SOLVENCY II AND THE SOLVENCY CAPITAL REQUIREMENT FOR INSURANCE FIRMS IN ISRAEL

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Recent developments in the insurance regulation emphasize risk management. The European regulators are going to implement the new capital requirements that are directly based on the risk taken by insurance companies. This framework is called Solvency II and it is expected to be implemented in Europe in the next few years. In the paper we describe various approaches to risk measurement and management in insurance, and describe the potential implications of Solvency II on the Israeli insurance companies in terms of capital and their risk appetite. Our results are based on QIS2 study, and they indicate that under the new regulations Israeli insurance companies will be required to keep much more capital (or change their risk exposure). We provide some international comparison and try to send an early warning signal to the relevant parties (regulators and insurers).

1. INTRODUCTION

Insurance firms have an important role to play in economic growth and efficiency. One of the industry's main contributions is in financial intermediation: the industry raises long-term sources (unlike the banks, which raise short-term sources), which increase the economy's long-term investment potential (Nagar, 2005).

What is solvency? According to the Merriam-Webster dictionary,[1] it is "the ability to pay all legal debts." The liabilities with regard to insurance contracts are expected claims and their associated expenses. The current value of these obligations, which is calculated on the basis of actuarial methods, is in the final event only an estimate (Sandstrom, 2006).

Solvency II is a project under which a new regime will be introduced for managing insurance risk in the European Union. The framework proposal of the directive (European Commission, 2007) was submitted to the European Parliament in July 2007 for consideration. This directive will eventually replace all previous ones. The EU aspires to assimilate the directive by 2012. The aim of the directive is to ensure the financial soundness of insurance firms, even during difficult times, in order to protect policy-holders and the financial system. Another aim is to develop a single insurance market within the EU

[1] http://www.m-w.com/dictionary/solvency

which adheres to the same regulatory requirements. Solvency II is characterized by an approach which incorporates all the various risks. The requirements of Solvency II will take account of all the risks facing the insurer, doing so more comprehensively than Solvency I, and basing them on economic risk. Furthermore, for the first time risk management will also be calculated on the assets side and not solely on the liabilities side (total balance sheet). The Insurance Commissioner intends to act to implement the Directive's recommendations in Israel in order to improve the risk management and capital-allocation mechanisms of insurance firms. Another aim is to induce Israel's insurance firms to act in accordance with accepted international criteria (Insurance Commissioner, 2007).

There are certain restrictions on the form in which solvency capital may be held. One of the objectives of Solvency II is to define capital requirements for insurance firms which are in line with the firms' real risks. The solvency margin consists of the minimum excess over its liabilities which an insurance firm must have in order to protect policy-holders and maintain financial stability.

Several important questions arise with regard to the solvency margin.

For which time-frame should it be calculated? Which assets may be included in it? The answers to these questions changed with the development of the EU Directive.

This study gives a brief review of the development of the insurance risk-management concept prior to Solvency II; this is followed by an account of the way solvency capital is calculated today in Israel and in various countries. Finally, I present the results of a simulation of solvency capital for several Israeli insurance firms according to the QIS2 methods, which will constitute the basis for calculating the solvency capital requirement presented in Solvency II. Note in this context that the final formulae for calculating solvency capital are expected to be published in the second half of 2009, after the results of QIS3 and QIS4 are received. The final formulae will be based on an examination of the results of the various QIS as well as on consultations with various entities.

2. HISTORICAL REVIEW

a. Directives prior to Solvency I

The establishment of the European Economic Community (EEC) in 1957 led to cooperation between the regulatory authorities (Sandstrom, 2006). In the framework of the discussions of the committee of the EEC'S insurance regulatory authorities, the need arose for measures that would lead to a free insurance market, and these led in turn to the decision to appoint a working party that would be based on the work of Campagne (Campagne, 1961). The working party submitted its report to the OECD in 1963, and proposed a criterion for the minimum solvency margin which would be based on the following three ratios (Sandstrom, 2006):
- The ratio of free assets to premiums received during the last year
- The ratio of free assets to pending claims in the last three years
- The ratio of free assets to technical reserves

That and other studies led to the first directives. The first General Insurance Directive was published in 1973 and was followed by additional directives in 1988 and 1992, while the first Life Insurance Directive was published in 1979 and was followed by others in 1990 and 1992.

b. The report of the Müller group

The conference of the insurance regulatory departments of the EU member countries set up a working party charged with conducting a thorough study of topics associated with solvency. The group, which was headed by Helmuth Müller, submitted its report in 1997. The group used questionnaires which were sent to the regulatory authorities in the EU member countries, and questionnaires which were sent to three European organizations, one of them being Groupe Consultatif (GC).

The working party analyzed the reasons for problems in the insurance industry in European countries over twenty years. Their conclusions were that even if the solvency rules were implemented and closely supervised it would have been impossible to prevent some of the economic collapses which occurred.

The group proposed that the solvency system be sub-divided as follows:
- Minimum guarantee fund
- Guarantee fund
- Solvency margin

One of the proposals was that the minimum guarantee fund should be significantly increased over what was customary till then. The group recommended that at least three measures be used to determine capital in general insurance: premiums, claims (as was the case with the first General Insurance Directive), and reserves which will enable long-tail businesses to be taken into account. The measure that yields the highest result will be the one used for calculating capital.

c. Solvency I

Subsequent to the Müller Report, it was decided to establish a fresh working party in order to improve the solvency margin regime and harmonize the reserves (Sandstrom, 2006). The new working party was required to take Dr. Müller's conclusions and the results of the questionnaires, especially the replies of GC, into account.

