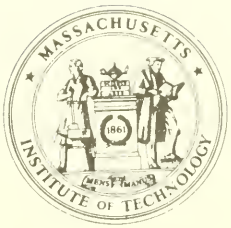

THE IMPACT OF INTERNATIONAL DIVERSIFICATION: A STUDY OF THE FRENCH MUTUAL FUND INDUSTRY

by

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June 1973

Not for Quotation
Comments Invited

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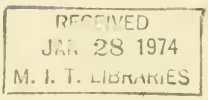

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ABSTRACT

The first French open-end mutual funds (called SICAV's) were founded in 1964. By the end of 1972 their number had grown to 70 with combined assets of 21.8 billion francs, which amounted to 6.8 percent of the market value of all listed French bonds and stocks. The purpose of this study is to present a comprehensive analysis of this industry, with particular emphasis on the investment performance achieved.

The investment performance of United States mutual funds has been analyzed by several authors (notably Sharpe [23], Jensen [13] and Pogue [22]). The analysis is simplified for the U.S. market by the fact that virtually all of the fund assets are invested in U.S. stocks and bonds. Thus, single market models, such as the Sharpe [24]-Lintner [16] Capital Asset Pricing Model can be used to evaluate fund performance. For the French funds, however, the situation is more complicated. French mutual funds typically offer the investor an internationally diversified portfolio. In fact, at the end of 1972, the proportion of fund assets invested in foreign common stocks exceeded that invested in French stocks. In this study we will examine the performance of the French funds using a series of French national and international security pricing models.

The study is organized as follows: Chapter II describes the operations, growth and regulation of the Industry. Previous studies are summarized and reviewed in Chapter III. Chapter IV presents both time series and cross-sectional results for two single-index models -- a French index model and a world single index model. Two multi-national index models are described and applied in Chapter V. Finally, Chapter VI presents a summary of the results and their implications for explaining investment performance.

Of the three main model types used in this study, the multinational index models have, by far, the largest explanatory power: 81 percent of the variance of the SICAV returns is explained, on average, compared to 68 percent and 46 percent for the French and world models respectively. The cross-sectional regression for the SICAV's point towards an international pricing of risk, but with a dependence

on national factors also, as claimed by the multi-national index model. The benefit that investors can derive from international diversification is clearly illustrated. The aggregate performance measure of the SICAV (measured on the French stock market) was found to be significantly positive, whereas the performance measures derived from the multinational index model were in general negative. This can be interpreted as evidence of the advantage to the investor of international diversification.

ACKNOWLEDGEMENTS

We gratefully acknowledge the help of the Société de Documentation et d'Analyse Financière (DAFSA) and the Association des Sociétés et Fonds Francais d'Investissement, both of Paris. Their publications furnished most of the data used in this study and greatly simplified our data collection problems.

The Commission des Opérations de Bourse should also be thanked for making available information on the operation and regulation of French mutual funds.

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CHAPTER I

INTRODUCTION

The first French open-end mutual funds were founded in 1964. By the end of 1972, 70 of these institutions had been created, and the combined assets of the French mutual funds industry had grown to 21.8 billion francs, which amounted to 6.8% of the market value of all French securities. This study studies this industry, and will concentrate on the analysis of its investment performance.

To measure the investment performance of a mutual fund, i.e., to compare its return to the return of an unmanaged portfolio of similar risk, a measure of risk obviously has to be defined and validated. In the case of the U.S. mutual funds, which invest most of their assets in U.S. stocks, the Capital Assets Pricing Model, developed by Markowitz, Sharpe and Lintner, gives a reasonable answer to this problem. Based on this model, several studies of the investment performance of the American mutual funds have been made, for instance by Sharpe ([23]) and Jensen ([13]).

However, the French open-end mutual funds have the interesting following characteristic: They usually offer to the investor a diversified portfolio containing not only French stocks, but also French bonds[1] and foreign stocks. In

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1. If only, because of legal requirements

fact, at the end of 1972, their combined assets invested in foreign stocks slightly exceeded those invested in French stocks.

Therefore, one cannot assume that the uni-dimensional measure of risk which has been developed and tested for portfolios invested mainly in a single market, will be applicable in this case. Measures of risk for such portfolios have to be derived from an International Asset Pricing Model, and they need to be validated before any conclusion can be drawn.

Background information on the French mutual funds will be given in Chapter II. Two previous studies on the same topic will be analyzed in Chapter III.

The rest of the study will use and test a sequence of models which will be progressively better adapted to our topic.

Chapter IV will present results derived from the application of several single index models: A purely French and a purely international specification will be tested for the stock funds, and a purely French model will also be used for the bond funds.

A multinational index model, developed by Solnik in [27] will be used and tested in Chapter V. Two slightly different specifications will be considered.

Finally, Chapter VI will give a summary of the results presented in the previous chapters, and attempt to identify

the main implications, as well as areas for further research.

Appendix A will present the data base which was used in the work reported here, and Appendix B will do the same thing for the various market indices.

CHAPTER II

BACKGROUND ON THE FRENCH MUTUAL FUNDS

A. A short history of their development

Although closed-end investment companies were allowed in France by an ordinance on November 2, 1945, the first steps towards the institution of open-end mutual funds were not taken until 1957, with the law of June 26, 1957 and a decree issued on December 28, 1957. Even then, the necessary application decrees were not issued before 1963, due to the reticences of the Finance minister and of the brokers association.[1] In summary, the Finance minister feared that the institution of mutual funds might divert the investors from the state bonds--as had been the case in Switzerland--and the brokers association was afraid of the destabilizing influence these funds might have on the stock market.

However, Mr. Valery Giscard d'Estaing--nominated Finance minister at the beginning of 1962--appointed in June, 1962 a committee (the Lorain committee, by the name of its president) which at the end of May, 1963 unanimously recommended the institution of mutual funds. This recommendation is probably one of the main reasons why the application decrees were

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1. Called "Chambre syndicale des Agents de change"

finally issued (on September 20, 1963 and October 14, 1963). The first "Sociétés d'Investissement à Capital Variable" (SICAV) started selling shares to the public in March, 1964, and a total of eight had been created by the end of 1964.

These initial SICAV had many common characteristics. They were usually founded by a large deposit bank, in association or not with an investment bank: SLIVAM was created by the Crédit Lyonnais, SOGEVAR by the Société Générale and the "Banque de Paris et des Pays-Bas", SOGINTER by the Société Générale and the "Banque de Neuflize", Epargne Valeur by the CNEP, UNIVAL by the BNCI,[2] Epargne Mobilière by the CIC and the "Compagnie financière de Suez". This type of association had the major advantages of providing to the SICAV a network of offices and an experience in portfolio management. It is probably why it has become quite common.

These SICAV also had in common to offer internationally diversified portfolios: At the end of 1964, SOGINTER had 52.7% of its assets in foreign assets, France Placement 31.24%, Epargne Valeur 29.54%, Optima 27.4%, Epargne Mobilière 24.04%, UNIVAL 23.4%, SLIVAM 17.45% and SOGEVAR 16.74%. They also had mainly stocks in their portfolios, except for

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2. Epargne Valeur and UNIVAL were to merge--keeping the former's name when the CNEP and the BNCI merged in 1967 to create the "Banque Nationale de Paris"(BNP).

the minimum legal requirement of 30% in cash or French bonds. This is why they have later come to be called stock SICAV ("SICAV Actions").

SLIVAM and France Placement, two of the initial SICAV were the first of many SICAV which were created by the transformation of a closed-end investment company into a mutual fund: France Investissement followed in 1966, Elysées Valeurs and SI EST in 1967, America Valor and Epargne Revenu in 1968, Euro-croissance, France Garantie and Société Nouvelle France-Obligations in 1969, Gestion Mobilière, Soleil Investissement, UAP Investissement and Worms Investissement in 1970 and SMI in 1971. In fact, these transformations accounted for most of the stock SICAV created between 1965 and 1968. Some closed-end investment companies were also absorbed by SICAV, e.g., Espagne Investissement by SOGEVAR in 1965, and France valor by Epargne Valeur in 1966. The obvious advantage of such transformations lies with the discount at which the closed end investment companies shares are usually sold. For instance, these discounts varied between 8 and 39.7% at the end of June, 1967, with one investment company selling at a 4.3% premium.[3]

In 1967, the largest three deposit banks (BNP, Crédit

3. DEGAND [5], pp. 32-33

Lyonnais and Société Générale) created the first three bond SICAV[4] (respectively Epargne Obligations, Slivarente and Sogepargne) which, as their name suggests, offer portfolios of bonds to the investor: At the end of 1967, these SICAV had respectively 0.78%, 19.29% and 1.10% of their assets in stocks. It is also interesting to note that these SICAV had a significant share of their assets in foreign bonds, at the same date, respectively 13.72%, 14.60% and 14.18%.

The assets managed by the SICAV increased rapidly in 1968, 1969 and 1970 due to many factors: The earlier stock SICAV enjoyed a fast growth, especially in 1969. More bond SICAV were created, including SICAV specializing in bonds guaranteed by the government ("obligations de première catégorie") which were therefore called "SICAV de première catégorie": In particular, the "Caisse des Dépôts et Consignations" created in 1969 France Garantie (specialized in government guaranteed bonds) and France Obligations, and had already, in 1968, taken part with an insurance company (UAP) and a bank (Banque Dreyfus) in the creation of another bond SICAV: "Première Catégorie".

An insurance company, "La Paix" had already been a founder of France Placement in 1964 and another ("Assurances

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4. "SICAV Obligations"

du Groupe de Paris") had created SI EST in 1967. However, it is only in 1968 that the insurance companies started to get heavily involved in the creation of SICAV: UAP created with "Société Séquanaise de banque": Actions Selectionnées (1968), Actanea and Aedificandi (1970). It also founded with Société Générale and Wellington Management a mutual fund management and distribution firm located in Luxemburg (Inter Europe Management) which created Intercroissance and Interselection in 1970. "Assurances Générales de France" founded CIP (1970) and AGFIMO (1971), "La Paternelle" (with CIC) founded Oblisem (1968), the "Groupe des Assurances Nationales" founded "Soleil Investissement (1970) ... Apart from the fact that insurance companies have networks of offices and salesmen which can be used to sell SICAV shares, the main reason for their involvement in the creation of SICAV is their decision to offer to their customers life-insurance contracts indexed on the price of a mutual fund's share.

Another reason for the growth of the SICAV is that some funds, which did not dispose of a large network of offices, started selling their shares through salesmen. The earliest examples are France Investissement, France Placement, Rothschild Expansion and Euro-croissance. It was estimated, at the end of 1970, that there were 12 organizations selling shares of mutual funds, which altogether employed 1,800 salesmen. The sales charge, in the case of accumulation

plans,varied between 5 and 13%.[5]

The growth of the SICAV in 1971 and 1972 was relatively smaller, but still quite rapid, especially in 1972 when the French stock market was up. The development of three kinds of more specialized SICAV continued:

SICAV specialized in stocks of building societies[6], the first of which--Pierre investissement--had been created in June 1970.

SICAV aimed at the small institutional investors[7], selling at a high share price and with a low sales charge, the first example of which had been "Première Catégorie" founded in August, 1968.

SICAV investing primarily in foreign securities.

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5. COB [4] pp. 154-158

6. "SICAV immobilières"

7. "SICAV institutionnelles"

TABLE II 1

THE GROWTH OF THE FRENCH
MUTUAL FUNDS INDUSTRY SINCE 1964

As of	Number of Stock SICAV	Number of Bond SICAV	Total Net Assets (in million Francs)
December 31 1964	8	--	696
December 31 1965	9	--	1,131
December 31 1966	10	--	1,381
December 31 1967	12	3	2,170
December 31 1968	15	7	4,721
December 31 1969	19	11	9,650
December 31 1970	40	13	13,090
December 31 1971	49	14	16,435
December 31 1972	54	16	21,802

B. Current regulation of the SICAV

We now present the main rules governing the French mutual funds, excepting the most technical which deal mainly with accounting and ensure that SICAV are genuinely "open-end mutual funds".

The institution of a new SICAV and the transformation of a closed-end investment company into a SICAV, are subject to the authorization of the Finance minister, which receives advice about this decision from the "Commission des Opérations de Bourse".[8] The initial assets of the SICAV cannot be less than 20 million francs (about 4.4 million dollars). Each SICAV is authorized to issue shares up to a given maximum amount, which can be raised only with the authorization of the Finance minister.

The SICAV have to publish daily the purchase and selling price of their shares. The sales charge is limited to a maximum of 4.75%.

The investments of the SICAV are subject to several restrictions: First, the SICAV must constantly hold at least 90% of their assets in securities which have been publicly offered or are listed in a stock exchange, in ordinary bills, in Treasury bills or in cash. Second, they must hold

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8. The "Commission des Operations de Bourse" (COB) somewhat resembles the S.E.C. of the U.S.

at least 30% of their assets in government securities, bonds denominated in francs which have been publicly offered or are listed in a stock exchange, Treasury bills and cash. Third, they cannot hold more than 10% of the shares issued by a company, nor have more than 10% of the voting rights in a shareholders' assembly. Fourth, they cannot invest in securities of any issuer more than 10% of their assets, an exception being made for the French government securities and for the securities guaranteed by the government. Also, the SICAV cannot sell short.

Although it is not binding, there are several incentives for a SICAV to have more than 50% of their assets in French securities: The first is that their shares can be included by insurance companies and the "Caisses de Mutualité Agricole" in their technical reserves. The second is that their shares can be used as an investment of the reserves constituted by firms in accordance with the present profit sharing laws.[9]

Apart from the daily publication of their offering and redemption prices, the SICAV have to publish at the end of each quarter a complete listing of their portfolios. The COB is in charge of controlling the quality of the information given by the SICAV in their quarterly prospectus.

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9. Under the present profit sharing laws, private enterprises generating a "sufficient profit" have to constitute a "participation reserve" which has to be invested during five years before it can be distributed to the employees of the firm.

The SICAV have to transmit to their shareholders all the dividends and interest payments they receive, otherwise they become subject to the regular taxes on their profits. SICAV may distribute capital gains to investors provided that retained earnings equal to one half the funds initial capital have been accumulated, and also that the reserve for capital losses is larger than 10% of the net assets value.

Finally, the management fees are limited to 1% of net assets per year.

C. The SICAV at the end of 1972

At the end of 1972, there were 70 SICAV in existence: 54 were "stock SICAV" and 16 "bond SICAV", the distinction between these two categories being the relative weights given in the portfolios to bonds and stocks. Table II2 shows the aggregate distribution of assets for the stock SICAV, the bond SICAV and all SICAV. It shows that as a whole the stock SICAV have only 34.81% of their assets in cash, French bonds and French convertible bonds, compared to a minimum of 30% required by the law. On the other hand, the holdings of the bond SICAV in stocks are very small, and a few of them have none. Only two of the bond SICAV have more than 20% of their assets in stocks (France Epargne and Laffitte Rendement). In fact, the portfolio of France Epargne at the end of 1972 does not look like the portfolio of a bond SICAV, but at the

end of 1971, the percentage of bonds in the portfolio of France Epargne was 84.56%.

