of a multiple regression model using data across time and EU countries. Essentially, one would want to run the same model as described in section A2 where regulatory stringency is added to the list of explanatory variables. If regulation acts as a barrier to entry in a significant way, one would expect the regulatory stringency variable to have a positive effect on premium levels. In effect, this analysis would replicate the work by Suponcic and Tennyson on US states for the EU.

The additional variable needed – regulatory stringency – should be easy to get. As all the EU countries have similar regulatory structures it should be straightforward to measure the degree of stringency consistently across countries (for example different reserve ratios etc.). This data may be available from the Irish regulator, or if not, could be collected by them from their colleagues in the other member states. It should also be available from the CEA (see section B2). The

separate project being carried out by Cass Business School regarding the economics and regulation of insurance may provide greater detail regarding regulatory stringency, and differences between member states in this regard. To the extent that it is considered desirable to examine regulation as a barrier to entry, it would be appropriate in defining data requirements to liaise with Cass Business School.

A potentially straightforward exercise in considering regulation as a barrier to entry would be for the Department or regulator to ask those companies that have made enquiries about possible entry to the non-life sector, but have not gone ahead with entry, to identify what factors prevented them from proceeding with their application.

## 10. Price of risk

If an analyst has access to a full set of policyholder level data over a number of years then he/she can duplicate the pricing decisions of firms. To be clear, the MIAB dataset holds data on every policy issued by IIF member firms covering motor insurance over a certain period of time. This dataset contains all the information that the insurance company has about the policyholder i.e. all information on which it can base its premium decision. One can therefore duplicate the pricing decision of firms and make some judgement about the reasonableness of those prices.

This is basically what the MIAB report did. There is relatively little added value in duplicating their work. However it would suit the present discussion to reformulate the MIAB analysis in terms of calculating the price of risk. Just as economists calculate an index of consumer prices or house prices; one can in principle calculate a price of risk. In other words, one views risk as the commodity that is being transferred from the insured to the insurer for a fee. If the market is competitive then the price of risk should be constant across all segments and equivalent to the price of risk in securities markets. So for example, male drivers might be charged more but only to the extent that they have more units of risk.

Any analysis along these lines would have to resolve a number of conceptual issues. In particular it is not clear how exactly to define the unit of risk whose price we seek. In principle it could be defined in many ways: the probability of an accident; the expected value of a claim; the probability of a claim above a certain threshold etc. All of these are plausible measures of risk (used in the MIAB report) but clearly each of them is deficient in some way. What is needed is an unambiguous, logical, precise and single parameter, which captures the risk inherent in an insurance contract. We are not sure that there is any such measure. But we suggest that one could follow the practice of financial economics and define risk in terms of the covariance of the returns of the asset (insurance contract) with the returns on the stock market.

One could in principle duplicate this analysis for EL and PL. But as we discuss in section B1, it is not clear that policyholder data is easily available for EL and PL.

This price of risk is in principle a more accurate measure of price than the average premium data used in the previous sections, as risk is the commodity that is really being traded. Once one has a price for risk, one could revisit the analysis of the previous sections using price of risk in place of average premium. So for example, one could see the effect of firm concentration on the price of risk across time and within segments (sections A1 and A8).

## 11. Wholesale price of risk and international comparisons

Having calculated the retail price of risk in Ireland it would be useful to compare this with the price of risk internationally and the wholesale price of risk i.e. the price of reinsurance. Ideally, in order to do this, one would like policyholder data throughout Europe – which is clearly not available.

However, there may be a way of short-circuiting this requirement. Swiss Re, one of the worlds leading insurance and re-insurance companies, offers an online tool, which allows the registered user to price risk in different countries. Apparently the formulae in this software ("Liability Fac") are based on analysis of over a hundred different risk factors internationally.

The software will provide the minimum premium needed to cover the risk of a particular insurance contract. It will also provide a quote for Swiss Re to reinsure this risk. It would be interesting to use this software to price typical Irish contracts and compare the price with those charged by Irish insurance companies. The re-insurance price will have to be adjusted for the fact that insurance firms typically re-insure only a certain portion of the claims distribution. However once the price for a portion of the claims distribution is known, a price for the whole distribution can be derived, if the shape of the entire claims distribution is known. This data is available from the regulator via Form 8.