The working party concluded that future legislation in the EU would have to be more flexible in order to incorporate developments in the financial services industry more quickly. The group's analysis indicated that the fact that the solvency margin system had operated satisfactorily did not guarantee that the system would function efficiently in the future (European Commission, 1999).

The work led to the proposal of the first Life and General Insurance Directives, Solvency I, in 2000. These were adopted by the EU in 2002.

The solvency capital required under Solvency I was calculated in the following way (Swiss Re, 2006):

Whichever was higher, minimum capital or the solvency capital required in accordance with the extent and type of business activity, when:

Minimum capital equals one third of solvency capital, provided it is between two and three million euros, depending on the kind of insurance in which the firm engages.

Solvency capital in general insurance equals whichever is higher of the following:

• The premiums ratio: 18 percent of the first fifty million euros of the gross premium, and 16 percent of the remaining gross premiums. The amount obtained is multiplied by the average ratio between net and gross claims in the last three years (the ratio to be used for the calculation should be at least 0.5).

• The claims ratio: 26 percent of the first 35 million euros of gross claims, and 23 percent of the remaining gross premiums. The amount obtained is multiplied by the average ratio between net and gross claims in the last three years (the ratio to be used for the calculation should be at least 0.5).

In insuring indebtedness (excluding compulsory insurance), marine insurance, and flight insurance the indices obtained should be multiplied by 1.5.

Solvency capital in life insurance equals whichever is higher of the following:

• 4 percent of the gross mathematical reserves multiplied by the ratio between net and gross reserves (this ratio should be at least 0.85).

• 0.3 percent of capital at risk. This amount should be multiplied by the ratio of net capital at risk to gross capital at risk (this ratio should be at least 0.5).

Similarly, the Directive included instructions and restrictions on investments and assets held by the insurance firms as reserves. In cases of deviation from solvency capital, the Regulator may require the insurer to take steps to amend the situation.

d. Towards Solvency II

Other organizations and projects affected the stability of the solvency assessment system, the main ones being:

Basel II: alongside the projected working framework of Solvency II, Basel II was proposed as a basis for incorporating the accumulated know-how in risk management and banking supervision into the project (European Commission, 2001). Basel II combines a three-pillar approach: minimal capital requirements and an efficient supervisory process within market discipline.

The following risks are included in the calculation of banks' capital requirement:
• Credit risk
• Market risk
• Operating risk
• Liquidity risk
• Legal risk

International Financial Reporting Standards (IFRS): The International Accounting Standards Committee (IASC) embarked on the project in 1997 with the object of developing international accounting standards (IAS) for insurance. At a later stage IASC became IASB, and today the new IAS are known as international financial reporting standards (IFRS). The purpose of the project was to create a uniform set of clearly

understood global accounting standards of a high standard requiring data of excellent quality which would be both transparent and comparable between financial statements.

IASB required that the full balance sheet system be used rather than the deferral and matching system (Abbink and Saker, 2002).

An insurance contract had to be broken down into its insurance and non-insurance sections (financial and service sections), while the accounts had to be divided as follows:

- IAS 18 for service contracts
- IAS 39 for financial instruments
- IFRS 4 for insurance contracts

Hence, the definition of an insurance contract is very important.

In 2002 IASB decided to divide the work on accounting standards into two stages. The main object of the first stage was to define an insurance contract as opposed to financial instruments. This stage came to an end in 2004, with the publication of IFRS 4, Insurance Contracts, by IASB (IASB, 2004). The second stage was the assimilation of the standards.

The International Association of Actuaries (IAA): In 2002 the IAA set up a working party in order to prepare a report regarding solvency assessment from an actuarial perspective. The report was published in 2004 (IAA, 2004).

The report supported the three-pillar approach of Basel II. In addition, the working party claimed that the correct assessment of the insurer's financial soundness for solvency purposes required the appraisal of its full balance sheet, relying on realistic values and the consistent treatment of both its assets and its liabilities.

According to the report, there had to be a high level of certainty (e.g., 99 percent) regarding the ability to meet all commitments for a period of a year. In addition, there had to be a more moderate level of certainty (e.g., 75 percent) that the capital would exceed the present value of future liabilities remaining at the end of the year.

The report recommended taking all the kinds of risk into consideration, and those which were difficult to quantify would be included in Pillar 2.

The risks which were to be included in Pillar 1 were:

- Insurance risk
- Credit risk
- Market risk
- Operating risk

It was found that for the purpose of assessing solvency in insurance firms, TailVaR had advantages over VaR. The report proposed that the interdependence of risks, risk-dispersal and transfer, and risk-allocation mechanisms should be taken into account.

The capital requirements in the document are divided into two levels:

- Target Capital Requirement (TCR): the appropriate level of capital that an insurer must hold in accordance with the risks it bears
- Minimum Capital Requirement (MCR): the level of capital beneath which the regulator is required to intervene in order to change the situation.