Table II3 compares the aggregate distribution of assets for the U.S. and French open-end mutual funds. It shows two significant differences: The first is that the French mutual funds as a whole hold a much larger percentage of bonds than their U.S. counterparts. The reason lies primarily with the law for the stock SICAV, but the existence and size of the bond SICAV can probably be traced back to the preferences of the French investor, who seems to be more attracted by bonds than the U.S. investor. The comparison of the relative market values of the domestic shares and bonds in the U.S. and in France is, in part[10], another result of the differing preference patterns.

A second difference is that the French mutual funds have a significant percentage of their assets in foreign securities, whereas the U.S. mutual funds do not hold foreign securities. For the U.S. the tax structure is the main reason. On the contrary, international diversification seems to have been an important objective for many of the French mutual funds. We have already noted that the first mutual funds created invested in foreign securities. Another related

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10. Among other factors are taxes and the presence in France of a large public sector which is financed nearly exclusively through bonds (two exceptions are Codetel and Finextel).

reason for the international orientation of the SICAV is that the French stock market has been down in many of the years since 1962, and that a mutual fund offering a portfolio comprised only of French securities is probably less attractive to many potential investors than a more international fund. The comparison of the development of Slivam and Slivafrance is interesting in that respect: They have been founded in 1964 and 1965 respectively, are both distributed by the Crédit Lyonnais and have the same management. Slivam is internationally-oriented, whereas Slivafrance is the only stock SICAV which restricts its investments to French securities. At the end of 1972, the assets of the former were 1,120.97 million francs, compared to 207.72 for the latter.

Table II3 also indicates the shares of the market values of stocks and bonds that the U.S. and French mutual funds hold. It shows in particular that the weight of the SICAV on the French stock market is still relatively low, at least compared with the U.S.

Table II4 is an attempt to provide the names of the founders, and the investment objectives of a certain number of SICAV. Table II5 gives the size and distribution of assets for all stock SICAV, at the end of 1972, and Table II6 summarizes these informations. Table II7 gives the same data for the bond SICAV and Table II8 describes the geographical distribution of shares for the stock SICAV.

It is clear from Tables II4,II5 and II7 that the largest SICAV are currently those which have been founded by the institutions having the largest number of offices: For both the stock and the bond SICAV, the main founders of the largest four are the largest three (nationalized) deposit banks (BNP, Crédit Lyonnais and Société Générale) and the "Caisse des Dépôts et Consignations".[11] The largest deposit bank, BNP, has more than 2,300 offices and founded Epargne Valeur, Epargne Croissance, Epargne Inter and Epargne Obligations, the assets of which totalled 4,550.15 million francs at the end of 1972. The second largest deposit bank, the Crédit Lyonnais, has more than 2,100 offices and founded Slivam, Slivafrance, Slivinter and Slivarente, the assets of which amounted to 3,856.50 million francs. The third largest deposit bank, the Société Générale, has more than 2,000 offices and founded Sogevar, Soginco, Soginter, and Sogepargne, which managed 3,385.86 million francs at the end of 1972. Société Générale also participated, through Inter Europe Management, to the creation of Interselection and Intercroissance. Finally, the "Caisse des Dépôts et Consignations" founded Livret Portefeuille, France Obligations, France Garantie and Première Catégorie. The combined assets

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11. The "Caisse des Dépôts et Consignations" is a state financial institution, which, among other duties manages about 5,000 savings banks ("Caisses d'Epargne").

of the first three were 3,577.85 million francs at the end of 1972, while the assets of "Première Catégorie"were not known at that date.

Therefore, the SICAV founded by these four financial institutions managedassets slightly larger than 15,370 million francs, out of a total of 21,802 for all SICAV at the end of 1972, that is 70.5%. This position can be attributed to the prominent role of these four institutions in the French banking community, to their large network of offices and also to their early interest in the SICAV, especially for the three deposit banks.

Table II4 tries to identify the main investment objective for most[12] of the SICAV. Five main categories have been identified: three for the stock SICAV and two for the bond SICAV.

The first comprises the stock SICAV which state that growth and income are their objectives, or do not state any precise objective. The second comprises the stock SICAV which listed growth as their primary objective, and five out of eight emphasize this by using the word growth ("croissance" in French) in their name. The third category includes the funds for which investment in foreign assets is an essential

12. The SICAV not mentioned there are those which have been founded by smaller institutions and are usually of smaller size. This includes many SICAV founded by insurance companies.

characteristic (and the names of many stress their orientation). This does not mean that the other stock SICAV are not also internationally diversified, but only that either they have a smaller percentage of their assets in foreign securities, or that they do not indicate international diversification as their main objective. In the later case, a current emphasis on foreign securities might be shifted if the prospects changed. Anyhow, there were a few doubtful cases, and this table cannot be more precise and reliable than the statements by the SICAV on which it is based. A fourth, more specialized category, not mentioned in the table, is the one of SICAV specializing in building societies, and which are: Aedificandi, AGFIMO, Foncier Investissement, IMSI, Pierre Investissement and Sicavimmo.

For the bond SICAV, the classification is easier: The first group comprises the SICAV which invest mainly in bonds, and the second is made of the funds which are specialized in government guaranteed bonds.

Table II8 shows the geographical distribution of the shares in the portfolios of the stock SICAV at the end of 1972. It shows better than anything else that most stock SICAV are very internationally oriented: Apart from France, the U.S. is the country which receives the largest share of the assets of the SICAV. 13 funds even had larger assets on the North American Stock markets than on the French Stock

markets, excluding bonds. The rest of the portfolios is invested in Europe (mainly U.K., Germany, the Netherlands, Switzerland and Belgium), Japan, South Africa and Australia. Only two SICAV restrict their investments in stock to one or two markets, Slivafrance (France) and America-Valor (the U.S. and Canada).

The sales charge for the SICAV is usually 4.75%, i.e., the maximum allowed. However, a few funds charge less, e.g., those which are directed at the institutional investors, and have a high share price (more than $2,000). Some SICAV have quantity discounts (France Obligations, Selection Rendement, ElyséEs Valeurs, France Placement, ...) and many SICAV now allow their shareholders to reinvest their dividends free of charge, provided that they do so within a certain period of time (usually three months). The other usually have a reduced charge.

Although we have seen that there are several fund groups offering SICAV with different investment objectives, there do not exist any conversion privilege similar to those offered by many U.S. mutual funds.

Many SICAV offer to the investors accumulation plans of various kinds.

Data on portfolio turnover are not easily available: It is not required by law that the SICAV publish them. However some funds give this information in their annual report, and

it has been obtained from there for eight SICAV. It is difficult to derive any conclusion from such a small sample. However, the data do not seem to contradict the hypothesis that large funds have less flexibility in the management of their portfolios.

Table II10 shows the sales and redemptions for the Stock and Bond SICAV over the last four semesters. The net sales for the stock SICAV appear to be diminishing over this two year period, the main factor being the increase in redemptions. On the contrary, the net sales of bond SICAV appear to increase over this period, the redemptions remaining a roughly constant percentage of sales. The result of this two movements is that net sales of bond SICAV, which were nearly equal to those of stock SICAV in 1971, were about twice those of stock SICAV in 1972.

If one now looks at the change, in 1972, of the number of shares outstanding for the stock SICAV, one finds that the largest stock SICAV did not grow very rapidly in most cases: Except for Epargne Valeur (the largest stock SICAV at the end of 1972) for which the growth was 14%, the increase was quite small for the next largest stock SICAV: Slivam (-1%), Soginter (6%), Livret Portefeuille (4%), Sogevar (5%) and Rothschild Expansion (1%).

The stock SICAV which grew fastest are Intercroissance (87%) and Interselection (76%) which are the two Inter Europe

Management SICAV. The next highest growth rates are for IMSI (60%) a SICAV specialized in building societies and founded by the "Banque de Suez", Epargne Unie (57%) a growth-income stock SICAV founded and distributed by the "Credit Agricole"[13] and Selection Mondiale (49%) an "international" SICAV founded by the CCF.

Redemptions exceeded sales for a few SICAV: The number of shares outstanding diminished by 13% for Optima, by 5% for Elysées Valeurs, by 0.8% for Slivam and 0.7% for Gestion Mobiliere.

For bond SICAV, the growth was more evenly distributed, and the largest funds did not appear to have slower growth rates. France Epargne was the only fund for which redemptions were in excess of sales, by 2% over the year. Laffitte Rendement more than doubled the number of its shares, but this was the first year this SICAV was in existence.

Two SICAV only met the two requirements which would have allowed them to distribute their capital gains: Gestion Mobilière and U.A.P. Investissement. However, none has made use of this possibility.

For the stock SICAV, the management fees averaged 0.4% of net assets in 1971. The largest SICAV had typically smaller

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13. An institution which extends credit to local and regional agricultural societies, and has a large network of offices.

management fees: For the six largest SICAV, the management fees were 0.2% for Epargne Valeur, 0.2% for Slivam, 0.3% for Sogevar, 0.3 for Soginter, 0.3% for Livret Portefeuille and 0.7% for Rothschild Expansion. On the other hand, SICAV with assets less than 50 million francs usually had management fees above average, and for many of these, the management fee was close or equal to the maximum allowed (1% of net assets).

TABLE II 2

AGGREGATE SIZE AND DISTRIBUTION OF
ASSETS FOR THE SICAV, AT THE END OF 1972

	BOND SICAV		STOCK SICAV		ALL SICAV	
		%		%		%
Liquid and short-term assets	574.62	5.89	783.80	6.51	1,358.42	6.23
French stocks	495.99	5.08	3,680.68	30.57	4,176.67	19.15
French bonds	7,825.70	80.16	2,985.51	24.80	10,811.21	49.59
French convertible bonds	349.90	3.58	421.47	3.50	771.37	3.54
Foreign stocks	275.08	2.82	4,034.62	33.51	4,309.70	19.77
Foreign bonds	241.40	2.47	132.91	1.11	374.39	1.72
TOTAL	9,762.69	100.00	12,039.07	100.00	21,801.76	100.00

NOTE: The figures are expressed in million francs.

TABLE II 3

COMPARISON OF THE U.S. AND FRENCH
OPEN END MUTUAL FUNDS PORTFOLIOS

	U.S.	FRANCE
Cash and short-term securities	3,039	271.68
(1) Domestic Shares	47,097	835.33
(2) Domestic Bonds	4,910	2,316.52
Foreign Shares	--	816.94
Foreign Bonds	--	74.88
(3) Total Net Assets	55,045	4,360.35
(4) Market Value of all domestic shares	1,030,422	31,958
(5) Market Value of all domestic bonds	593,981	31,937
(6) : (4)+(5)	1,624,403	63,895
(1)/(4)	4.57%	2.61%
(2)/(5)	0.82%	7.25%
(3)/(6)	3.38%	6.82%

NOTES: 1. The figures are as of the end of 1971 for the U.S. and as of the end of 1972 for France.

2. The Figures are in million of dollars for both the U.S. and France. The conversion was done on the basis of five francs/dollar.

Source for the U.S. mutual funds: 1972 Mutual Fund Factbook, Investment Company Institute, Washington, D. C.

TABLE II4

MAIN FOUNDERS AND INVESTMENT OBJECTIVES FOR 48 SICAV

	Growth and Income	Growth	International	Bonds	Gov't. Guar. Bonds
Deposit Banks					
BNP	Epargne-Valeur	Epargne Croissance	Epargne Inter	Epargne-Oblig.	
Crédit Lyonnais	Slivam Slivafrance		Slivinter	Slivarente	
Société Générale	Sogevar Soginco		Soginter	Sogepargne	
CIC	Epargne Mobilière		Credinter	Oblisem	
CCF	Elysées Valeurs		Selection Mondiale	Selection Rendement	
Banques Populaires	Valorem			Fructidor	
Investment Banks					
Banque de Suez	Epargne Mobilière Unigestion		Credinter France Placement		Securité Mobilière
Banque de l'Indochine		Indovaleurs		Gestion Rendement	
Banque de Paris et des Pays-Bas	Sogevar Essor	Selection Croissance France Croissance	Paribas Gestion Credinter	France Epargne Sogepargne	
BUP-CFCB	Epargne Valeur	Univalor	America-Valor	Epargne Revenu	Epargne Instit.

TABLE II 4 (CONT)

	Growth and Income	Growth	International	Bonds	Gov't Guar. Bonds
Investment Banks					
Banque de l'Union Européenne	Optima	Euro-Croissance		Selection Rendement	
Banque Rothschild			Rothschild Expansion	Laffitte Rendement	
Banque de Neuflize	Gestion Mobilière Soginco		Soginter	Sogepargne	
Insurance Companies					
UAP	Actions Selectionnées	Actanea	UAP Investissement		Première Catégorie
GAN	Soleil Investissement		Assurances Placements		
Other					
Caisse des Dépôts et Consignations	Livret Portefeuille			France Oblig.	France Garantie Première Catégorie
Inter Europe Management	Interselection	Inter-croissance			

TABLE II 5

SIZE AND DISTRIBUTION OF ASSETS FOR THE STOCK SICAV, AS OF DECEMBER 31, 1972

SICAV	ASSETS	CASH	FRENCH STOCKS	FRENCH ORD. BONDS	FRENCH CONV. BONDS	FOREIGN STOCKS	FOREIGN BONDS
Actanea	29.94	1.74%	29.36%	10.35%	19.34%	39.21%	--%
Actions Selectionées	81.46	1.26	45.94	20.60	8.78	23.42	--
Aedificandi	52.21	6.97	51.48	23.69	5.63	11.07	1.16
AGFIMO	42.68	2.76	65.30	30.74	0.89	0.31	--
America-Valor	108.39	5.27	--	22.25	3.19	67.28	2.01
Assurances Placements	54.36	6.57	22.87	18.41	9.86	42.29	--
C.I.P.	65.58	2.30	32.42	26.55	5.52	32.19	1.02
Credinter	165.21	9.09	19.58	24.51	2.84	41.56	2.42
Drouot Investissement	94.35	6.76	24.65	18.62	6.31	41.05	2.61
Elysées Valeurs	168.59	3.36	28.46	24.38	6.44	36.46	0.90
Epargne Assurance	29.47	1.77	32.51	40.35	7.74	16.96	0.67
Epargne Croissance	332.72	7.76	21.27	23.67	1.51	45.33	0.46
Epargne Inter	190.04	39.58	--	13.30	1.53	42.29	3.30
Epargne Mobiliere	257.16	6.32	35.23	25.49	3.80	27.96	1.20
Epargne Unie	368.82	7.33	30.98	28.09	1.57	30.42	1.61
Epargne Valeur	2193.75	8.06	37.46	23.91	1.97	26.24	2.36
Essor	29.36	3.38	22.82	42.14	6.84	24.14	0.68
Eurocroissance	126.51	10.05	32.30	25.31	1.87	29.34	1.13
Financière Privée	53.80	7.64	32.71	20.61	4.96	33.29	0.79
Foncier Investissement	78.12	4.88	54.58	24.72	6.66	7.62	1.54