In addition to the formal Liability Fac software, Swiss Re has several publications that show how to price risk given data on claims history, risk factors etc. These publications could be used as a basis of a simple model to derive the price of certain typical insurance contracts.<sup>7</sup>

Another way to examine the price of risk across countries would be to get data from captive insurance companies. These are companies that don't offer insurance to the public but to a single client or group of clients. For example, McDonald's has its own in-house insurance company that insures all their restaurants worldwide. These companies

<sup>7</sup> See for example Swiss Re (2000,2003)

tend to offer a single very standard product across countries. As such they provide a useful basis of comparison for claims costs, risk factors etc.

## 12. The insurance company as a hedge fund

The MIAB report pointed out that one could think of insurance companies as investment funds. They take in large amounts of cash as premiums and, at a later date, pay most of it out in claims. In the meantime, the insurance company invests the cash and earns a return. Viewing an insurance company in this way, one can see that it is in its interest to have high claims financed by high premiums, because both generate a large volume of cash flow --- the greater the flow, the higher the investment income. (This provides a rationale for why insurers may not be too concerned to fight any rent sharing of the type discussed in section A6 above).

This view of insurance companies is not unique to the MIAB; it is relatively common among industry insiders.<sup>8</sup> One can take the analogy further. An insurance company is like a hedge fund that borrows cash and buys shares. The insurance company has a disadvantage over a normal hedge fund in so far as prudential regulation will prevent it from investing in high return (and high risk) assets.

On the other hand, the insurance company has an advantage over the investment fund in so far as it can borrow money cheaply as customers are obliged by law and prudence to buy insurance. When individuals buy insurance they are effectively lending money to the insurer. When claims are paid, it is as if the insurer is paying back the loan. Any underwriting loss can be considered the interest paid by the insurance company in return for borrowing customers' money to finance its investment strategy. In fact taking this view of the insurance company, there should always be an underwriting loss. If there is not then this indicates that the firm is not operating in the borrowing side of its business (i.e. underwriting) in a competitive manner. Instead it is using market power to extract favourable credit terms from its lenders. As the MIAB report noted, and a glance at the blue book confirms, underwriting losses are not unknown but are far from being the norm. For similar reasons one would expect the size of any loss to co-vary positively with the level of real interest rates if the insurance market were competitive. This is easy to test econometrically.

One can take the analogy one step further. Hedge funds are often valued by construction a portfolio of stocks that has similar risk profile to the fund. The return of the resulting portfolio can then be thought to give the price of the risk incurred by the fund. If the fund produces an even higher return then it is rated a good buy.

One can perform similar analysis of an insurance company. The idea is that one would construct a portfolio of stocks that match the risk profile of the potential claims against the insurance company. The market value of the resulting portfolio then gives the competitive market price for the aggregate risk taken on by the insurance company. This price can then be compared with the price the insurance company charges its customers i.e. the aggregate premium. Any difference will imply some deviation from competitive behaviour.

In principle one can perform this analysis using the aggregate claims data (Form 8) submitted to the regulator but not included in the Blue Book. Established techniques exist to find a matching portfolio from among internationally traded stocks. One caveat: this calculation of the price of risk takes the claims data as given. If rent sharing and X-inefficiency exist the finding that these claims are priced at market value does not indicate competitive behaviour.

## 13. Switching costs

A competitive market is characterised by a large number of firms providing products that are close substitutes for each other. In section A8 (Collusion across Segments) we examined the possibility that firms may behave as monopolists within their own market segments. A consequence of this would be that it would be very difficult for a consumer to switch from one firm to another.

However, even in the case where several firms compete in a particular segment they still have an incentive to make it difficult for individuals to take their business elsewhere. There is some anecdotal evidence to suggest that this does indeed occur. For example, insurance companies have been accused of sending out renewal notices close to expiry of the policy in order to make it difficult for the individual to search for alternative quotes. Asymmetric Information (see section A8) would also act as a barrier to switching in so far as it makes it more difficult for an insurance company to quote for new business compared to returning business.