3. SOLVENCY II

The Solvency II project began in 2001 and was intended to examine the working methods of insurance regulators in Europe. The main outcome of the directive was that the method of calculating solvency capital was changed. The existing approach is based on underwriting, whereas Solvency II is based on a combination of the risks facing insurance firms.

As stated, the Solvency II Directive was referred as planned to the European Parliament in July 2007, and the intention is that it should be assimilated by the year 2012.

The objectives of Solvency II include the following:
- To protect policy-holders
- To determine solvency capital requirements which are more appropriate for the insuring firm's risks
- To prevent unnecessary complexity
- To reflect developments in the market
- To establish principles and avoid issuing too many specific guidelines
- To prevent overcapitalization

The features of the directive are as follows:
- There are two levels of capital requirements: minimal capital requirements and solvency capital requirements
- The directive is based on principles rather than on specific laws
- Solvency capital is calculated on the basis of consistent assessments of the market, incorporating the relevant parameters
- The need to quantify the absence of interdependence between risks will stimulate insurers to use internal measurement and risk-management models
- Solvency II is directed at attaining consistency between financial segments, harmonization of regulatory methods throughout Europe, and convergence to the determination of uniform international standards
- In common with Basel II for the banking system, the directive is based on the three-pillar approach. There will be quantitative requirements (laws regarding financial resources), qualitative requirements (the process of regulation and risk management) and market discipline (reporting and transparency).

In the last few years, in the wake of previous directives, additional studies in this and allied areas (especially Basel II), and accumulated experience in the sphere of risk management in general and insurance risks in particular, a comprehensive concept of risk and its assessment has been developed and perfected by insurance firms. These developments are evident in the current directive to a greater extent than was the case with the previous one.

The three-pillar approach, as described in greater detail below, is central to the directive:

Pillar 1: quantitative requirements

The first pillar contains rules concerning financial resources, including technical reserves, investments, and solvency capital requirements.

The precise way solvency capital is calculated and the approaches regarding the assessment of investments and technical reserves are still being formulated. The third quantitative study (QIS3) is currently being undertaken by CEIOPS[2] regarding an examination of the preferred and appropriate methods for the calculations of Pillar 1, and in December 2007 the fourth study (QIS4) is expected to be undertaken. The final formulae for calculating the capital requirements are expected to be published in the second half of 2009.

This pillar contains two levels of capital requirement:

a. *Solvency Capital Requirement* (SCR): the amount of capital required from the insurer enabling it to absorb unexpected losses and meet its obligations towards policy-holders at a high level of equitableness. The calculation of this requirement is to be made on the basis of the VaR calculation at the 99.5 percent significance level for the period of a year (Holmquist, 2007). The method is based on the approach examined in QIS2 (CEIOPS, 2006) with amendments as a result of additional examinations in QIS3 (CEIOPS, 2007a) and QIS4.[3]

The approach to calculating the solvency capital requirement consists of modules, for each one of which the capital deriving from the VaR calculation is calculated at a 99.5 percent significance level; the overall capital requirement is also calculated at that significance level, taking the development of dispersal into account.

The calculation of the solvency capital requirement includes the following risks:

- Market risk
- Underwriting risk for life insurance
- Underwriting risk for health insurance
- Underwriting risk for general insurance
- Credit risk (including bankruptcy and margin risk)
- Operating risk

In addition to the standard approach, it will be possible to calculate SCR by means of internal models.

b. *Minimum Capital Requirement* (MCR): this requirement relates to the minimum amount of capital below which the immediate intervention of the Insurance Commissioner is required. In contrast with SCR, this requirement will not be calculated for all the risks and its calculation will be simpler. The calculation will be implemented by means of VaR at a significance level of between 80 and 90 percent. The minimum capital level will be one million euros in general insurance transactions and two million euros in life insurance transactions. In QIS3 another way of calculating MCR, proposed by CEA (CEA. 2006), was examined; according to this method, the minimum capital requirement is calculated as a given proportion of the solvency capital requirement.

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[2] Additional information about CEIOPS (Committee of European Insurance and Occupational Pensions Supervisors) and QIS3 may be found at: www.ceiops.org

[3] QIS4 is expected to begin in December 2007 April 2008. Details of the technical requirements can be seen on http://ec.europa.eu/internal_market/insurance/docs/solvency/qis4/technical_specifications_en.pdf

Pillar 2

The second pillar provides principles for the regulatory process as well as for the internal auditing and management of the policy-holder's risks. This pillar incorporates the risk-management processes (including the mixed mechanisms), the rules for managing investments, the rules for managing assets and liabilities, etc. In addition, this pillar includes capital requirements regarding risks which are difficult to quantify (e.g., liquidity) and are hence not included in Pillar 1.

Pillar 3

This pillar is based on the assumption that the market and risk-based regulatory mechanisms will become stronger as reporting and transparency are augmented. As soon as all the players in the market have extensive information about the risks to which the insurance firms are exposed, stronger market discipline will develop as regards risk management in firms' senior managements.

4. THE CURRENT GLOBAL SITUATION

Under Solvency I the model of the solvency capital requirement is based on only one type of risk (single risk factor based model), while in Solvency II standard solvency capital is based on a variety of risks (multi risk factor based model), and the advanced requirement will be based on internal models which take the various risks into account and themselves quantify the risks and their interdependencies.