TABLE II 5 (CONT)

SICAV	ASSETS	CASH	FRENCH STOCKS	FRENCH ORD. BONDS	FRENCH CONV. BONDS	FOREIGN STOCKS	FOREIGN BONDS
Fortune 1	37.27	13.09	37.05	19.53	9.48	20.16	0.69
France Croissance	29.84	1.64	27.88	9.82	20.64	40.02	--
France Investissement	239.05	9.25	28.87	25.69	4.08	31.06	1.05
France Placement	318.25	4.95	26.64	22.13	6.42	37.50	1.36
Gestion Mobilière	223.03	4.47	26.10	18.99	6.53	41.21	2.70
IMSI	82.60	2.51	46.21	29.88	--	19.49	1.91
Indovaleurs	50.76	9.69	25.77	17.12	8.35	37.96	1.11
Intercroissance	136.42	9.09	26.18	22.65	--	42.08	--
Interselection	60.75	6.41	33.78	21.54	6.08	32.19	--
Livret Portefeuille	820.94	8.18	45.00	28.86	4.60	12.92	0.44
Optima	121.90	6.51	36.10	27.08	3.75	23.81	2.75
Paribas Gestion	55.42	2.42	25.48	18.51	11.73	41.86	--
Pierre Investissement	52.28	17.76	45.11	26.49	2.43	6.64	1.57
Placements Institutionnels	47.62	8.61	32.86	21.90	7.03	28.37	1.23
Priges	70.56	4.56	18.53	25.10	3.06	49.06	--
Rothschild Expansion	748.95	3.83	21.46	29.01	0.44	44.81	0.45
Selection Croissance	62.16	6.42	30.00	20.22	7.85	35.51	--
Selection Mondiale	61.31	7.45	5.42	22.69	6.21	56.96	1.27
Sicavimmo	37.47	11.74	51.35	22.18	5.95	8.78	--
S.I. Est	86.93	6.97	34.84	19.59	3.44	30.00	5.16
Slivafrance	207.72	13.67	53.43	29.42	3.48	--	--
Slivam	1120.97	2.30	31.10	29.75	--	36.85	--

TABLE II 5 (CONT)

SICAV	ASSETS	CASH	FRENCH STOCKS	FRENCH ORD. BONDS	FRENCH CONV. BONDS	FOREIGN STOCKS	FOREIGN BONDS
Slivinter	62.27	8.95	5.60	25.58	0.98	58.89	--
SMI	40.54	2.30	52.42	27.24	2.66	15.14	0.24
Sogevar	820.35	4.31	34.76	22.38	8.17	30.19	0.19
Soginco	269.42	1.40	24.62	22.87	5.88	43.83	1.40
Soginter	915.89	4.63	14.06	22.32	3.23	55.60	0.16
Soleil Investissement	58.70	10.77	20.07	23.12	2.81	42.23	--
UAP Investissement	178.36	1.80	23.16	24.55	4.05	45.00	1.44
Unigestion	55.35	7.14	36.80	19.42	8.54	26.78	1.32
Univalor	49.58	7.87	34.59	21.38	6.03	28.14	1.99
Valorem	261.75	2.96	26.01	26.82	4.34	37.57	2.30
Victoire	26.76	11.14	59.53	23.99	2.65	2.69	--
Worms Investissement	105.38	5.29	33.11	24.26	4.63	32.71	--

NOTE: Assets are in million of francs, and the other figures are in percentages of assets.

TABLE II 6

SUMMARY STATISTICS FOR THE ASSETS SIZE AND DISTRIBUTION OF THE STOCK SICAV AT THE END OF 1972

ASSETS SIZE (in million francs)

Range	Frequency
25 - 50	11
50 - 100	19
100 - 200	9
200 - 500	9
Above 500	6

ASSETS DISTRIBUTION (percentages)

Range	Frequency for French Bonds	French Stocks	Foreign Stocks
0 - 10	1	4	6
10 - 20	10	3	5
20 - 30	40	18	10
30 - 40	1	18	15
40 - 50	2	4	14
50 - 60	--	6	3
60 - 70	--	1	1

TABLE II 7

SIZE AND DISTRIBUTION OF ASSETS OF THE BOND SICAV, AS OF DECEMBER 31, 1972

SICAV	ASSETS	CASH	FRENCH STOCKS	FRENCH ORD. BONDS	FRENCH CONV. BONDS	FOREIGN STOCKS	FOREIGN BONDS
Epargne Institutions	95.19	24.63%	--%	75.37%	—%	--%	--%
Epargne Obligations	1833.64	2.38	2.57	83.80	5.73	0.17	5.35
Epargne Revenu	87.23	23.97	7.84	62.80	3.57	0.75	1.07
France Epargne	28.02	0.39	21.81	34.48	15.31	27.41	0.60
France Garantie	1067.49	6.99	--	93.01	—	—	--
France Obligations	1689.42	9.48	1.01	83.01	2.46	0.04	4.00
France Retraite	61.81	17.76	--	82.24	--	—	--
Fructidor	109.85	9.70	0.78	81.05	3.91	0.44	4.12
Gestion Rendement	33.21	17.46	—	68.44	14.10	—	--
Laffitte Rendement	61.29	3.21	27.17	53.21	4.89	8.35	3.17
Oblisem	439.61	8.56	14.05	63.00	5.13	3.13	6.13
Première Catégorie	(254.69)	(4.57)	—	(95.43)	—	—	--
Securité Mobilière	227.17	13.74	—	86.26	—	—	--
Selection Rendement	183.02	7.57	4.49	79.58	4.85	1.85	1.66
Slivarente	2465.54	3.01	9.27	74.33	3.08	8.92	1.39
Sogepargne	1380.20	4.77	7.44	80.52	5.55	1,46	0.26

NOTES: 1. Assets are in million francs and the other figures are percentages of assets

2. For Première Catégorie, the information was not available for the same date. The data shown are as of March 31, 1972

TABLE II 8

GEOGRAPHICAL DISTRIBUTION OF THE STOCKS IN THE PORTFOLIOS OF THE STOCK SICAV, AS OF DECEMBER 31, 1972

SICAV	FRANCE	REST OF EUROPE	INCL. U.K.	INCL. GERMANY	US & CANADA	SOUTH AFRICA	JAPAN
Actanea	42.81%	12.37%	3.36%	0.65%	33.65%	6.53%	4.16%
Actions Selectionnées	66.24	10.72	2.93	3.09	20.97	2.07	--
Aedificandi	82.31	5.32	1.25	1.22	9.50	--	0.26
Agfimo	99.54	--	--	--	0.46	--	--
America-Valor	--	--	--	--	100.00	--	--
Assurances Placements	NA	NA	NA	NA	NA	NA	NA
C.I.P.	50.19	13.60	2.19	--	29.11	6.77	0.33
Credinter	32.02	24.62	2.99	4.67	36.00	5.36	2.00
Drouot Investissement	37.52	15.32	3.96	--	44.48	2.68	--
Elysées Valeurs	43.84	20.96	4.44	3.86	31.73	1.07	0.76
Epargne Assurance	65.71	9.20	0.97	--	16.94	5.89	2.26
Epargne Croissance	31.93	8.20	4.09	0.59	52.58	5.52	0.01
Epargne Inter	--	23.05	6.63	6.83	73.83	2.66	--
Epargne Mobilière	55.75	10.67	1.70	2.49	24.28	7.15	2.15
Epargne Unie	50.45	12.51	3.68	5.17	33.92	1.28	1.80
Epargne Valeur	58.80	10.96	1.42	2.64	25.16	2.35	2.13
Essor	48.59	11.53	3.34	--	33.21	6.67	--
Euro croissance	52.39	12.13	2.86	1.41	28.09	1.45	5.94
Financière Privée	49.58	26.00	2.05	4.96	21.41	1.60	1.41
Foncier Investissement	87.75	2.82	2.14	--	9.43	--	--

TABLE II 8 (CONT)

SICAV	FRANCE	REST OF EUROPE	INCL. U.K.	INCL. GERMANY	US & CANADA	SOUTH AFRICA	JAPAN
Fortune 1	64.77%	13.09%	1.27%	—	20.17%	1.97%	—
France Croissance	41.06	13.53	1.38	1.39	34.10	7.89	3.42
France Investissement	48.17	10.39	1.09	6.82	39.41	2.03	—
France Placement	41.54	15.10	1.77	—	29.14	0.80	13.33
Gestion Mobilière	38.77	17.53	4.40	3.39	33.35	—	10.35
IMSI	70.33	11.51	7.16	—	9.72	1.32	7.12
Indovaleurs	40.44	11.99	2.11	2.44	33.08	2.76	11.09
Intercroissance	38.36	19.66	2.82	—	30.35	—	11.63
Interselection	51.19	16.32	2.67	4.44	32.49	—	—
Livret Portefeuille	77.70	10.77	4.23	3.40	8.93	—	2.50
Optima	60.25	5.57	—	—	32.63	1.55	—
Paribas Gestion	37.83	17.05	6.46	0.59	39.06	4.44	1.62
Pierre Investissement	87.18	2.88	0.89	1.99	9.94	—	—
Placement Institutionnels	53.67	12.59	6.00	3.70	23.22	—	10.52
Priges	27.40	10.67	—	—	59.47	2.46	—
Rothschild Expansion	32.37	15.31	4.73	6.39	32.49	4.76	14.70
Selection Croissance	45.80	16.85	7.14	—	31.16	3.95	2.24
Selection Mondiale	8.69	26.33	13.25	1.49	50.10	—	14.88
Sicavimmo	85.39	2.30	—	—	7.42	—	4.89
S.I. Est	53.73	16.25	1.38	—	21.45	7.51	0.37
Slivafrance	100.00	—	—	—	—	—	—
Slivam	45.77	22.71	3.23	11.22	26.09	3.61	0.18

TABLE II 8 (CONT)

SICAV	FRANCE	REST OF EUROPE	INCL. U.K.	INCL. GERMANY	US & CANADA	SOUTH AFRICA	JAPAN
Slivinter	8.69%	8.32%	4.26%	--	73.36%	2.66%	--
SMI	77.58	13.18	0.29	0.88	1.06	6.61	--
Sogevar	53.52	10.34	3.49	0.82	32.40	3.74	--
Soginco	35.98	17.65	3.64	6.93	29.62	--	16.75
Soginter	20.18	19.61	3.52	7.15	34.15	--	26.06
Soleil Investissement	(43.58)	(18.17)	(1.79)	(0.34)	(29.63)	(5.37)	(1.16)
UAP Investissement	33.97	18.58	2.87	2.59	39.38	3.19	3.19
Unigestion	57.89	13.90	2.22	0.82	20.74	1.08	6.39
Univalor	55.14	19.97	1.90	3.02	15.82	6.43	2.64
Valorem	40.91	13.58	—	3.02	42.09	0.82	1.59
Victoire	95.68	1.20	—	--	2.64	0.48	—
Worms Investissement	49.61	14.85	2.89	--	30.64	3.65	1.25

NOTES: 1. Figures are percentages of all assets invested in shares.

2. For Soleil Investissement, the information was not available as of the end of 1972. The information shown here is for the end of the first quarter of 1972.

3. The histogram for the percentages of shares in France is the following.

RANGE		FREQUENCY
0%	20%	4
20	40	11
40	60	24
60	80	7
80	100	7

TABLE II 9

PORTFOLIO TURNOVER FOR EIGHT SICAV, DURING 1971

SICAV	AVERAGE ASSETS	PORTFOLIO PURCHASES	PORTFOLIO SALES	TURNOVER RATE
Epargne Assurance	27.	13.87	12.61	46.70%
Livret Portefeuille	637.	356.8	272.6	42.79%
Paribas Gestion	40.	45.9	41.3	103.25%
Selection Croissance	41.	46.1	29.3	71.46%
Sogevar	2,079.	267.91	228.20	10.97%
France Obligations	1,257.	569.3	261.0	20.76%
Selection Rendement	103.	44	14	13.59%
Sogepargne	887.0	396.10	73.33	8.26%

NOTES:

1. Assets, purchæs and sales are expressed in million francs.
2. The last three SICAV are bond SICAV, and the other five are stock SICAV.
3. Rate of turnover was computed by dividing the lesser of the portfolio purchases or sales (sales in all cases) by the average net assets for the year.
4. For the U.S., Mutual funds, according to the "1972 Mutual Fund Fact Book", the turnover rate averaged 14.1% in 1960, 19.5% in 1965, 38.8% in 1970 and 48.1% in 1971.

TABLE II 10

SALES AND REDEMPTIONS OF THE SICAV IN 1971 AND 1972

	1st Semester 71	2nd Semester 71	1st Semester 72	2nd Semester 72
ALL SICAV				
Sales	2,367.34	1,796.03	2,779.87	2,501.35
Redemptions	544.99	426.52	790.96	742.51
Net Sales	1,822.35	1,369.51	1,988.91	1,758.84
STOCK SICAV				
Sales	1,264.92	1,000.20	1,225.57	1,152.52
Redemptions	380.70	287.44	566.10	551.58
Net Sales	884.22	712.76	659.47	600.94
BOND SICAV				
Sales	1,102.42	795.83	1,554.30	1,348.83
Redemptions	164.29	139.08	224.86	190.93
Net Sales	938.13	656.75	1,329.44	1,157.90

NOTES: 1. Sales and Redemptions are expressed in million Francs

2. Only the sales and redemptions coming from the public are taken into account above.

SOURCE: Commission des Opérations de Bourse

CHAPTER III

THE INVESTMENT PERFORMANCE OF THE SICAV: SURVEY OF THE LITERATURE

The rest of this study is going to be concerned with the analysis of the investment performance of the SICAV. This topic has already received some attention, and two previous attempts to study this question will now be analyzed.

A. Study of 11 SICAV (1965-1968)

In [8], [9], and [10], Georges Gallais-Hamonno, who was at that time "chargé de cours à la Faculté de Droit et de Sciences Economiques" in Orléans (France), reports the work he has done on the investment performance of eleven SICAV. These SICAV are all the stock SICAV which were in existence at the end of 1967, excluding only SOGINTER.

The first step of his analysis is to transform raw data on prices of the SICAV into indices. The second step is to build for each SICAV a reference index[1] to which the actual index can be compared. This comparison is performed in a third step, by using two statistical tests.

In the first step, the input is the net assets value per share on every Friday, during one to four years according to the SICAV. This data is transformed into indices (with base

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1. Called "SICAV de référence"

100 at the beginning of each period). For yearly periods dividends received during the year by the SICAV are included in the index: This was checked by comparing the charts shown for 1968 to the data given in the DAFSA quarterly bulletin on the SICAV, and the differences betwen the two sets of figures are quite small. They could be due to the slightly different starting and ending dates for the comparison, and in the differing ways to handle the dividend payment during the year. However, for periods larger than one year, the data shown on the charts could not be reconciled with the two sets of data given in the DAFSA bulletin (with or without dividend).