In order to analyse the extent to which switching is a problem the analyst would need access to policyholder data that contains information on identifiable policyholders through time. Unfortunately the MIAB data, while at the level of the policyholder, does not allow the analyst to identify individual policyholders. In principle this data should be available from the insurance firms or via the Relay system. Using this data the analysts could track how often individuals change firms.

A fuller analysis would require a comparison between the insurance contract that the consumer actually bought with others available at the time. The other (rejected) quotes are not recorded directly in the data. But it should be possible to proxy them by looking at the quotes received (and accepted) by other similar individuals from the other insurance companies.

<sup>8</sup> See Swiss Re (2001) and Warren Buffett's description of Berkshire Hathaway's business strategy in Buffett (2002).



## 14. Vertical relationships

Insurance products are sold through intermediaries (e.g., brokers and tied agents) and, also, directly by insurance companies. A role of insurance brokers is to offer independent advice to consumers. Any person acting as an insurance brokers is required to be able to place insurance with at least five insurance undertakings. However, if brokers have an incentive to place business with a particular insurance company (in order to preserve an agreement with that company) rather than find the cheapest quote on the market, the consumer will not get the expected service from the broker, and might pay more than if they had searched the market themselves.

In order to analyse whether this is an issue, and if so, to what extent, it would be useful to find out how many brokers have had relationships with insurance companies discontinued for not placing enough business for that company (e.g., by a survey of brokers). The survey could also ask each broker what their volume of Motor, EL and PL business is, and the percentage of that business they have done in respect of each specific insurance company over the last five years.

## SECTION B

In this section we review each potential source of data and comment on its availability. We also indicate the issues identified in section A that each source of data can shed some light on. These relationships are summarized in the table below.

### 1. Policyholder data

In principle the most comprehensive data that can be made available is data on each insurance contract made over a period of time. The dataset should contain all the variables that are used by the insurance firms to set their premiums. With this kind of data one can replicate their decisions and form a judgement on whether their behaviour is consistent with that of a competitive industry. Specifically one can answer several questions posed in section A of this report: one can price risk directly (section A10); one can identify market segments and the effects of concentration in those segments (section A8); one can test for asymmetric information as a barrier to entry (also section A8); one can test for strategic price behaviour (section A3); estimate a structural model of the insurance market (section A7) and calculate switching costs (section A13). Such data may be available from three sources:

1. Software Vineyard / MIAB/Insurance Companies
2. Relay
3. Brokers

#### Software Vineyard / MIAB/Insurance companies

Software Vineyard compiles data for the Irish Insurance Federation to fulfil their obligations to the MIAB. The data provided to the MIAB covered the years (1997-2001) and is now finally consistently coded across firms and time.<sup>9</sup> Now that the collection infrastructure has been established, it should be possible to get data going back further and also include 2002.

More importantly the MIAB data collected by Software Vineyard applies only to motor insurance. Similar data for EL and PL is not available from one source. In principle one could collect this data from the major insurance companies separately. However, bearing in mind the difficulties experienced by the MIAB, it is unlikely that data provided by different firms would be coded in a consistent way. Sorting out this data could be expensive and time consuming.

Another problem with this data is that there is no way of identifying individuals. This means that the data is of little use in answering questions regarding switching costs (section A13). In order to look at this issue we need to be able to track individuals over time as they change (or not) their insurance companies.

#### Relay

An alternative source of basically the same data may be provided by a company call Relay. This company is one of the two companies that supply software and on-line quotes to insurance brokers. They confirmed that they store a record of all insurance contracts agreed over their system. This data is stored electronically in an easily available and consistent format going back to 1997. In principle data is also available going back to early 1990s, but may not be coded consistently. They account for about 65% of the broker market. This data is likely very reliable because it forms the basis for real contracts. A downside is that the Relay system does not apply to EL and PL. The upside is that the Relay data would enable the analyst to track a policyholder through time and look at switching behaviour (section A13).

#### Broker

It has been suggested by a number of sources that a large brokerage firm may be in position to provide data on EL and PL contract in electronic format. If the brokerage firm were large enough, this would be a representative sample of the whole market and valid for statistical analysis. There would also be the possibility of tracking individuals through time to examine switching behaviour. At the moment we have no information as to the willingness/ability of a brokerage firm to provide this data.