A clear-cut development is currently evident whereby risks are estimated and measured by means of more sophisticated models than the approaches based on a single risk factor. There are, however, marked differences between countries regarding the understanding of risk in insurance firms, and the regulatory requirements from firms vary from one country to another. The methods for assessing assets and liabilities and the way solvency capital is calculated also vary between countries.

In this part of the article I provide a brief survey of the way solvency capital is calculated in Switzerland and the US.[4]

Switzerland (Kaufmann and Wyler, 2005) uses the SST model, which is based on an analytic and scenarios approach, taking into account the following risk factors: market, insurance, and credit. In this model the assessment of assets and liabilities is consistent with market prices. The influence of reinsurers can be taken into account in full.

The model incorporates two capital requirements: minimum capital and target capital. Target capital is calculated as capital which even in exceptional circumstances (with one percent probability) will be sufficient on average to enable the assets and liabilities to be transferred to a third party. It comprises four parts:

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[4] For a detailed account of the way capital is calculated in other countries, see the document prepared by the Insurance Commissioner (2007).

• An analytic part: this is calculated as the expected shortfall of total market and insurance risks at a given significance level. In SST there are 23 market risk factors and six insurance risk factors, the correlations and their standard deviations being supplied by the regulator.

• Scenario aggregation: in addition to the analytic calculation, estimates of losses under various scenarios must be calculated. These scenarios will encompass the risks which are specific to each firm. In the final event, the results obtained in this and the previous section will be aggregated.

• A credit risk charge: this section contains a capital requirement for credit risks due to bankruptcy risks and spread risks. The capital required against credit will be calculated in the same way as in Basel II.

• A risk margin.

According to the Swiss method it is possible and even desirable to use internal models, although prior permission must be obtained to do so.

Table 1
International Comparison of Different Approaches to Calculating Solvency Capital

	Comparisons	Australia	Canada	Denmark	Netherlands	Singapore	Switzerland	UK	USA
1)	**Valuation**								
	Liabilities	BE	Actuarial	BE	BE	BE	BE	BE	Actuarial
	Technical provisions	FV	Actuarial	MV	FV	FV	FV	FV	Actuarial
	Assets	MV	MV	MV	MV	MV	MV	MV	Cost of MV
	Risk margin in FV	*Risk margin*	−	−	*Risk margin*	*PAD*	*Risk margin*	*Risk margin*	−
2)	**Solvency classification**								
	Fixed ratio	(1973)	−	EU	EU	−	EU	EU	−
	Risk factor based	Y	Y	−	Y	Y	−	Y	Y
	Scenario based	−	Y	Y	Y	Y	Y	Y:MCR	Y
	Principles based	Y	−	−	Y	−	Y	Y:ECR	−
3)	**Minimum and target levels**								
	Fixed minimun amount	$2 million	−	EU	EU	$5 million	EU	EU	−
	Minimum level (MCR)	Y	100% of MCT	Y:EU	Y:EU	−	Y:EU	Y:EU	% of RBC
	Target level (SCR)	−	120% TAAM 150% of MCT/TAAM	−	TC	TRR	TC	ECR	RBC
4)	**Internal models**								
	Use of internal model	Y	Y	−	Y	Y	Y	Y	(ALM)

5) **Time horizon**								
Time horizon, years	At all times	Two or five	One	One+multi	At all times	One	One	One
6) **Interventions**	Y	Y	Traffic light zones	Y	FR Warning event	Y	Y	5 levels
7) **Confidence levels**								
Confidence levels, %	−	−	VaR: 99.0 and 99.5	99.5 and 97.5 pension	−	ES:99.0	99.5	−
8) **Available solvency capital**								
ASC	Capital base	TAAM	ASC	ASC	FR Warning	ASC	ASC	TAC

ALM	Asset liability management risk	FV	Fair value, i.e., BE + a risk margin	MCT	Minimum capital test
BE	Best estimate		(The risk margin is usually named	MV	Market value
ECR	Enhanced capital requirement		market value margin. In Singapore, the	RBC	Risk-based capital
ES	Expected shortfall or TailVaR		risk margin is called PAD, provisions	SCR	Solvency capital requirement
EU	Means the use of EU rules on solvency		for adverse deviation.)	TAAM	Test of adequacy of assets in
FR	Financial resources	MCR	Minimum capital requirement		Canada and Margin equirement

TAC	Total adjusted capital
TC	Target capital
TRR	Total risk requirement
VaR	Value at risk
(1973)	The 1973 solvency system

SOURCE: International comparison made by Sandstrom (2006).

The US: the RBC model calculates solvency capital on the basis of the standard approach, which takes various risks into consideration. The risk factors in this model and their interdependence varies between life, general, and health insurance. In this model the risk incurred by insurance firms is divided into several categories. In each category solvency capital is measured for its risk. The solvency capital of all the categories gives rise to the solvency capital on which overall risk is based and calculated, taking the correlations between the various risk factors into account.

The risk factors in life insurance are: asset risk, insurance risk, interest-rate risk, credit risk, health risk, and business risk.

The risk factors in general insurance are: investment risk, credit risk, reserves risk, premium risk, and risks associated with future growth (growth risk).

The risk factors in health insurance are: investment risk, insurance risk, credit risk, and business risk.