In the second step, a reference index is built for each SICAV. For that purpose, the portfolios are split into four parts: Liquidities, French bonds, French stocks and foreign securities. The percentage of assets in each of these four categories, and for each SICAV, was obtained at the end of each quarter and used during the entire following quarter. For each of the four markets, an index was chosen, and its base was set to 100 at the beginning of each period.

For the liquidities, the index was chosen to be constant and equal to 100. The reason given was that the return from the liquidities barely offset inflation.

For the French bonds and French stocks, the indices were the respective INSEE indices, and for the foreign securities, the index was the "Dow Jones Industrial". The reference

index for each SICAV was computed as the sum of the products of the market indices by the percentage of assets in each market.

In the third step, the two series of indices were analyzed using two statistical tests. The first one was a binomial test, and the null hypothesis was: The probability that the sign of the difference between the actual and reference indices be positive is equal to 0.5. This hypothesis could be rejected in 29 of the 33 cases, at the 95% confidence level. (One case means one SICAV during a one-year period.)

The second test performed was the Cochran test, where the null hypothesis was: The means of the actual and reference indices over a given period are equal. This test was performed for one-year periods, and also for the entire period during which each SICAV was in existence, up to the end of 1968. The null hypothesis could be rejected, at the 95% level of confidence, in all but three cases. The three cases were analyzed and explained by various factors.

The conclusion, after the binomial test, was: "This non-parametric test provides a scientific answer to the first of our two questions: Have the SICAV managers done better than the markets on which they had chosen to invest? The answer is unquestionably yes. And the hypothesis, sometimes formulated in the United States that the mutual funds managers do not do better than randomly selected portfolios is, in

France, absolutely inacceptable."[2]

After the Cochran test, the conclusion is: "The fundamental result of the Cochran test is to prove scientifically that, apart from three cases analyzed above: All SICAV have constantly done better than the markets on which they had invested."[3]

We are now going to discuss the analysis which has been presented, by first concentrating on the construction of the actual and reference indices, then on the statistical analysis and finally on more general issues.

Two main comments should be made about the indices. The first is that the market indices, for each of the four markets, do not take into account any interest or dividend payments, while the actual indices for the SICAV include the dividends, at least for the one-year periods. The second comment is that the Dow Jones is not a very significant index for the U.S. stock market, even less for the other stock markets. As the author points out, this leads to a bias which over the four year period was favorable to the SICAV.

About the statistical analysis, the first test is not valid since the successive events are not independent of one another: For the actual index, for instance, the ratio be-

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2. [10] p. 74

3. [10] p. 82

tween the index for one week, and the index for the preceding week is the return of the SICAV during the week, plus one. An analogous relation is true for the reference index. It is then clear that the succession of signs for the difference is not a succession of independent trials.

More generally, a statistical analysis done on indices of the form used here seems less significant than an analysis based on weekly returns, if weekly data are used. The above analysis privileges the assets value at the end of a year, which needs not be done, and successive values of the indices are not independent. Also, the Cochran test which is done tests the equality of two means which have a very peculiar meaning.

More fundamentally, this analysis of investment performance does not explicitly take risk into account: A high return could be caused by a higher risk level, as it could be caused by selectivity.

B. Study by McDonald of eight SICAV (64-69)

In [19] McDonald investigated the investment performance of eight of the oldest French mutual funds, from month of introduction to 1969. These SICAV are the nine oldest, excepting Epargne Valeur.

The first model he uses is a purely French model

$$R_{it} - R_{ft} = d_i + B_{il} (R_{ml} - R_f) + e_i$$

where R_i is the monthly realized return of fund i

R_f the risk free rate

R_{m1} the French market return

B_{i1} the non diversifiable risk of fund i with respect to the French market

d_i the performance measure of fund i

In a second model, he considers that the portfolios of the SICAV are made up of two parts: A first part is invested in the French stock market, and the rest is invested in U.S. stocks. Assuming that the two markets are segmented, the second model he derives is the following

$$R_{it} - R_{ft} = \phi_i + B^*_{i1} (R_{m1t} - R_{ft}) + B^*_{i2}(R_{m2t} - R_{ft}) + e_i$$

where $\phi_i = x_i d_{i1} + x_2 d_{i2}$

$B^*_{i1} = x_1 B_{i1}$

$B^*_{i2} = x_2 B_{i2}$

with most notations equivalent to the above, and

- x_1 and x_2 Fractions invested in French and U.S. stocks
- d_{i1} and d_{i2} Performance measures on the French and U.S. stock markets

Both equations were estimated using ordinary least squares. The risk free rate was the rate of return on one-

month blocked accounts, gathered with the cooperation of a Paris bank. The market returns used were the CAC index for the Paris Bourse and the Standard and Poor's 500 index for the U.S. stock exchange, and both were corrected for dividends.

The results from the first model show correlation coefficients between 0.41 and 0.89, the highest being for the fund restricted to the French market (Slivafrance) and the lowest for the most international fund (Soginter). Non diversifiable risk with respect to the French market ranged from 0.25 to 0.55, and were significant at the 95% level of confidence. The performance measures were all positive, but only one was significant at the 95% level (for SOGINTER).

For the two-markets model, the estimate of sensitivity to the U.S. market was significantly positive at the 95% level of confidence for the seven funds which invested in this market. The variance explained increased by 0 to 20%, but for Soginter and Optima less than 50% of the total variance was explained by the regression. The coefficients of the French market return were slightly different from the ones derived previously. Finally, the new performance measure $\emptyset$ is always positive, and is significantly different from zero only for SOGINTER. The author recognizes that the interpretation of this measure is impaired by the omitted markets; however, he states that the omitted markets would be reflected

in B_1^* or B_2^* if these omitted markets were highly correlated with the French or U.S. market, and in $\emptyset$ if the correlation was law. He found evidence "suggesting that the London and Tokyo returns, for example, were highly positively correlated (0.87) with the U.S. index in the 1968-1970 period". He concludes that "if this high correlation obtained in the period of this study, the impact on $\emptyset$ was probably small provided the French fund managers did not have access to consistently "superior analysis" on Japanese and British stocks. In any case, the interpretation of $\emptyset$ that follows is subject to the qualification as to the potential effect of omitted markets."

The data were split into two parts: 1964-1967 (bear market in France) and 1967-1969 (bull market in France). For the down market period, using the two markets models, only four of the eight performance measures were positive, and none was significant at the 95% level of confidence. Only three of the eight funds had estimates of B_1^* significantly lower in the bear market than in the bull market, indicating an attempt on the part of the fund managers to reduce the non-diversifiable risk of the French portion of the portfolio in the down market. The author concludes that the funds were not generally able to shift their portfolios to foreign markets in anticipation of the French market decline.

The author then presents performance comparisons over the 28 months period (August 67 to November 69). This period is

the up-market period in France. Of the three periods which were considered, this is the period for which the performance measures were highest. However, this is the only period on which the number of observations is equal for all funds. Various performance measures are used: Sharpe and Treynor measures, Jensen measure for both the one and two index models, and also the ratio of return to non-diversifiable risk in France. In all five cases, SOGINTER--the most international SICAV of the eight--comes out with the highest measure and SLIVAFRANCE--the only SICAV restricted to French investments--comes out last. The ranks of the other SICAV are quite similar for the various measures. For the Jensen two market measures, all eight values are positive, and they range from 1.08% to 0.03% per month.

The last part of McDonald's paper examines whether fund managers are "superior analysts" of French securities. Having assumed that the performance measure of the French funds on the U.S. market (d_2) is equal to zero, he obtains that

$$d_1 = \frac{\emptyset}{x_1}$$, x_1 being defined

as the portion of fund portfolios invested in French stocks and debt, at the end of 1968. The resulting d_1 ranged from 2.375% to 0.030% per month, i.e., from 28.5% to 0.36% per year. The average was 0.80% per month (about 9.6% per year). The author therefore concludes that "fund managers in general were

superior analysts in terms of forecasting returns on French securities, and that three funds, Soginter, France Placement and Optima achieved striking results in 1967-1969."

Interviews with fund managers indicated that they were able to have continuing contacts inside companies, allowing analysts with banking affiliations not so much to have access to inside information as to monitor developments on a more current basis than individual investors.

The conclusion of the author is therefore that"the "superiority" of performance of mutual funds in the choice of French stocks implied that portfolio profits attributable to bank's investment research skills and access to timely and accurate information was passed on in part to fund shareholders, principally small investors."

We now turn to the analysis of this paper. The main remark concerns the model which is used: The two markets model assures that the portfolios of the SICAV is composed of only two parts: One in French stocks and one in U.S. stocks. During the period studied, the sum of these two components of the portfolios of the SICAV was less than 68% for Slivafrance, less than 60% for the other SICAV and less than 40% for Soginter. The results of the regressions are therefore subject to an important qualification as to the potential effect of the omitted markets.

The effect of the other markets very much depend on the

correlation of these markets with the French and U.S. stock markets. Appendix B of this study shows correlation which have been computed between monthly returns on various stock markets, but they are for a more recent period. However, the correlations of the U.S. stock market with the U.K. and Japanese markets appear smaller than those quoted by McDonald (0.87). In that case, the effect on the performance measure would be higher. It also appears that during the up-market period in France (1967-1969), the main other stock markets were also up rapidly, the U.S. stock market being the exception, with an average annual rate of return of 5.1%.

The French bonds market (in which SICAV have to invest so that the total of their liquidities and holdings in French denominated bonds represents more than 30% of their assets) is also among the omitted markets. During the period studied, the French bonds market has been very little correlated with either the French or the U.S. stock markets. Hence, the return from the bond portfolios of the SICAV is reflected in the "performance measure". Assuming an average 3% per year risk premium on bonds, and a percentage of 30% of bonds in the portfolios, the bonds could account for .9% per year, or .00075 per month in the constant term. This is much smaller than the values of this term for the 67-69 period, but much closer to those for the whole period.

The interpretation of the constant terms in the regressions as "performance measures"does not therefore seem valid

because the effect of markets omitted in the model formulation is to bias significantly these measures.

CHAPTER IV

SINGLE INDEX MODELS

A. French Stock Market Model

1. Theoretical Framework

The first theoretical model which will be used is the Capital Asset Pricing Model, developed by Markowitz, Sharpe and Lintner, which has been applied by Sharpe and Jensen, among others, to the evaluation of the performance of open-end mutual funds in the U.S. Modigliani, Pogue, Scholes and Solnik have studied the behavior of European Stock prices and have found support for the Capital Asset Pricing model on the European stock markets. Solnik also studied the behavior of the French stock prices, and his results are consistent with the Capital Asset Pricing model.

This model is the first of several which are going to be used in our attempt to evaluate the investment performance of the SICAV. Even though many funds have a large share of their assets invested in foreign capital markets, it is hoped that this initial model will allow us to have a first look at the degree of diversification, the risk level and the performance of the stock SICAV. This is also the most natural model for French mutual funds, and, incidentally, it underlies many of the reports that the SICAV managers send to the shareholders.

The specification for our first model is therefore the following:

$$\tilde{R}_j - R_{RF} = \alpha j + \beta_j (\tilde{R}_{FS} - R_{RF}) + \tilde{\varepsilon}$$

where

$\tilde{R}_j$ is the return[1] of SICAV j

$\tilde{R}_{FS}$ is the return[2] of the French stock market

R_{RF} is the French risk-free rate[2]

α_j is a constant

β_j is the systematic risk of SICAV j on the French stock market (also called volatility).

$\tilde{\varepsilon}$ is a random variable of mean equal to zero

α_j is sometimes called the performance measure, but we will not use this term before we have validated it.

2. Time series regressions

Time series regressions were run in order to estimate this model. Quarterly and monthly returns were used. For quarterly returns, the period covered for a fund usually extended from the first quarter following its introduction to the last quarter of 1972. In the case of monthly returns, the period was January 1969 - December 1972 for the fifteen oldest stock SICAV, and for the other stock SICAV it extends usually from the first month following introduction to December 1972. The quarterly regressions were run for 46 SICAV over a longer period, especially for the oldest SICAV, and the constant

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1. See Appendix A for the exact definition

2. See Appendix B for the exact definition

terms obtained are less likely to be the result of transitory conditions. On the other hand, the number of degrees of freedom is small for the most recent SICAV. The monthly regressions (run for 42 SICAV) provide more degrees of freedom, but one should be cautious about the interpretation of "statistically significant" constant terms obtained from these regressions.

The complete results of the regressions are shown on Tables IV1 and IV3, with summary results shown on Tables IV 2 and IV 4 . These tables show that the regressions explain an average of 68% of the returns' variance, that the volatilities measured are usually very significant (e.g. t-statistics average 9.64 for the monthly regressions) and that the constant terms are not generally significant: t-statistics average 0.97 for the quarterly regressions and 0.76 for the monthly regressions.

A closer look at the results shows that the percentage of variance explained by the regressions is smaller for funds having a large percentage of their assets invested outside France, and higher for funds concentrating their investments in France. For instance, America Valor (R^2 = 19.98% for quarterly regressions) has only North American stocks in its portfolio, apart from the required percentage of French bonds. Soginter and Selection Mondiale also have a large percentage of their assets in foreign stocks (usually more than 50%) and

their respective R^2, for quarterly regressions are 30.63% and 42.83%. On the other hand, Slivafrance restricts its investments to French assets, and Actions Selectionnées, Fortune 1 and Victoire have assets mainly in French stocks. Their respective R^2 are, for quarterly regressions, 92.74%, 91.36%, 94.07% and 93.92%.

The group of SICAV investing heavily in stocks of building societies (Aedificandi, IMSI, Pierre Investissement and Sicavimmo) tend to have a lower R^2 (between 43 and 65% for the monthly regressions) and their volatilities are also below the average. Their constant terms are also significant at the 5% level of confidence for both the quarterly and the monthly regressions. This is in accordance with the fact that the building societies' stocks have performed better than average during the period covered. The only other stock SICAV which appear to have positive constant terms, for both the quarterly and monthly regressions, and significant at the 5% level of confidence are Indovaleurs, Intercroissance and Victoire. These SICAV have in common to be quite recent: Indovaleurs is the oldest and was created in June of 1970. Indovaleurs and Intercroissance are also internationally oriented and were holding a large percentage of their assets in U.S. and Japanese stocks at the end of 1972.

As a whole, the constant terms tend to be positive: For the quarterly regressions 36 out of 46 and for monthly regres-

sions 31 out of 42. The significance test for the average constant term is equal to 5.81 for the quarterly regressions and 3.84 for the monthly regressions. Both are significant at the 1% level of confidence. If we believe that the one-index model used here is valid, we should conclude that the SICAV as a whole have outperformed standard portfolios having the same degree of volatility, during the period covered.

3. Cross sectional regressions

In order to test the validity of the model used, cross-sectional regressions were run in the following way:

$$\overline{R_j - R_{RF}} = b_o + b_1 \hat{\beta}_j^F \overline{(R_{FS} - R_{RF})_j} + \eta$$

where $\overline{R_j - R_{RF}}$ is the mean realized excess return of SICAV j.