### 2. International Data: Swiss Re and Comite European Des Assurances (CEA)

There are two commercially available datasets that enable international comparisons of insurance markets to be made. Swiss Re provides a data set encompassing all countries in the OECD dating back as far as 1980 at a cost of e1000 for ten years worth of data.

The European insurers representative association (CEA) also provides a similar dataset at e240 for each year. In addition the CEA provides a country-by-country comparison of regulatory frameworks. Some of the CEA data may be available from the IIF.

<sup>9</sup> This data is to be distinguished from the aggregate data produced by Software Vineyard. This is effectively an electronic version of the Blue Book and of analyses derived from the Blue Book.

It is difficult to make a judgement on the quality of these datasets without seeing them. However, we have been able to examine some of the studies conducted with both datasets and look at some introductory documentation over the WWW. It seems that the Swiss Re dataset is more comprehensive.

With these datasets one can examine the following issues: Do Irish insurance markets respond to changes in regulation and taxes in a similar manner to the rest of Europe (sections A2, A4)? They may also be able to shed light on the variation in regulatory stringency across the EU (section A9) and also on the productivity (X-inefficiency) of insurance companies (section A6).

### 3. Blue Book and Regulators' Data

The regulator has access to several data sources, which will be of some limited use in the analysis of the issues identified in section A. However, the legal position regarding access to this data would need to be clarified.

#### The Blue Book

The data in the Blue Book can be used to calculate concentration ratios for the Irish insurance market (section A1). Unfortunately it is of no help in identifying concentration in market segments as it only reports figures for EL, PL and motor as a whole (section A8). The Blue Book will also be of use in the investment analysis approach (section A5) as it collects consistent and detailed accounting data.

#### Form 8

The details of claims against the firm through time may be used to assess the aggregate risk underwritten by the firm (section A12). It will also enable the construction of parametric claims distributions, which can be used to derive the wholesale price of risk from the re-insurance quotes provided by Swiss Re (section A11). It may also be useful in helping to price risk from policy level data (section A10). Form 8 is not published but is in the hands of the regulator. There may be a problem with the interpretation of expected future claims data that is contained in Form 8. Clarification will be needed of the actuarial assumptions used to derive these figures.

#### Regulator stringency

The regulator should also be able to provide at least some data on the relevant stringency of regulations across the EU (section A9).

#### Actuarial reports

Finally, the regulator also has access to detailed actuarial reports on the profile of risks faced by each firm. These could be used to calculate the market price of the aggregate risk underwritten by insurance firms (see section A12). If these are not made available by the regulator, they would have to be requested from individual firms.

### 4. Data on legal costs

Data on legal costs are necessary to examine the rent-sharing hypothesis of section A6. Fees for most criminal lawyers should be available from the DPP or the Chief State Solicitor. For other specialities including insurance related cases, the situation is more difficult. The Bar Council has indicated that it has no data on fees. The taxing master has data, but not in electronic format. Furthermore, this data is related to disputed legal cost, which may be very different from the average.

Legal cost accountants possess this data in detail. We talked to one firm who confirmed that they had standard procedures for evaluating the costs of legal services. They keep records of thousands of cases in a standard format. Unfortunately, these records are on paper (each case is summarized on two A4 pages) and, of course, are considered highly confidential.

To the extent that cost accountants only deal with disputed legal bills, the data may constitute an unrepresentative sample of legal costs. One would guess, for example, that only the larger costs are disputed. This could cause problems for any analysis. There are, however, well-established techniques for dealing with such "sample selection" issues. The most simple is to assume a particular parametric form of the distribution of legal costs and then to assume that a certain portion is disputed. The parameters of the distribution can then be derived. A better alternative is to identify some variable, which will predict that a bill will be disputed but itself not correlated with the size of the bill. No such variable springs to mind at the moment. However, if one can be identified then we can calculate the distribution of legal costs without recourse to parametric assumptions.

The fact that the data is available raises two possibilities. Firstly, a firm could be contracted to conduct an examination of their files and construct either a fully anonymous data set or summary statistics. Secondly, the data could potentially be summonsed using the powers of the Competition Authority. However, it is unlikely that the data would be that crucial for this study as to justify the expense or inconvenience of either of these two courses of action.