5. THE INSURANCE MARKET IN ISRAEL

Some 24 insurance firms are active in Israel (Commissioner of Capital Market, Insurance and Savings, 2006). The industry is characterized by a high degree of concentration, and in recent years there has been a clear tendency towards mergers and acquisitions. Concentration in the life insurance industry is greater than that in general insurance (74 percent of insurance commitments vis-à-vis 46 percent in the three largest firms).

The insurance industry has a high yield on capital, and in 2006 this was 23.8 percent. Some of the reasons for the large differences between the return on capital of insurance firms and banks are the low capital requirements imposed on insurance firms and the reduction of their solvency capital as a result of the purchase of reinsurance.

Table 2
Return on Capital in Banking and Insurance, 2003-2006 (percent)

	2003	2004	2005	2006
Leumi	8.6	14.3	15.1	23.0
Hapoalim	10.4	15.5	20.5	22.2
Discount	3.9	10.3	8.4	13.7
Mizrachi	9.7	10.7	12.3	13.9
First International	5.4	7.2	12.7	12.5
Total	8.4	13.2	15.4	19.5
Clal	29.9	25.6	26.8	20.4
Harel	66.9	46.9	51.5	34.0
Migdal	33.5	24.4	27.9	26.2
Phoenix[1]	25.3	15.8	24.8	29.7
Menorah	52.7	32.4	27.8	22.3

[1] Based on data from the Phoenix Insurance Company (formerly the Hadar Insurance Company) for 2006 and from the Phoenix Israel Insurance Company (currently Phoenix Holdings) for previous years.
SOURCE: Israel's Banking System, Annual Report 2005, Bank of Israel
Commissioner of Capital Market, Insurance and Savings, Annual Report 2005
Financial statements of the insurance firms.

Figure 1
Return on Equity in Banks and Insurance Firms, 2003-2006

SOURCE: Commissioner of Capital Market, Insurance and Savings, Annual Report 2005; Calculations based on financial statements of the Ministry of Finance's website; Israel's Banking System, Annual Report 2006, Bank of Israel.

Since the return on capital in insurance firms has risen significantly in the last few years, it might have been expected that the yield on these companies' shares would have been higher than that on bank shares. Contrary to expectations, however, the accumulated yield on the banking shares index between 2001 and 2006 is higher than that on the insurance companies' shares index in that period (138.6 percent in banks compared with 94.9 percent in insurance firms).

Figure 2
Annual Yields on Shares in Banking and Insurance, 2002-2006
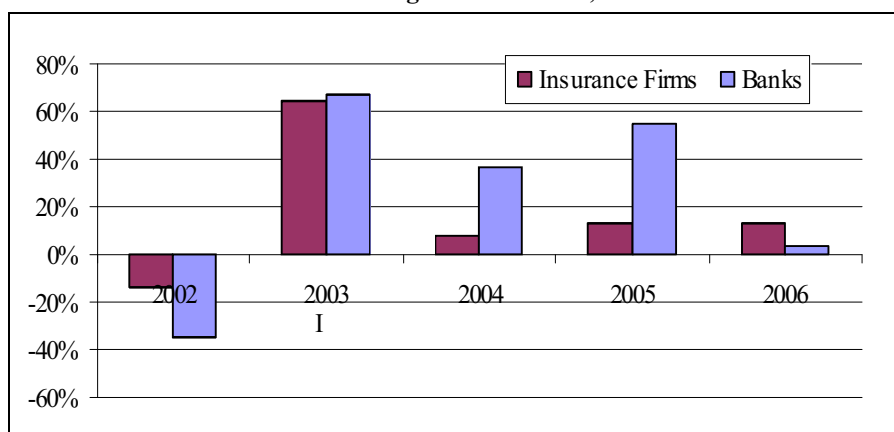
SOURCE: Insurance and banking shares indices, Tel Aviv Stock Exchange.

In the wake of the conclusions of the Bachar Committee, the insurance firms and other institutional entities increased their activities in the nonbanking savings and credit markets. The expansion of the activity of insurance firms in the financial markets was intended to increase competition, reduce the concentration of banking intermediation, and in the final event help make Israel's financial markets more efficient. However, this expansion exposes the financial system to risks as a result of the insurance companies' lack of experience in some of the new spheres of activity and under-regulation vis-à-vis the banking system (both in Israel and abroad).

In Israel there is an added risk due to the combination of activities undertaken by insurance firms. According to Nagar (2005) the collapse of a general insurance firm which has no ownership or business connection with banks does not jeopardize the stability of the financial system, whereas in life insurance the contagion effect exists. The combination of general insurance with life insurance in the same firm, as is the case in Israel, constitutes a risk to financial stability because the collapse of a general insurance firm could also affect life insurance and hence the financial system.

a. Capital requirements in Israel today

The capital requirements in Israel pertain primarily to insurance risk in general insurance and social welfare insurance. The minimal equity required of an insurer (in NIS) comes under the following five main headings:[5]

1. The highest of the following three:
    a. The core capital required of an insurer (depending on the business of the insurance firm)
    b. The sum of the following:
        -   10 percent of the insurance fee in general insurance registered in the insurer's books in the twelve months prior to the date of the report, up to a limit of NIS 55 million.
        -   5 percent of the insurance fee in general insurance registered in the insurer's books in the twelve months prior to the date of the report, above the stated limit.
        -   7.5 percent of the residual insurance fee in general insurance registered in the insurer's books in the twelve months prior to the date of the report.
    c. The sum of the following:
        -   20 percent of the balance of the residual outstanding claims in general insurance up to a limit of NIS 300 million.
        -   12 percent of the balance of the residual outstanding claims in general insurance up to the stated limit.