$\overline{(R_{FS} - R_{RF})_j}$ is the mean realized excess return of the French stock market, both averages being taken over the time span covered by the time series regression for SICAV j (hence the subscript j in the second expression).

$\hat{\beta}_j^F$ is the measured volatility on the French stock market.

The theoretical values predicted by the Capital Asset pricing model are $b_o = 0$ and $b_1 = 1$.

The cross sectional regressions were run for quarterly and monthly average returns. The results are given in Table IV A6. The constant term appears to be significantly differ-

ent from zero in both regressions. The slope is not significantly different from one, but the percentage of variance explained is quite small, especially for the monthly regressions.

It also appears that there exists a strong negative correlation between α_j and β_j: It is - 0.45 for the quarterly regressions estimates and - 0.55 for the monthly.[3] We would not expect to find a strong correlation between the "performance measure" of a SICAV and its risk level.

These negative results lead us to reject the single index model tested above: Although it seems to provide reasonable measures of the diversification of the SICAV on the French stock market, the measures that it gives of the systematic risk do not satisfy the cross sectional tests. The reason for these negative results can probably be attributed to the part of the protfolios which is invested in foreign assets.

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3. This is not an additional fact, but only a reformulation of the fact that the slope of the cross sectional regressions is not equal to one and the intercept to zero.

TABLE IV A1

RESULTS OF THE FRENCH REGRESSIONS

(1964 - 1972, quarterly returns)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
Actanea	10	-0.24	0.82	0.51	0.12	70.17
Actions Selectionnées	17	-0.14	0.43	0.65	0.05	91.36
Aedificandi	10	1.81	0.53	0.31	0.08	68.57
America-Valor	17	-0.52	2.10	0.49	0.25	19.98
C.I.P.	12	-0.02	0.58	0.55	0.08	83.05
Credinter	9	0.88	0.71	0.40	0.10	71.81
Drouot Investissement	11	1.50	0.89	0.46	0.12	63.75
Elysées Valeurs	21	-0.04	0.77	0.55	0.10	63.24
Epargne Assurance	7	0.42	0.70	0.32	0.08	74.28
Epargne Croissance	9	0.97	0.75	0.38	0.10	67.21
Epargne Mobilière	35	0.37	0.37	0.49	0.05	74.89
Epargne Unie	12	0.24	0.68	0.63	0.09	81.92
Epargne Valeur	35	0.59	0.38	0.46	0.05	70.99
Euro croissance	13	-0.17	0.86	0.60	0.12	69.27
Fortune 1	8	-0.42	0.41	0.50	0.05	94.07
France Croissance	10	0.13	0.54	0.63	0.08	89.48
France Epargne	10	0.48	0.50	0.30	0.07	68.28
France Investissement	24	0.19	0.75	0.43	0.09	49.43
France Placement	35	0.23	0.58	0.50	0.08	56.08
Gestion Mobilière	10	0.83	0.77	0.45	0.11	68.01
IMSI	8	1.93	0.46	0.17	0.06	59.18

TABLE IV A1 (CONT)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
Indo valeurs	10	1.36	0.65	0.44	0.09	73.79
Intercroissance	8	3.42	1.44	0.52	0.18	56.79
Interselection	10	0.70	0.65	0.54	0.09	80.96
Livret Portefeuille	23	0.35	0.48	0.53	0.06	79.32
Optima	35	0.19	0.50	0.46	0.07	58.84
Paribas Gestion	11	1.06	1.13	0.64	0.15	67.64
Pierre Investissement	10	2.10	0.79	0.34	0.11	54.15
Priges	8	0.91	0.88	0.40	0.11	68.35
Rothschild Expansion	14	-0.04	0.82	0.51	0.12	60.75
Selection Croissance	13	-0.12	0.94	0.62	0.13	66.53
Selection Mondiale	8	0.62	1.00	0.27	0.13	42.83
Sicavimmo	7	2.01	0.79	0.27	0.09	62.49
S.I. Est	22	0.47	0.86	0.47	0.10	50.71
Slivafrance	31	0.47	0.24	0.60	0.03	92.74
Slivam	35	0.22	0.42	0.45	0.06	65.93
Sogevar	35	0.52	0.40	0.47	0.05	70.93
Soginco	12	-0.09	1.00	0.59	0.14	64.86
Soginter	32	1.11	0.84	0.41	0.11	30.63
Soleil Investissement	11	0.42	0.99	0.51	0.13	63.54
UAP Investissement	10	0.98	0.83	0.45	0.12	64.70
Unigestion	7	1.44	0.78	0.58	0.09	88.59
Univalor	9	0.92	1.13	0.57	0.15	66.36
Valorem	19	0.42	0.56	0.54	0.07	77.40
Victoire	8	0.96	0.31	0.38	0.04	93.92
Worms Investissement	8	0.29	0.58	0.38	0.07	81.31

Note on Table IV A1

ALPHA and BETA are respectively the intercept and the slope in the regression. SE.A and SE.B are their respective standard errors. NOBS is the number of observations used in the regression and R**2 the percentage of variance explained by the regression.

This note applies also to Tables IV A3, IVB1, IV B2, IV C1 and IV C3.

TABLE IV A2

SUMMARY OF THE RESULTS OF THE
FRENCH MARKET QUARTERLY REGRESSIONS

1. ALPHAS Mean: 0.65 Standard deviation: 0.76

RANGE		FREQUENCY
-0.52	0.27	16
0.27	1.05	19
1.05	1.84	6
1.84	2.63	3
2.63	3.42	1

2. t-statistics for ALPHAS Mean: 0.97 Standard deviation: 1.07

RANGE		FREQUENCY
-1.03	0.01	10
0.01	1.04	17
1.04	2.08	11
2.08	3.12	4
3.12	4.15	3

3. BETAS Mean: 0.48 Standard deviation: 0.11

RANGE		FREQUENCY
0.17	0.27	2
0.27	0.37	4
0.37	0.46	13
0.46	0.56	16
0.56	0.65	10

TABLE IV A2 (CONT)

4. Standard errors of BETAS Mean: 0.097

RANGE		FREQUENCY
0.03	0.08	14
0.08	0.12	21
0.12	0.16	8
0.16	0.21	1
0.21	0.25	1

5. R-squared Mean: 68.24 Standard deviation: 15.14

RANGE		FREQUENCY
19.98	34.80	2
34.80	49.62	2
49.62	64.44	11
64.44	79.25	19
79.25	94.07	11

TABLE IV A3

RESULTS OF THE FRENCH REGRESSIONS

(1969-1972, monthly returns)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
Actanea	27	0.10	0.27	0.52	0.06	73.39
Actions Selectionnées	48	0.00	0.15	0.64	0.03	88.01
Aedificandi	29	0.65	0.16	0.28	0.04	65.27
America-Valor	48	-0.30	0.60	0.48	0.14	21.28
C.I.P.	27	0.17	0.17	0.45	0.04	82.87
Credinter	27	0.36	0.27	0.47	0.06	68.10
Drouot Investissement	30	0.44	0.30	0.47	0.07	60.47
Elysées Valeurs	48	-0.24	0.22	0.63	0.05	76.87
Epargne Croissance	24	0.33	0.26	0.43	0.06	70.58
Epargne Mobilière	48	0.02	0.18	0.57	0.04	81.09
Epargne Unie	30	0.39	0.22	0.51	0.05	77.02
Epargne Valeur	48	0.00	0.16	0.56	0.04	83.23
Euro croissance	36	0.03	0.33	0.43	0.08	45.00
Fortune 1	24	-0.12	0.17	0.51	0.04	89.58
France Croissance	30	0.09	0.22	0.53	0.05	78.71
France Epargne	30	0.15	0.15	0.33	0.04	75.30
France Investissement	48	-0.20	0.22	0.57	0.05	73.33
France Placement	48	-0.16	0.31	0.61	0.07	61.08
Gestion Mobilière	30	0.30	0.26	0.50	0.06	69.58
IMSI	24	0.63	0.25	0.23	0.06	44.40
Indovaleurs	30	0.45	0.18	0.48	0.04	81.34

TABLE IV A3 (CONT)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
Intercroissance	24	1.17	0.42	0.49	0.09	55.46
Interselection	30	0.24	0.23	0.59	0.05	80.60
Livret Portefeuille	48	0.19	0.18	0.61	0.04	82.93
Optima	48	-0.19	0.28	0.61	0.06	66.19
Paribas Gestion	30	0.58	0.29	0.48	0.07	63.16
Pierre Investissement	30	0.72	0.22	0.25	0.05	43.80
Priges	24	0.34	0.34	0.43	0.08	59.39
Rothschild Expansion	36	-0.01	0.28	0.44	0.07	53.38
Selection Croissance	36	0.13	0.25	0.59	0.06	73.91
Selection Mondiale	24	0.23	0.39	0.34	0.09	41.40
S.I. Est	48	-0.09	0.25	0.59	0.06	70.80
Slivafrance	48	0.18	0.11	0.63	0.02	93.43
Slivam	48	-0.21	0.16	0.59	0.04	84.20
Sogevar	48	-0.01	0.17	0.58	0.04	82.82
Soginco	36	-0.03	0.37	0.45	0.09	42.20
Soginter	48	0.06	0.35	0.57	0.08	51.73
Soleil Investissement	30	0.38	0.27	0.49	0.06	67.14
UAP Investissement	29	0.19	0.25	0.50	0.06	71.63
Valorem	48	0.04	0.17	0.60	0.04	83.42
Victoire	24	0.35	0.13	0.32	0.03	84.84
Worms Investissement	24	0.13	0.32	0.31	0.07	44.89

TABLE IV A4

SUMMARY OF THE RESULTS OF THE
FRENCH MARKET MONTHLY REGRESSIONS

1. ALPHAS Mean: 0.18 Standard deviation: 0.30

RANGE		FREQUENCY
-0.30	0	11
0	0.29	16
0.29	0.58	10
0.58	0.87	3
0.87	1.17	1

2. t-statistics for ALPHAS Mean: 0.76 Standard deviation: 1.20

RANGE		FREQUENCY
-1.28	-0.23	8
-0.23	0.81	15
0.81	1.85	11
1.85	2.90	5
2.90	3.95	2

3. BETAS Mean: 0.50 Standard deviation: 0.11

RANGE		FREQUENCY
0.23	0.31	4
0.31	0.39	2
0.39	0.48	8
0.48	0.56	11
0.56	0.64	16

TABLE IV A4 (CONT)

4. t-statistics for BETA Mean: 9.64 Standard deviation: 4.50

RANGE		FREQUENCY
3.5	7.9	17
7.9	12.3	14
12.3	16.8	8
16.8	21.2	1
21.2	25.6	1

5. R-squared Mean: 68.0 Standard deviation: 16.2

RANGE		FREQUENCY
21.0	35.7	1
35.7	50.1	6
50.1	64.6	7
64.6	79.0	14
79.0	93.4	13

TABLE IV A5

COMPARISON OF MONTHLY AND QUARTERLY
REGRESSIONS ON THE FRENCH MARKET INDEX

	MONTHLY			QUARTERLY		
SICAV	BETA	SE.B	R**2	BETA	SE.B	R**2
Actions Selectionnées	0.64	0.03	88.01	0.65	0.05	91.36
America-Valor	0.48	0.14	21.28	0.49	0.25	19.98
Elysées Valeurs	0.63	0.05	76.87	0.55	0.10	63.24
Epargne Mobilière	0.57	0.04	81.09	0.49	0.05	74.89
Epargne Valeur	0.56	0.04	83.23	0.46	0.05	70.99
France Investissement	0.57	0.05	73.33	0.43	0.09	49.43
France Placement	0.61	0.07	61.08	0.50	0.08	56.08
Livret Portefeuille	0.61	0.04	82.93	0.53	0.06	79.32
Optima	0.61	0.06	66.19	0.46	0.07	58.84
S.I. Est	0.59	0.06	70.08	0.47	0.10	50.71
Slivafrance	0.63	0.02	93.43	0.60	0.03	92.74
Slivam	0.59	0.04	84.20	0.45	0.06	65.93
Sogevar	0.58	0.04	82.82	0.47	0.05	70.93
Soginter	0.57	0.08	51.73	0.41	0.11	30.63
Valorem	0.60	0.04	83.42	0.54	0.07	77.40

TABLE IV A6

CROSS SECTIONAL REGRESSIONS FOR FRENCH MODEL

Quarterly Returns (46 SICAV)

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic	Predicted Value
Constant	0.562	0.177	3.167	0
Beta	1.293	0.446	2.898	1

$R^2 = 0.163$

Monthly Returns (42 SICAV)

Independent Variable	Estimated Coefficient	Standard Error	t-Statistic	Predicted Value
Constant	0.278	0.089	3.111	0
Beta	0.216	0.605	0.357	1

$R^2 = 0.003$

B. French Bond Market Model

1. Theoretical Framework

The bond SICAV usually hold a very large percentage of their assets in French bonds. The model which we are going to use for the study of the investment performance of the bond SICAV is a direct transposition to the bond market of the Capital Asset Pricing model. Taking as a given the spread between the risk-free rate and the average bond market return, it assumes that there is within the bond market a risk-return trade-off similar to the one encountered on the stock market, and it tries to measure it.

The model used is therefore the following:

$$\tilde{R}_j - R_{RF} = \alpha_j + \beta_j (\tilde{R}_{FB} - R_{RF}) + \tilde{\varepsilon}$$

where $\tilde{R}_j$ is the return[4] of SICAV j

$\tilde{R}_{FB}$ the return[5] of the French Bond Market

R_{RF} the French risk-free rate[5]

α_j a constant term

β_j the systematic risk, or volatility of SICAV j on the French Bond market

$\tilde{\varepsilon}$ a random variable of mean equal to zero.

2. Time series regressions

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4. See Appendix A for the precise definition

5. See Appendix B for the precise definition

Time series regressions were run for twelve bond SICAV. A first set of regressions used quarterly returns, and monthly returns were subsequently used. The results of these regressions are shown on Tables IV B1 and IV B2.

The percentage of variance explained, for the quarterly regressions, varies from 41.18 to 89.46%. The bond SICAV which hold the smallest percentage of their assets in bonds are those which have the largest residual variance: Over the past four years Slivarente has held 9 to 14% of its portfolio in French stocks and 5 to 9% in Foreign stocks. For Oblisem, these ranges have respectively been 8 to 14% and 0 to 3%, and for Sogepargne 0 to 9% and 0 to 2.2%. The percentage of explained variance for these three funds is, for the quarterly regressions, 41.18%, 47.23% and 68.32%. On the other hand, France Garantie and Securité Mobilière have restricted their investments to the bond market and more precisely to government guaranteed bonds. Their R^2 for quarterly regressions are 84.42 and 85.17%.