## 5. Swiss Re Insurance and Reinsurance Quotes

Swiss Re is one of the world's biggest insurance companies. On its website it provides manuals and software to aide underwriters in the pricing risk. Most of these procedures are fairly straightforward and could be applied to Irish data with a modicum of effort.<sup>10</sup> This would enable to compare the retail price of risk in Ireland with its retail price elsewhere and its international wholesale price (section A11).

In addition, the Swiss Re website allows access to a more sophisticated piece of software called "Liability Fac". Apparently the formulae in this software are based on an analysis of over a hundred different risk factors internationally. Using this software is an indirect way of accessing what appears to be a very rich database of the international insurance market.

The software will provide the minimum premium needed to cover the risk of a particular insurance contract. It will also provide a quote for Swiss Re to reinsure this risk. It would be interesting to use this software to price typical Irish contracts and compare the price with those charged by Irish insurance companies.

It seems that the software is designed to be simple to use yet sufficiently rigorous to be used in real underwriting decisions. However, as we have not yet been able to use the software, we cannot state this with certainty. The conditions of use imply, but do not state explicitly, that the user must be an underwriter. Furthermore there is explicit prohibition on communicating the results of the software's analysis. Nevertheless, as the software seems potentially so useful that it is worth exploring whether it could be accessed for the purposes we have outlined.

## 6. Broker Survey

A survey of brokers conducted through representative association(s) could help identify market segments and which firms have entered or exited segments over time. This would help answer the market segmentation collusion hypothesis (section 8). Indeed, for PL ad EL, there may be no other source of data.

## 7. Self Insurers and Captive Insurance Companies

Some companies find it more efficient to self-insure i.e. to bear the risk of meeting claims against them from their own resources. Self-insurers will have data on Irish legal fees even for non-disputed costs. This would be useful for sections A6.

Captive insurance companies are a variation on the self-insurance theme. They are firms that don't offer insurance to the public but to a single client or group of clients who are also often their owners. For example, McDonald's has its own in-house insurance company that insures all their restaurants worldwide.

These companies tend to offer a single very standard product across countries. As such they provide a useful basis of comparison for claims costs and claims probabilities across countries. This would be useful for sections A2, A6, A11.

As self-insurers and captive insurance companies do not operate in the open market, they have no obvious reason not to co-operate. Furthermore, several captive insurers are based in Dublin (IFSC) they will come under the jurisdiction of the Competition Authority, as will the domestic self-insurers.

<sup>10</sup> The documentation associated with one of these algorithms contains the following sentence which deserves to be quoted in full: "The price calculated using the above method, although accurate in risk underwriting terms, is occasionally thought of as to low by commercial standards". See Swiss Re

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DATA	QUESTIONS	SOURCES	AVAILABILITY
Policy Holder data	A3 Strategic price changes (2) A8 Collusion and across Segments (2) A8 Asymmetric Information (5) A7 Structural Model (10+) A10 Price of Risk (10) A13 Switching Costs (2)	MIAB/Software Vineyard (5) Relay (5) Broker (5) Individual Insurance Companies (?)	Available Possibly Available but Legal Issues Unknown Unknown
International Data	A2 Concentration (1) A4 Reaction to Regulation (1) A6 X-Inefficiency (1)	Swiss Re (2) CEA (2)	Commercially available Commercially available or from IIF
Legal Costs	A6 Rent Sharing (1)	Taxing master Legal Cost Accountants (4)	Unknown Data exists but confidential and in paper format
Irish regulatory data	A1 Concentration (1) A5 Investment Analysis (2) A4 Reaction to Regulation (1)  A12 Insurance Company as a Hedge Fund (4)	Blue Book (0.5) Form 8 (0.5) Actuarial Reports (4)	Available Available If not made available by regulator, could be requested directly from companies
Swiss Re Quotes	A11 Wholesale Price of Risk (2)	Liability Fac (1)	Commercially available but restrictions on use and dissemination
Brokers' Survey	A8 Collusion and Segmentation (0.5)  A6 Rent Sharing (0.5)	Questionnaire to members of Brokers' association(s) (4)	PIBA and IBA both willing to co-operate
Self Insurers & Captive Ins. Company	A6 Rent Sharing (1) A2 International Comparisons (1)	Claims Data	Unknown