2. The sum of the deferred purchase expenses of life insurance policies and insurance policies regarding sickness and hospitalization.[6]

3. The sum of unrecognized liabilities (assets invested in contradiction of the investment regulations).

4. The sum required for yield-guaranteed insurance schemes. This amount should not be less than the following two:
    a. Two percent of the sum of liabilities against these schemes.
    b. The sum of the multiples of the investment against each asset at a rate determined in the table which appears in the regulations.

5. For social welfare insurance, the higher of the following two:
    a. The sum of the following three:
        -   10 percent of the insurance fee in social welfare insurance registered in the insurer's books in the twelve months prior to the reporting date above a limit of NIS 10 million.
        -   5 percent of the insurance fee in social welfare insurance registered in the insurer's books in the twelve months prior to the reporting date above the stated limit.
        -   7.5 percent of the residual insurance fee in social welfare insurance registered in the insurer's books in the twelve months prior to the reporting date.
    b. The sum of the following two:
        -   20 percent residual outstanding unsettled claims in social welfare insurance up to a limit of claims of NIS 50 million.

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[5] The precise requirements are specified in the Commissioner of Insurance's Regulations (Minimum Equity Required of an Insurer), 5748-1998.

[6] The precise details of this section are given in the regulations.

- 12 percent of outstanding unsettled claims in social welfare insurance up to the stated limit.

In addition, the insurance firms are required to hold additional capital amounting to 0.17 percent of the residual amount at risk in life insurance.

From the regulations it transpires that beyond the minimum capital required for insurance business, the main test for solvency capital is the extent of the general insurance business, from which equity in direct proportion to the extent of the insurance fees or unsettled claims is required. In firms which also engage in both life and general insurance the minimum capital required for life insurance is swamped by the requirements for general insurance activity. In addition, the existing capital requirements relate solely to insurance risks and do not take other risks to which the insurers are exposed into consideration.

In 2007 the Insurance Commissioner examined the effect of the implementation of the capital requirements under Solvency I, the English model, and the Australian model on the solvency capital requirements of Israeli insurance firms (examination of the implications of the implementation of the English and Australian models was undertaken solely for the business of general insurance). He found that the implementation of the capital requirements under Solvency I would in most cases lead to an increase (of up to 30 percent) in solvency capital. The implementation of the Australian and English models generally led to an increase of between 50 and 150 percent in the current capital requirement.

b. Changes in the capital requirements in Israel

The Capital Market and Insurance Department is expected to adopt the principles of Solvency II in 2012, when these go into effect in the European Union. There will apparently be considerable differences between the current capital requirement in Israel and those of Solvency II. In 2007, in order to reduce the expected gaps, the Insurance Commissioner proposed an intermediate stage between the capital requirements existing today and the full implementation of Solvency II. The target the Ministry has set itself is to inaugurate capital requirements that are 30 percent above those accepted under Solvency I. In order to achieve that target, the Insurance Commissioner has proposed adding the following capital requirements to those currently in existence:

- Capital requirements for investment assets held against liabilities which are not contingent on yield as well as for exposure to the financial soundness of reinsurers.
- Capital requirements for exposure to loss as a result of an isolated catastrophe in the general insurance business.
- Capital requirements for the share of reinsurers in the amount exposed to a natural disaster.
- Capital requirements for operating risks.

The Insurance Commissioner calculated the solvency capital required according to the new model proposed, comparing it with the capital requirements existing today and the capital target that has been set. The comparison shows that the solvency capital of the major insurance firms is slightly lower than that of the target capital. The capital requirement in the small and medium-sized insurance firms is higher than that of the target capital.

Table 3
Existing Equity vis-à-vis Minimum Equity Required of Insurance Firms in 2003-2006 (NIS million) [1]

	2003			2004			2005			2006		
	Residue	Existing equity	Required minimum equity	Residue	Existing equity	Required minimum equity	Residue	Existing equity	Required minimum equity	Residue	Existing equity	Required minimum equity
Migdal group	33%	1819	1366	23%	1916	1563	23%	2185	1779	28%	2510	1954
Clal group	27%	1926	1520	48%	2697	1825	38%	2895	2093	51%	3279	2172
Phoenix group	28%	1680	1311	26%	1867	1485	35%	2284	1695	38%	1580	1144
Harel group	10%	912	828	12%	1031	924	4%	1188	1143	11%	2013	1810
Menorah	19%	652	547	4%	1283	1240	10%	1482	1348	6%	1575	1488
Ayalon	18%	241	204	15%	285	247	7%	313	293	8%	396	368
Eliyahu	49%	314	211	96%	436	222	0%	666	663	20%	822	688
Hachsharat Hayishuv	-7%	204	221	6%	261	247	-10%	251	278	0%	280	279
Direct Insurance	14%	172	151	19%	185	155	61%	307	191	91%	326	171
AIG	61%	124	77	56%	143	92	57%	160	102	75%	191	109
Agricultural Insurance	47%	107	73	55%	118	76	51%	131	87	5%	142	135
Ezer	19%	65	55	4%	84	80	-11%	91	101	8%	132	122
Sharvit	29%	63	49	43%	77	54	22%	93	76	25%	113	91
New B.S.M.H.	10%	48	44	29%	57	44	28%	58	46	50%	68	45
Inbal	11%	53	48	14%	55	49	12%	56	50	26%	63	50
Shomerah	15%	56	48	9%	53	49	9%	55	50	7%	60	56
Ashrah	25%	15	12	24%	15	12	21%	15	12	21%	15	12
Natural Disasters Fund	14%	7	6	11%	7	6	4%	6	6	11%	7	6