The monthly regressions appear to explain a smaller percentage of the variance: between 21.88 and 62.85%. The SICAV having a large percentage of their portfolio in bonds still have the highest percentage of explained variance. A reason for the decrease in the percentage of explained variance might be that adjustments between the different segments of the bond market (government guaranteed bond, indexed bonds and corporate bonds) take time to occur. In that case,

a single index model couldbe inappropriate to analyze monthly returns on the bond market.

The volatilities measured are in general smaller for the monthly than for the quarterly regressions, although the differences are generally not significant at the 5% level of confidence.

The last four SICAV listed on Tables IV B1 and IV B2 (Epargne Institutions, France Garantie, Première Catégorie and Securité Mobilière) are called "SICAV de première Catégorie", because they specialize in government guaranteed bonds ("obligations de première catégorie" in French). As expected, the volatilities of these SICAV are smaller than those of the other eight: For the monthly regressions, the average volatility for these four SICAV is 0.695, compared to 0.753 for the other eight. For the quarterly regressions, the same averages are 0.85 and 0.90 respectively. The difference would be larger if it was not for OBLISEM which has the smallest volatility, but also the lowest percentage of variance explained.

The constant terms are usually negative (ten out of twelve in both cases), and seven of the constant terms are significant at the 5% level of confidence for the quarterly regressions. A part of the explanation certainly lies with the management fees (limited to a maximum of 0.25% per quarter). Once the management fees are substracted, there remains only one SICAV for which the constant term is significantly negative.

TABLE IV B1

RESULTS OF THE REGRESSIONS ON
THE FRENCH BOND MARKET INDEX

(Quarterly Returns)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
France Obligations	8	-0.54	0.33	1.12	0.16	89.46
Epargne Obligations	21	-0.24	0.19	0.87	0.12	72.96
Epargne Revenu	17	-0.60	0.21	0.93	0.13	78.06
Fructidor	14	-0.62	0.28	0.98	0.16	75.12
Oblisem	16	0.09	0.32	0.67	0.19	47.23
Selection Rendement	16	-0.60	0.25	0.93	0.15	74.42
Slivarente	23	0.14	0.29	0.73	0.19	41.18
Sogepargne	21	-0.33	0.23	0.97	0.15	68.32
Epargne Institutions	10	-0.57	0.25	0.80	0.13	82.63
France Garantie	16	-0.54	0.16	0.83	0.10	84.42
Première Catégorie	17	-0.83	0.22	0.94	0.13	77.55
Securité Mobilière	15	-0.34	0.16	0.84	0.10	85.17

TABLE IV B2

RESULTS OF THE REGRESSIONS ON
THE FRENCH BOND MARKET INDEX

(1969 - 1972 Monthly Returns)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
France Obligations	48	0.03	0.06	0.71	0.08	61.33
Epargne Obligations	48	-0.07	0.07	0.79	0.10	56.09
Epargne Revenu	48	-0.15	0.10	0.74	0.14	36.47
Fructidor	36	-0.11	0.08	0.80	0.11	59.41
Oblisem	48	0.06	0.12	0.63	0.17	21.88
Selection Rendement	48	-0.14	0.08	0.77	0.11	51.45
Slivarente	48	-0.04	0.11	0.75	0.16	32.96
Sogepargne	48	-0.08	0.10	0.83	0.14	45.00
Epargne Institutions	24	-0.08	0.12	0.58	0.15	40.58
France Garantie	48	-0.12	0.06	0.69	0.09	57.46
Première Catégorie	48	-0.19	0.06	0.75	0.09	62.85
Securité Mobilière	24	-0.09	0.13	0.76	0.17	47.84

C. A single index world market model

1. Theoretical Framework

This is the first of the two international market structures which we will investigate. Solnik has shown that it can be derived under certain assumptions about the capital markets perfection and the consumption behavior of investors. In particular, it assumes that there are no constraints on international capital flows and that investors hold homogenous expectations about exchange rate variations and the distribution of returns in terms of the asset currency. The model states that:

$$\tilde{r}_i - R_i = \gamma_i(\tilde{r}_w - R_w) + \tilde{\varepsilon}_i$$

where $\tilde{r}_i$ is the realized return on portfolio i

R_i the interest rate in the country of portfolio i

$\tilde{r}_w$ the realized return on the world market portfolio

R_w the average interest rate in the world

γ_i the international systematic risk of portfolio i

with the usual conditions on the error terms

$$\begin{cases} \text{Cov}\ (\tilde{\varepsilon}_i\ ,\ \tilde{\varepsilon}_j) = \begin{matrix} 0 & \text{if } i \neq j \\ \sigma^2 & \text{if } i = j \end{matrix} \\ \text{Cov}\ (\tilde{\varepsilon}_i\ ,\ \tilde{r}_w) = 0 \end{cases}$$

Given the international characteristics of the portfolios of the SICAV, we will use for both R_i and R_w the

risk free rate which has probably the most truly international characteristics, i.e., the eurodollar rate in London. For the realized return on the world market portfolio, we will use a composite index of the seven largest stock markets, the weights being the GNP's of the countries. The specifications of the model which we are going to test are the following:

$$\tilde{R}_j - R_{EDL} = \alpha_j + \gamma_j (\tilde{R}_{WIN} - R_{EDL}) + \tilde{\varepsilon}_j$$

where $\tilde{R}_j$ is the realized return[6] of SICAV j

R_{EDL} the Eurodollar rate[7] in London

$\tilde{R}_{WIN}$ the realized return[7] on the GNP-weighted world index

γ_j the international systematic risk, or volatility, of SICAV j

α_j a constant term

$\tilde{\varepsilon}_j$ an error term of mean equal to zero

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6. See Appendix A for the exact definition.

7. See Appendix B for the exact definition.

2. Time series regressions

Time series regressions were run similarly to those run for the French stock market model: quarterly regressions were run for 46 SICAV and monthly regressions for 42. The complete results are shown in Tables IV C1 and IV C3, with summary statistics in Tables IV C2 and IV C4.

They show that the world factor explains an average of 51.73% of the variance of the quarterly returns, and 45.66% for the monthly returns. The constant terms are usually negative (38 out of 46 for the quarterly regressions, and 30 out of 42 for the monthly regressions), although there is no fund for which the constant terms of the quarterly and monthly regressions are both significant at the 5% level of confidence. The volatilities measured by the regressions average 0.65 for the quarterly regressions and 0.60 for the monthly regressions. They are in general highly significant (for instance, the average t-statistic for the monthly volatilities is 5.46, with only two under 2.86).

A closer look at the results indicates that the percentage of variance explained by the regressions is low for the funds investing primarily in French stocks (e.g., R^2= 17.15% for the quarterly returns of Slivafrance and higher for the most internationally-oriented funds (e.g. R^2 are 69.72%, 59.75% and 58.82% respectively for the monthly returns of Rothschild Expansion, Paribas Gestion and Selection Croissance). For

America Valor, which has stocks only in the U.S. and Canada, the high correlation between the U.S. and world indices explains the high R^2 found: 74.80% and 68.64% respectively for the quarterly and monthly returns.

The R^2 for Soginter are higher for the regression on the World index than they were for the regressions on the French index: 52.74% and 56.71% for the quarterly and monthly regressions on the world index, compared to 30.53% and 51.73% for the quarterly and monthly regressions on the French index. Table III C5 compares for the fifteen oldest SICAV the proportions of risk explained by the French and international factors, for monthly returns. The latter is larger than the former for two funds: America Valor and Soginter, and is less than 45% for only two funds: Livret Portefeuille (23.04%) and Slivafrance (21.90%).

The volatilities average 0.65 and 0.60 for the quarterly and monthly regressions, respectively. They are very significant in general: For instance, the t-statistics average 5.46 for the monthly regressions. The highest volatilities are the ones of America Valor: 1.29 and 1.12 respectively for the quarterly and monthly returns. The next highest volatilities are for Paribas Gestion, Soginter and France Placement, with 0.78, 0.77 and 0.76 respectively for the monthly regressions. All three are internationally oriented funds, with an important percentage of their assets in the

U.S. The lowest volatilities are those of IMSI and Aedificandi, with 0.13 and 0.30 respectively, for the monthly returns. Both are funds specializing in building societies' stocks.

The constant terms are usually negative: 32 out of 46 for the quarterly regressions, and 30 out of 42 for the monthly regressions. However, none of the funds has a significantly negative constant term for both the quarterly and the monthly regressions. The largest constant terms for the monthly regressions are the "building societies SICAV": Aedificandi, IMSI and Pierre Investissement (0.31, 0.49 and 0.42) and for Intercroissance (0.48) which has a strong international orientation (at the end of 1972, 42.08% of its assets were in foreign stocks, including 20% in the U.S. and 7.5% in Japan). The lowest constant terms are for Actanea, Fortune 1, France Croissance, Selection Mondiale and UAP Investissement (-0.59, -0.67, -0.58, -0.53, -0.58, respectively for the monthly regressions). The quarterly regressions do not reveal striking differences, and the remark already done for the French index regressions still holds: The funds for which the constant terms are most significant are among the most recent funds.

The significance test for the aggregate constant term is equal to -4.75 for the quarterly regressions and 3.80 for the monthly regressions, and both are statistically significant

at the 5% level of confidence. Since many funds are quite recent, too much value should not be assigned to this test.

If we restrict ourselves to funds for which four years of monthly data are available (there are fifteen) the t-statistics for the constant term is usually very low: It is -1.0 for America Valor, but for the fourteen other funds, the mean absolute value of the t-statistics is 0.39.

3. Cross sectional regressions

Cross sectional regressions were again run, in order to test the validity of the model used. They are similar to those run for the French index model. The equation is

$$\overline{R_j - R_{EDL}} = b_o + b_1 \left[\hat{\beta}_j^w \, \overline{(R_{WIN} - R_{EDL})_j} \right] + \eta$$

, with notations similar to those used in IV A3. The theoretical values predicted by the single index world market model are $b_o = 0$ and $b_1 = 1$.

The cross sectional regressions were run for the quarterly and monthly average excess returns and estimated volatilities, and the results are given in table IV C6.

The constant terms are not statistically different from zero, but the slopes are statistically different from one. For the monthly regression, the percentage of variance explained is much larger than it was for the French model, but the difference is quite marginal for the quarterly regressions.

Also[8], the correlation between the volatilities and the constant terms are -0.617 for the quarterly regressions and -0.564 for the monthly regressions. We would not expect such a high correlation between performance measures and risk levels.

As a conclusion to this part, the single index world market model, at least in the form tested, does not appear applicable to the study of the investment performance of the SICAV.

In this chapter, using two single index models, we have tried to measure the degree of diversification and the volatility of the stock SICAV. Although the measures of diversification appear reasonable, this is not so for the measure of volatility. In particular, the correlation between the constant terms (i.e., the would-be "performance measures") and the volatilities appear quite high.

We are now going to use a multinational index model in order to get estimates of different dimensions of the risk of the SICAV, and to try to obtain a more satisfactory measure of the investment performance of the stock SICAV.

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8. This is not an additional fact but a reformulation of the already noted fact that the slope in the cross sectional regressions is not equal to one.

TABLE IV C1

RESULTS OF THE WORLD REGRESSIONS

(1964 - 1972, quarterly returns)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
Actanea	10	-2.59	1.71	0.71	0.32	38.84
Actions Selectionnées	17	0.12	1.15	0.57	0.19	38.04
Aedificandi	10	0.97	1.26	0.27	0.23	14.56
America-Valor	17	-0.94	1.18	1.29	0.19	74.80
C.I.P.	12	-1.05	0.78	0.53	0.11	70.15
Credinter	9	-1.54	1.12	0.79	0.23	63.82
Drouot Investissement	11	0.81	1.38	0.28	0.19	20.04
Elysées Valeurs	21	-0.41	0.86	0.72	0.15	55.36
Epargne Assurance	7	-1.19	1.23	0.63	0.27	51.86
Epargne Croissance	9	-1.56	1.01	0.82	0.20	70.10
Epargne Mobilière	35	-0.21	0.55	0.57	0.10	48.25
Epargne Unie	12	-0.93	0.92	0.61	0.13	68.70
Epargne Valeur	35	0.03	0.51	0.55	0.10	50.60
Euro croissance	13	-1.22	0.62	0.71	0.09	84.89
Fortune 1	8	-2.42	1.72	0.69	0.33	41.64
France Croissance	10	-2.60	1.79	0.85	0.33	44.85
France Investissement	24	-0.32	0.86	0.54	0.15	37.88
France Placement	35	-0.43	0.62	0.68	0.12	51.21
Gestion Mobilière	10	-1.97	1.25	0.81	0.23	60.70
IMSI	8	1.12	0.84	0.24	0.16	27.29
Indo valeurs	10	-1.16	1.21	0.74	0.22	57.57

TABLE IV C1 (CONT)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
Intercroissance	8	0.82	2.36	0.86	0.46	37.40
Interselection	10	-2.17	1.44	0.86	0.27	56.20
Livret Portefeuille	23	0.31	0.89	0.49	0.15	32.08
Optima	35	-0.39	0.59	0.57	0.11	44.76
Paribas Gestion	11	-0.59	0.88	0.76	0.12	81.82
Pierre Investissement	10	1.10	1.57	0.32	0.29	13.33
Priges	8	-1.61	1.29	0.81	0.25	63.40
Rothschild Expansion	14	-0.69	0.64	0.61	0.10	76.78
Selection Croissance	13	-1.19	0.74	0.73	0.11	80.30
Selection Mondiale	8	-1.65	1.09	0.69	0.21	64.09
Sicavimmo	7	0.71	1.29	0.50	0.29	38.37
S.I. Est	22	0.18	0.88	0.67	0.15	49.96
Slivafrance	31	0.09	0.81	0.35	0.14	17.15
Slivam	35	-0.33	0.54	0.54	0.10	46.49
Sogevar	35	-0.03	0.55	0.55	0.10	46.40
Soginco	12	-1.33	0.93	0.66	0.13	71.56
Soginter	32	0.37	0.70	0.73	0.13	52.74
Soleil Investissement	11	-0.97	0.64	0.64	0.09	85.88
UAP Investissement	10	-2.20	1.08	0.91	0.20	72.00
Unigestion	7	-0.77	2.18	0.95	0.48	43.48
Univalor	9	-1.04	2.31	0.71	0.46	24.95
Valorem	19	0.06	0.88	0.55	0.14	46.29
Victoire	8	-0.73	1.21	0.56	0.23	48.67
Worms Investissement	8	-1.87	1.14	0.70	0.22	62.49

TABLE IV C2

SUMMARY OF THE RESULTS OF THE
WORLD INDEX QUARTERLY REGRESSIONS

1. ALPHAS Mean: -0.70 Standard deviation 1.00

RANGE		FREQUENCY
-2.60	-1.86	7
-1.86	-1.11	9
-1.11	-0.37	12
-0.37	0.38	11
0.38	1.12	6

2. t-statistics for ALPHAS Mean: -0.65 Standard deviation 0.84

RANGE		FREQUENCY
-2.03	-1.35	14
-1.35	-0.68	8
-0.68	-0.01	10
-0.01	0.66	10
0.66	1.34	3

3. BETAS Mean: 0.65 Standard deviation 0.19

RANGE		FREQUENCY
0.24	0.45	5
0.45	0.66	17
0.66	0.87	20
0.87	1.08	2
1.08	1.29	1

TABLE IV C2 (CONT)