SOURCE: Annual Report of the insurance firms and calculations of the Capital Market, Insurance, and Savings Department.

6. CAPITAL REQUIREMENTS IN ISRAEL AND SOLVENCY II

It is not yet possible to estimate the changes that will occur in the capital requirements once Solvency II goes into effect, as the final formula has not yet been determined. It is possible to calculate an approximation of these capital requirements from the methods outlined in QIS2 (CEIOPS, 2006). In order to see what would have happened to the solvency capital of the insurance firms if the capital requirement was calculated on the basis of the methods appearing in QIS2, an examination of the solvency capital calculation was undertaken on the basis of data from the financial statements of several insurance firms and general assumptions about the missing data needed for the calculation. In addition, some of the modules were not included in the calculation of solvency capital.[7] The solvency capital required was calculated in two different situations: where there is no correlation between the various risks, and where there is full correlation between the various risks. [8]

a. Principal stages in calculating solvency capital under QIS2

According to QIS2 (CEIOPS, 2006), the principal and secondary risk categories for which solvency capital has to be calculated are depicted in the following way:

Figure 3
Calculation of Solvency Capital
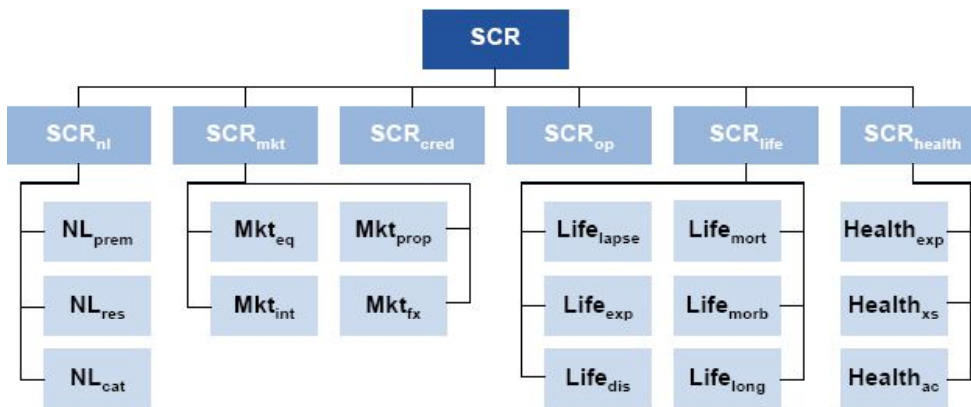
Where:
SCR_{mkt} = market risk, comprising four sub-categories: shares risk, interest-rate risk, exchange-rate risk, and real-estate risk
SCR_{life} = insurance risk for life insurance, comprising six sub-categories: mortality risk, morbidity risk, longevity risk, expenditure risk, disability risk, expiration risk, and lapse risk.

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[7] Catastrophe risk in general insurance and excess expenses risk in health insurance.

[8] The reference here is to the correlations between the principal risk categories: market, credit, life insurance, health insurance, general and operational insurance. The correlations for the sub-categories are given.

SCR_{health} = insurance risk for health insurance, comprising three sub-categories: expenditure risk, excessive expenses risk, and epidemic risk.

SCR_{nl} = insurance risk for general insurance, comprising three sub-categories: premium risk, reserves risk, and catastrophe risk.

SCR_{cred} = credit risk.

SCR_{op} = operating risk.

The solvency capital for each insurance firm is calculated by computing the basic capital required *plus/minus* profits and losses expected in the coming year in general insurance. The basic capital requirement is calculated while taking the correlations between the various risks into account. These correlations are computed by the insurance firms on the basis of assumptions and analyses of past data. In this study the basic capital required for each firm is calculated in two ways:

1. When there are no correlations between the principal risk categories, the formula for calculating solvency capital is:

$$\sqrt{SCR_{Mkt}^2 + SCR_{cred}^2 + SCR_{life}^2 + SCR_{health}^2 + SCR_{nl}^2 + SCR_{op}^2}$$

2. When there are full correlations between the principal risk categories, the formula for calculating solvency capital is:

$$SCR_{Mkt} + SCR_{cred} + SCR_{life} + SCR_{health} + SCR_{nl} + SCR_{op}$$

In order to calculate solvency capital an Excel file is created based on QSI2. In this file solvency capital is computed for each sub-category, main category, and the total. The sample spreadsheet from the file given below computes the basic capital of total solvency capital required in the various categories (Table 4). The solvency capital for each type of risk is calculated in other spreadsheets and linked to this one. In row 4 we can see the basic capital requirement which takes the correlations between the kinds of risks into account (the