4. Standard errors of BETAS Mean: 0.20

RANGE		FREQUENCY
0.09	0.17	22
0.17	0.25	12
0.25	0.33	6
0.33	0.40	2
0.40	0.48	3

5. R-squared Mean: 51.73 Standard deviation 18.67

RANGE		FREQUENCY
13.33	27.84	6
27.84	42.35	7
42.35	56.86	15
56.86	71.37	9
71.37	85.88	8

TABLE IV C3

RESULTS OF THE WORLD REGRESSIONS

(1969 - 1972, monthly returns)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
Actanea	27	-0.59	0.40	0.73	0.14	50.41
Actions Selectionnées	48	0.06	0.32	0.59	0.10	44.89
Aedificandi	29	0.31	0.26	0.30	0.10	26.06
America-Valor	48	-0.38	0.38	1.12	0.11	68.64
C.I.P.	27	-0.28	0.37	0.48	0.13	34.83
Credinter	27	-0.17	0.42	0.57	0.15	35.77
Drouot Investissement	30	-0.30	0.40	0.67	0.14	44.61
Elysées Valeurs	48	-0.20	0.30	0.70	0.09	56.84
Epargne Croissance	24	-0.34	0.36	0.65	0.13	54.55
Epargne Mobilière	48	0.06	0.28	0.59	0.08	52.69
Epargne Unie	30	-0.24	0.40	0.59	0.14	38.71
Epargne Valeur	48	0.03	0.27	0.58	0.08	53.68
Eurocroissance	36	-0.29	0.33	0.53	0.10	47.56
Fortune 1	24	-0.67	0.45	0.57	0.15	37.70
France Croissance	30	-0.58	0.41	0.63	0.14	40.87
France Epargne	30	-0.20	0.29	0.33	0.10	26.34
France Investissement	48	-0.17	0.30	0.61	0.09	50.35
France Placement	48	-0.14	0.33	0.76	0.10	56.90
Gestion Mobilière	30	-0.49	0.37	0.72	0.13	52.44
IMSI	24	0.49	0.35	0.13	0.12	4.93
Indovaleurs	30	-0.18	0.35	0.59	0.12	45.40

TABLE IV C3 (CONT)

SICAV	NOBS	ALPHA	SE.A	BETA	SE.B	R**2
Intercroissance	24	0.48	0.55	0.68	0.19	36.78
Interselection	30	-0.41	0.47	0.63	0.17	33.96
Livret Portefeuille	48	0.27	0.38	0.41	0.11	23.04
Optima	48	-0.16	0.34	0.67	0.10	48.83
Paribas Gestion	30	-0.29	0.34	0.78	0.12	59.75
Pierre Investissement	30	0.42	0.30	0.27	0.11	18.52
Priges	24	-0.36	0.41	0.68	0.14	50.68
Rothschild Expansion	36	-0.36	0.23	0.60	0.07	69.72
Selection Croissance	36	-0.25	0.31	0.64	0.09	58.82
Selection Mondiale	24	-0.53	0.34	0.71	0.12	61.98
S.I. Est	48	-0.06	0.32	0.64	0.09	50.07
Slivafrance	48	0.28	0.37	0.39	0.11	21.90
Slivam	48	-0.17	0.28	0.60	0.08	52.79
Sogevar	48	0.03	0.29	0.59	0.09	50.78
Soginco	36	-0.37	0.34	0.59	0.10	50.04
Soginter	48	0.06	0.34	0.77	0.10	56.71
Soleil Investissement	30	-0.38	0.38	0.69	0.13	48.67
UAP Investissement	29	-0.58	0.35	0.72	0.13	53.26
Valorem	48	0.09	0.30	0.59	0.09	48.91
Victoire	24	-0.05	0.28	0.38	0.10	41.21
Worms Investissement	24	-0.38	0.38	0.48	0.13	37.98

TABLE IV C4

SUMMARY OF THE RESULTS OF THE WORLD INDEX MONTHLY REGRESSIONS

1. ALPHAS Mean: -0.17 Standard deviation: 0.29

RANGE		FREQUENCY
-0.67	-0.44	6
-0.44	-0.20	14
-0.20	0.02	10
0.03	0.26	5
0.26	0.49	6

2. t-statistics for ALPHAS Mean: -0.45 Standard deviation: 0.81

RANGE		FREQUENCY
-1.65	-1.04	8
-1.04	-0.43	17
-0.43	0.18	7
0.18	0.79	5
0.79	1.40	4

3. BETAS Mean: 0.60 Standard deviation: 0.16

RANGE		FREQUENCY
0.13	0.33	3
0.33	0.53	5
0.53	0.72	28
0.72	0.92	4
0.92	1.12	1

TABLE IV C4 (CONT)

4. t-statistics for BETAS Mean: 5.46 Standard deviation: 1.82

RANGE		FREQUENCY
1.07	2.86	2
2.86	4.65	12
4.65	6.45	13
6.45	8.24	12
8.24	10.04	2

5. R-Squared Mean: 45.66 Standard deviation: 13.19

RANGE		FREQUENCY
4.9	17.9	1
17.9	30.8	4
30.8	43.8	9
43.8	56.8	20
56.8	69.7	7

TABLE IV C5

PROPORTIONS OF RISK EXPLAINED BY
FRENCH AND INTERNATIONAL FACTORS

(1969-1972, monthly returns)

	Proportion of Variance attrib. to Fr. market variations	Proportion of Variance attrib. to world market variations
Actions Selectionnées	88.01%	44.89%
America-Valor	21.28	68.64
Elysées Valeurs	76.87	56.84
Epargne Mobilière	81.09	52.69
Epargne Valeur	83.23	53.68
France Investissement	73.33	50.35
France Placement	61.08	56.90
Livret Portefeuille	82.93	23.04
Optima	66.19	48.83
S.I. Est	70.08	50.07
Slivafrance	93.43	21.90
Slivam	84.20	52.79
Sogevar	82.82	50.78
Soginter	51.73	56.71
Valorem	83.42	48.91

TABLE IV C6

CROSS SECTIONAL REGRESSIONS FOR WORLD MARKET MODEL

Quarterly Returns (46 SICAV)

Independent Variable	Estimated Coefficient	Standard Error	t-Statistics	Predicted Value
Constant	0.306	0.205	1.493	0
Beta	0.340	0.112	3.023	1

$R^2 = 0.175$

Monthly Returns (42 SICAV)

Independent Variable	Estimated Coefficient	Standard Error	t-Statistics	Predicted Value
Constant	0.057	0.068	0.839	0
Beta	0.480	0.129	3.720	1

$R^2 = 0.262$

CHAPTER V

MULTINATIONAL INDEX MODEL

A. Theoretical Framework

In [26], Solnik developed and tested a multinational index model, which is an intermediate between two extreme stochastic security price processes: A purely nationalistic specification (examined in Chapter IV, part A) and a purely international specification (examined in Chapter IV, part C). All securities returns are assumed to be influenced by two factors, the world factor and a purely national factor common to all securities of a country.

This can be expressed in the following relations:

$$\tilde{r}_{ki} - R_k = \alpha_{ki} + \gamma_{ki} (\tilde{I}_w - R_w) + \beta_{ki} \tilde{\varepsilon}_k + \tilde{\eta}_{ki} \qquad (1)$$

and $$\tilde{I}_k - R_k = \delta_k (\tilde{I}_w - R_w) + \tilde{\varepsilon}_k \qquad (2)$$

where $\tilde{r}_{ki}$ is the realized return on portfolio ki of securities in country k

R_k is the risk free interest rate in country k

γ_{ki} is the international systematic risk of portfolio ki

$\tilde{I}_w$ is the realized return on the world market portfolio

R_w is the average interest rate in the world

β_{ki} is the national risk of portfolio ki in country k

δ_k is the international systematic risk of country k

$\tilde{I}_k$ is the realized return of the national index of country k

$\tilde{\varepsilon}_k$ is a random variable orthogonal to $\tilde{r}_w$ and of zero mean

Let us now consider a SICAV, which has in its portfolio French bonds, French stocks and Foreign stocks in N countries, the respective fractions being x_{FB}, x_{FS}, $(x_k)_{k=1,\ldots,N}$. Let us define x_s the total portion of the portfolio in stocks: $x_s = x_{FS} + \sum_{k=1}^{N} x_k$, and x_c the portion of the assets kept in cash:

$$x_c = 1 - x_{FB} - x_s$$

For the French bonds part of the portfolio, we will assume the same model as was assumed in Chapter IV part B, that is:

$$\tilde{r}_{FB} = R_F + \alpha_{FB} + \beta_{FB} (\tilde{I}_{FB} - R_F) + \tilde{\eta}_{FB} \qquad (3)$$

where $\tilde{r}_{FB}$ is the realized return on a portfolio of French bonds, R_F is the French risk free rate,

$\tilde{I}_{FB}$ is the realized return on the index of French bonds

β_{FB} is the non-diversifiable risk of the portfolio of French bonds

α_{FB} is a constant term

The return of the SICAV is therefore:

$$\tilde{r} = x_c R_F + x_{FB}[R_F + \alpha_{FB} + \beta_{FB}(\tilde{I}_{FB} - R_F) + \tilde{\eta}_{FB}]$$

$$+x_{FS}\left[R_F + \alpha_{FS} + \gamma_{FS}(\tilde{I}_W - R_W) + \beta_{FS}\,\tilde{\varepsilon}_{FS} + \tilde{\eta}_{FS}\right]$$

$$+ \sum_{k=1}^{N} x_k \left[R_k + \alpha_k + \gamma_k\,(\tilde{I}_w - R_w) + \beta_k\,\tilde{\varepsilon}_k + \tilde{\eta}_k\right]$$

$$\tilde{r}-R = \alpha + x_{FB}\,\beta_{FB}\,(\tilde{I}_{FB} - R_F) + x_s\,\gamma(\tilde{I}_w - R_w)$$

$$+ x_{FS}\,\beta_{FS}\,\tilde{\varepsilon}_{FS} + \sum_{k=1}^{N} x_k\,\beta_k\,\tilde{\varepsilon}_k \qquad (4)$$

where $$R = (x_c + x_{FB} + x_{FS})R_F + \sum_{k=1}^{N} x_k R_k \qquad (4a)$$

$$\alpha = x_{FB}\,\alpha_{FB} + x_{FS}\,\alpha_{FS} + \sum_{k=1}^{N} x_k\,\alpha_k \qquad (4b)$$

$$\gamma = \gamma_{FS}\,\frac{x_{FS}}{x_s} + \sum_{k=1}^{N} \gamma_k\,\frac{x_k}{x_s} \qquad (4c)$$

R is the weighted average of the risk free interest rates applicable to the various portions of the portfolio. α is the weighted average of the constant terms (sometimes called "performance measures") of the various portions of the portfolio. γ is the weighted average of the international systematic risks of the securities in the portfolios of the

SICAV.

If we assume that the French bond market is independent of the world stock market and of the various national factors,[1] the independent variables in equation (4) are all orthogonal to one another. An important result can then be used[2]: It is that the estimates of the coefficients obtained by a least squares fitting of a model omitting some of the variables will be unbiased estimates of the true coefficients.

An alternative form of equation (4) can be derived by replacing $\tilde{\varepsilon}_{FS}$ by its value drawn from equation (2), that is:

$$\tilde{\varepsilon}_{FS} + \tilde{I}_{FS} - R_F - \delta_{FS} (\tilde{r}_w - R_w)$$

The transformed equation is then

$$\tilde{r} - R = \alpha + x_{FB} \beta_{FB} (\tilde{I}_{FB} - R_F) + x_s \gamma' (\tilde{I}_w - R_w)$$

$$+ x_{FS} \beta_{FS} (\tilde{I}_{FS} - R_F) + \sum x_k \beta_k \tilde{\varepsilon}_k \qquad (5)$$

where $$\gamma' = \gamma - \delta_{FS} \beta_{FS} \frac{x_{FS}}{x_s}$$

$$\gamma' = (\gamma_{FS} - \delta_{FS} \beta_{FS}) \frac{x_{FS}}{x_s} = \sum_{k=1}^{N} \gamma_k \frac{x_k}{x_s} \qquad (6)$$

Although Equations (4) and (5) are basically similar, the

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1. Information given in Appendix B does not contradict this assumption.

2. MALINVAUD [20] p. 311-312

interpretation of γ' differs from the interpretation of γ. To interpret γ', one has to take the point of view of a French investor for which the international risk of an international portfolio (including French stocks) is made of two parts. The first part is somewhat unavoidable, since it results from the effects of the international factors on the French market as a whole: It is the average international risk of a French portfolio of volatility β_{FS}, and is taken into account in the term $x_{FS}\ \beta_{FS}(\tilde{I}_{FS} - R_F)$. The second part is measured by γ' and is itself decomposed in two portions, as equation (6) shows. The first portion reflects the international orientation of the French securities in the portfolio: If the portfolio is more sensitive to international factors than the French market as a whole, then the term $\gamma_{FS} - \delta_{FS}\ \beta_{FS}$ is positive, and the reverse holds if the portfolio is less sensitive to international factors than the French market as a whole. The second portion of γ' measures the effect on the international risk of the "foreign"[3] securities. To summarize, one might therefore say that γ' measures the excess international systematic risk a French investor bears when he holds an international portfolio, over what he would bear if he was holding an average French portfolio of similar volatility on the French stock market.

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3. From the viewpoint of a French investor.

In equation (5), the independent variables are not orthogonal, and one would expect to get less efficient estimates. However, the ε_k's are still assumed to be orthogonal to the first three independent variables. The same result as before applies: Ignoring some or all of the ε_K's will not bias the estimates of the coefficients. It is not true, however, that one can estimate γ' (without bias) by running a simple regression of the return of the SICAV against the world index, or β_{FS} by running a simple regression of the return of the SICAV against the French stock market index, since the French stock market index is correlated to the world index. Equation (4) nevertheless shows how γ and β_{FS} could be estimated without bias by simple regressions.

B. Time-Series Regressions

1. Specification

Equations (4) and (5) were both estimated, including only the first three independent variables (French bonds, French stocks and World indices). The only other national stock market in which many SICAV had a relatively large portfolio is the U.S. stock market. The estimation of the national factors (ε) normally stems directly from equation (2): The procedure is to regress the national index against the world index, and to use the residuals of this regression as estimates of the national factor. However, the U.S. stock market has a weight of more than .60 in the world index we use,

and is very highly correlated with the world stock market. That is very probably why the application of the above procedure to the U.S. stock market index did not yield satisfactory results.