Table 4
Basic Solvency Capital Requirement

BSCR	1354.53						
SCR_1	1354.53	SCR calculation for actual correlations (from the table below)					
SCR_2	1354.53	SCR calculation assuming the correlations between risks are zeros					
SCR_3	2564.75	SCR calculation assuming the correlations between risks are ones					
		The Insurer correlations estimations					
		660.2	160.5	244.4	69.8	1093.3	336.7
		SCRmkt	SCRcred	SCRlite	SCR_{health}	SCR_{nl}	SCR_{op}
660.2	SCR_{mkt}	1	0	0	0	0	0
160.5	SCR_{cred}		1	0	0	0	0
244.4	SCR_{lite}			1	0	0	0
69.8	SCR_{health}				1	0	0
1093.3	SCR_{nl}					1	0
336.7	SCR_{op}						1

green cells, which in this case are all zero). In row 5 we can see the basic capital requirement when the correlations between the various risks are zero. In row 6 we can see the basic capital requirement when there is full correlation between all the types of risk.

For each firm the data are taken from the annual reports for 2004-2006.[9] Calculations were made as regards the data required which did not appear in the reports and could be computed. General assumptions were made with regard to the data required which did not appear in the reports and could not be computed. The calculation of solvency capital given here is based on public information provided by the insurance firms as well as on several general assumptions. In the internal application, firms are supposed to use genuine data. Consequently, it is to be expected that the results of the calculation of solvency capital obtained by each firm will differ from ours.

b. Results

The results of the calculation of all the examinations are given in the following table:

Table 5
Capital Requirements for 2006 (NIS million)

	Equity required under the regulations	Existing equity	Capital requirements[1] under Solvency II (QIS2)		Percentage change in solvency capital	
			Assuming full correlation between risks	Assuming no correlation between risks	Assuming full correlation between risks	Assuming no correlation between risks
					(percent)	
Clal Insurance	1,957	2,927	3,849	2,352	97	20
Migdal	1,717	2,270	2,241	1,031	31	-40
Phoenix[2]	1,144	1,580	2,733	1,508	139	32
Hachsharat Hayishuv	279	280	727	577	160	107
Magen	237	240	422	254	78	7
AIG	109	191	287	232	164	113

[1] The capital requirements under QIS2 in these calculations did not take deferred purchase expenses and other unrecognized assets invested contrary to regulations into account. Note that at present the Ministry of Finance demands the solvency capital requirement for these items. Taking these factors into consideration would have considerably altered the solvency capital calculated here.
[2] Based on data from the Phoenix insurance company (formerly the Hadar insurance company) for 2006 and on data from the Phoenix Israel insurance company (currently Phoenix Holdings) for previous years.
SOURCE: Based on data from the annual reports of the insurance firms.

[9] The reports are published on the Ministry of Finance website under the link:
http://www.mof.gov.il/hon/2001/insurance/mewComp.asp

The right-most column in the table gives the solvency capital requirement for 2006 of several insurance firms. This capital is the minimal amount required from the firms by the Ministry of Finance and is calculated in accordance with the regulations. The second column on the right gives the existing equity in each company on the balance-sheet day. The third column shows the capital that would be required if these requirements were based on QIS2 and the insurance firms were to determine that there is no correlation between the various risks. The fourth column gives the capital that would be required if these requirements were based on QIS2 and the insurance firms were to determine that there is full correlation between the various risks. The left-most columns show the difference in solvency capital between the existing requirement and what the requirements would be under QIS2.

The table shows that the insurance firm which would be required to add the least capital (as a percentage) is the large Migdal company, and the two firms which would be required to add the most capital (as a percentage) are the two small companies, Hachsharat Hayishuv and AIG. The range of change in the solvency capital requirement between the two situations we examined is wide, but it can be seen that in general the difference (as a percentage) between the capital required in a situation where there is full correlation between risks and one in which there is no such correlation is greater in the large firms. This result stems from the larger reduction in solvency capital due to the wider dispersal of risks. However, it is almost certain that there is positive interdependency between most risks, and therefore the reduction due to risk dispersal will apparently be smaller than the differential obtained in the present examination.

Note that many insurance firms in Israel deal with both general and life insurance. The application of a standard formula for calculating solvency capital in firms which engage in both these spheres leads to a lower capital requirement than would be the case if two separate insurance firms were involved. CEIOPS is aware of this problem and notes that at present the standard formula will serve for these firms too. It stresses, however, that the treatment of insurance firms handling both general and life insurance requires additional analysis and examination (CEIOPS, 2007b, p.23).

When these results and those of the examinations undertaken by the Insurance Commissioner (2007) are examined we find that the solvency capital currently required in Israel is lower than would be the case if other models were used. In other words, in the present situation the low level of capital required of insurance firms exposes the Israeli economy to greater risk of insolvency of insurance firms than would be the case under Solvency II or the English or Australian models.

Note when examining the results that it is reasonable to assume that if the requirements were in effect the insurance firms would take the possible influence of the capital requirements into account and would disperse risks more efficiently, thereby also reducing the capital requirements. It should also be borne in mind that the formulae for calculating the solvency capital required have not yet been finalized and may in fact differ substantially from those delineated in QIS2 and QIS3.

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