The model used for estimating equation (5) was therefore

$$\tilde{r} - R = \alpha + x_{FB}\,\beta_{FB}\,(\tilde{I}_{FB} - R_F) + x_s\,\gamma'(\tilde{r}_w - R_w)$$

$$+ x_{FS}\,\beta_{FS}\,(\tilde{I}_{FS} - R_F) + \tilde{\eta} \qquad (7)$$

and for equation (4) it was

$$\tilde{r} - R = \alpha + x_{FB}\,\beta_{FB}\,(\tilde{I}_{FB} - R_F) + x_s\,\gamma(\tilde{r}_w - R_w)$$

$$+ x_{FS}\,\beta_{FS}\,\tilde{\varepsilon}_{FS} + \tilde{\eta} \qquad (8)$$

Monthly returns were used because it was the only way to get enough degrees of freedom for the time-series regressions and also enough stock SICAV to perform a cross sectional regression. 40 SICAV were studied. For the fifteen oldest of those, 48 periods of data were available, and for the other the number of periods varied between 24 and 48. The exact number of periods for each fund is given in Chapter IV, for instance in Table III A3.

The exact distribution of assets was known at the end of each quarter in most cases, and the average distribution of

assets during any month was estimated by linear interpolation, which was an acceptable approximation, given that the changes from one quarter to the next were usually quite small. Appendix A describes in greater detail the data base available on the SICAV.

Equation (4a) gives the exact definition for R. Given the combined weight of cash, French bonds and French stocks in the portfolios of the SICAV, R is close to the risk-free rate in France. On the other hand, the calculation of the exact value of R from Equation (4a) would require to compute the exact percentage of assets in any country where a SICAV has assets, and to multiply the percentages by the risk free rates in these countries. Therefore, the risk free rates in France was used for the time series regression of equation (8), and for those of equation (7), the rates used were the French risk free rate for cash, French bonds and French stocks, the U.S. risk free rate for the U.S., and the Eurodollar rate in London for all the other countries. The errors coming from this factor were checked and found to be very small.

2. Results for three-factors model

Time series regressions results for equation (7) (which includes the French stock market index) are given in table V A1, with a summary of the results in table V A2.

The percentage of variance explained appears to be relatively large: 0.813. This can be compared to the results obtained by two other authors for the U.S. mutual funds:

Jensen in [13] studied 115 American mutual funds, with annual returns in 1955-64 and obtained an average R^2 of 0.85. Sharpe in [23] studied 34 mutual funds, with annual returns in 1954-63 and the average R^2 was 0.878. In Chapter IV, we found an average of 0.680 for the French model and of 0.457 for the single index world market model, using monthly returns in both cases. The estimates of γ' and of the volatility on the French stock market are in general very highly significant: These coefficients average respectively 0.517 and 1.109, with standard errors averaging 0.118 and 0.176. However, the volatilities on the French bond market were not in general very significant. In a few cases, the values of the coefficients were large in absolute value.

It is interesting to look at the values of the coefficient, keeping in mind its interpretation. Only two funds have a negative coefficient: Slivafrance (-0.036) and IMSI (-0.091), but they are not significantly different from 0. Livret Portefeuille has also a very small coefficient (0.0283). The group of the SICAV specialized in building societies has low coefficients: Apart from the already mentioned IMSI, the coefficients are 0.12 (Aedificandi) and 0.11 (Pierre Investissement). America Valor, a SICAV which has stocks only in the U.S. or in Canada, has the largest coefficient. This is in accordance with the orientation of the fund towards growth. Other SICAV having a high γ' coefficient are France Placement (0.76), Paribas Gestion (0.79), Roths-

child Expansion (0.86), Selection Mondiale (0.81) and Soginter (0.83). We had noted in Chapter II that all these funds are setting international diversification as their primary investment objective. The other two SICAV in our sample which had stated a similar objective have lower coefficients: 0.36 (credinter) and 0.59 (UAP Investissement).

The analysis of the systematic risks on the French stock market for the stock SICAV which describe their main investment objective as being growth does not show such a clear distinction: Epargne-Croissance has a volatility of 1.53, but the other growth SICAV do not appear to have above average volatilities: Actanea (0.81) Eurocroissance (0.71), France Croissance (1.06), Indovaleurs (1.10) and Selection Croissance (1.08). The stock SICAV specializing in the stocks of building societies are, again, those which have the lowest volatilities: 0.36 (Aedificandi), 0.52 (IMSI) and 0.23 (Pierre Investissement). The other volatilities are usually much higher, except for Worms Investissement (0.44, but with a large standard error).

The constant terms tend to be negative. However, their interpretation is ambiguous, as equation (5) shows: A positive or negative constant term can come from either selectivity (i.e., α in equation (5)) or from a positive or a negative average realized return of the national factors during the period. Whatever the cause might be, the interpretation of the constant terms is subject to the important qualificatio

that a period of four years(at most) is probably not long enough to judge whether they are the result of chance or not. The constant terms average -0.15, with an average t-statistic of 0.97. Seven constant terms are significant at the 95% level of confidence: Six of these are negative.

Since the estimates of the coefficients for the French bonds had in a number of cases very large standard errors, time series regressions were also run in which the volatilities of the portfolios of French bonds were arbitrarily set to one, i.e., the bond returns were removed from the portfolios returns, assuming $\beta_{FB} = 1$. The regressions run were of the form:

$$\tilde{r} - R - x_{FB} (\tilde{I}_{FB} - R_F) = \alpha + x_S \gamma'(\tilde{r}_w - R_w)$$

$$+ x_{FS} \beta_{FS} (\tilde{I}_{FS} - R_F) + \tilde{\eta} \qquad (7a)$$

The results are shown in Table V B1, with summary statistics in Table V B2. As expected, the percentage of variance explained declined. However, the R^2 are not exactly comparable, since the dependent variable in equation (7a) has a smaller variance than the one in equation (7). The other results did not change very much, in particular, the coefficient and the volatility on the French stock market. The only notable change was the increase of the average t-statistic of the constant, from 0.97 to 1.28. Twelve con-

stant terms were then significant at the 95% level of confidence: Nine were negative and three positive (the three SICAV specializing in stocks of building societies). For the nine SICAV having a significantly negative constant term, the average constant term was -0.43% per month, i.e., about -5.2% per year. It is unlikely that the error which might have been done on the portfolio of bonds could explain a constant term of that magnitude. Among the SICAV which have a significantly negative constant term, are three SICAV which make international diversification their primary objective, and three other have an important proportion of their assets in foreign stocks. It might therefore be that the negative constant terms are caused in part by the relatively high cost of buying foreign stocks, even for a SICAV. However, this is only an hypothesis.

3. Results for three factors orthogonalized model

Time series regressions results for equation (8) are shown in table V C1, with summary statistics in table V C2.

The measures of the average international systematic risk average 0.885 and have an average standard error of 0.109. America Valor was the fund with the highest international systematic risk (1.74), and the SICAV defining their objective as being international diversification had generally higher coefficients. The fund restricting its investment to French securities had a coefficient equal to 0.63. The three SICAV specializing in stocks of building societies had the

lowest coefficients: .31 (Aedificandi), .19 (IMSI) and .24 (Pierre Investissement). All the other SICAV had coefficient higher than 0.60.

The constant terms were the only other estimates which were markedly different from those obtained from time-series regressions of equation (7). The mean of the constant term increased from -0.146 to -0.068. In fact, this change in the value of the constant is not surprising, since another approximation of the average risk free rate applicable to the SICAV was used in these regressions.

All the other coefficients, especially the volatilities on the French stock market, were very close to those which had been estimated by time-series regressions of equation (7): The average volatility on the French stock market was 1.119, compared to 1.109 before.

For six SICAV which have a significant share of their assets in Japanese stocks, time-series regressions were run, including the Japanese factor

$$\tilde{r}-R = \alpha + \beta_{FB}\, x_{FB}\, (\tilde{I}_{FB} - R_F) + x_s\, \gamma\, (\tilde{I}_w - R_w)$$

$$+ x_{FS}\, \beta_{FS}\, \tilde{\varepsilon}_{FS} + x_{JS}\, \beta_{JS}\, \tilde{\varepsilon}_{JS} + \tilde{\eta} \qquad (9)$$

where the subscript JS stands for Japanese stocks.

The results for these regressions are shown in table V C4. The volatility on the Japanese stock market is significant at

the 95% level of confidence in all but one case. This was for SOGINCO which, at the end of 1971, had invested in stocks of only three Japanese issuers. The average percentage of variance explained increased from .7294 to .7829 for these six funds. As expected, the change in the other coefficients estimated was quite small: The average absolute value of the deviation was 0.04 for the average international systematic risk and 0.06 for the volatility on the French stock market.

Finally, similarly to what has already been done above, time series regressions were used to estimate the following equation

$$\tilde{r} - R - x_{FB}(\tilde{I}_{FB} - R_F) = \alpha + x_s \gamma (\tilde{I}_w - R_w) + x_{FS} \beta_{FS} \tilde{\varepsilon}_{FS} + \tilde{\eta} \qquad (8a)$$

in which the volatility on the French bonds market was arbitrarily set to one. Results for these regressions are shown in Table V D1, and summary statistics in Table V D2. As before, the percentage of variance explained declined (from 0.814 to 0.794), which can, in part be attributed to the smaller variance of the modified dependent variable. The changes in the other terms were very small, except for the average t-statistic of the constant which increased from 0.835 to 1.059. In particular, eight constant terms had t-statistics significant at the 95% level of confidence. Four

were positive and four negative.

For the six SICAV having a significant share of their assets in Japan, similar regressions were also performed, for which the equation was

$$\tilde{r} - R - s_{FB}(\tilde{I}_{FB} - R_F) = \alpha + x_s \gamma(\tilde{I}_w - R_w) + x_{FS} \beta_{FS} \tilde{\varepsilon}_{FS}$$

$$+ x_{JS} \beta_{JS} \tilde{\varepsilon}_{JS} + \tilde{\eta} \qquad (9a)$$

in which JS still refers to Japanese stocks. The results are shown in Table V D4. As before, the percentage of variance explained was lower and the changes in the coefficients estimated were small compared to the standard error of the estimates.

C. Cross sectional regressions

Cross sectional regressions were run for the first two types of time-series regressions which were performed. The specification for the first type of time series regressions (Equation (7)) was

$$\overline{(\tilde{r}-R)}_j = a_o + a_1 \beta_{FB} \left[\overline{x_{FB}(\tilde{I}_{FB} - R_F)}\right]_j + a_2 \gamma \left[\overline{x_s(\tilde{I}_w - R_w)}\right]_j$$

$$+ a_3 \beta_{FS} \left[\overline{x_{FS}(\tilde{I}_{FS} - R_F)}\right]_j + \tilde{\eta} \qquad (10)$$

where $\bar{u}_j$ is defined as the mean of the variable u over the period during which the time-series regression for SICAV j were run. The theoretical values for a_1 a_2 and a_3 are 1 and for a_o the theoretical value is 0.

The results for the regression of equation (10) are given in table V A3. The percentage of variance explained is 25.2% and the standard error of the regression is 0.273% per month. The coefficients a_2 and a_3 are not statistically different from 1 (at the 95% level of confidence). The coefficient a_1, which is the coefficient related to French bonds, is significantly lower than 1.

The constant term is very small, and not statistically different from zero.

In order to check what effect the least significant points might have on the above cross sectional regression, another regression was performed in which the seven SICAV with the lowest percentages of variance explained were dropped: The results are shown in Table V A4. They show that the percentage of variance explained increased to 34.8% and the standard error of the regression was 0.197% per month. The coefficients a_2 and a_3 shifted closer to 1, especially for a_3. Both were not statistically different from 1. The coefficient a_1, related to French bonds, was still significantly lower than 1. The constant term remained small and not statistically different from zero.

Cross sectional regressions were also run for the time

series regressions corresponding to equation (7a). The percentage of variance explained dropped in this regression, but it was mainly due to the smaller variance of the dependent variable, since the standard error of the regression remained about the same as it was before (for the same number of funds).

Cross sectional regressions for the other two types of time-series regressions could not be run satisfactorily for the following reason: The average value of the French stock market factor ($\tilde{\varepsilon}_{FS}$) is expected to be zero over a long enough period of time and, over a four-year period, as Appendix B indicates, this was approximately true (see Appendix B, Table B1). Therefore, if a cross sectional regression similar to equation (10) is run, the term $\overline{x_{FS}\,\tilde{\varepsilon}_{FS}}$ (where the average is taken over a two-to-four-year period) will be quite small, except when the variance of x_{FS} is very large: It will also be very sensitive to random fluctuations or measurement errors in the determination of $\tilde{\varepsilon}_{FS}$. This is probably why the regressions shown in Tables V C3 and V D3 are not satisfactory.

D. Sensitivity to French and World factors for 40 SICAV, at the end of 1972

Table V E1 shows for each of 40 stock SICAV the sensitivities of the returns to the World and French factors. These sensitivity measures are direct outgrowths of the time-series regressions of equation (7) and are defined as follow:

$$\text{Sensitivity to World factor} = x_s \cdot \gamma'$$

$$\text{Sensitivity to French factor} = x_{FS} \cdot \beta_{FS}$$

where x_s and x_{FS} are taken at the end of 1972. An implicit assumption is that γ' and β_{FS} at the end of 1972 were equal to their mean during the measurement period. Under this assumption, the sensitivities are estimates of the expected elasticities of the returns of the SICAV with respect to the French and World indices: For instance, a sensitivity of 0.5 for the French factor means that a 10% return on the French stock market index can be expected to result in a 5% return for the SICAV. The term "sensitivity to world factor" is subject to the same qualification as was made after γ' was defined, since world factors influence the French stock market index.

The percentages of variance explained by the time-series regressions of equation (7) are also given, since they indicate the extent to which factors other than those accounted for in equation (7) have affected the returns of the SICAV in the past, and might therefore continue to do it in the future.

These three different characteristics of the SICAV show that the various funds are relatively differentiated assets.

Slivafrance, for instance, is sensitive only to the French factor (sensitivity of 0.61) and has a high diversifi-

cation on this market (R^2 = 0.9498). Livret Portefeuille has also a very small sensitivity to World factors and a sensitivity of 0.525 to the French factors. However, its diversification is smaller (R^2 = 0.8346). The other SICAV having a low sensitivity to world factors are the three SICAV specializing in the stocks of building societies (Aedificandi, IMSI and Pierre Investissement). However, they have different sensitivities to the French factor, and different degrees of diversification.

America Valor is the SICAV which has the highest sensitivity to the world factor. Its degree of diversification is relatively high for a SICAV invested in only one market, but it reflects the high percentage of variance in the U.S. stock market that is explained by the world index. The SICAV which have the next highest sensitivities to world factors are Paribas Gestion (0.621), Soginter (0.603), Rothschild Expansion (0.575) and France Placement (0.544), and they are all SICAV for which international diversification is the main objective. However, the degrees of diversification are different, since they are 0.8457 and 0.8377 for Paribas Gestion and Rothschild Expansion respectively, while it is 0.7080 for Soginter. This can be related to the number of stocks from different issuers these SICAV had in portfolio at the end of 1971: They were 41 (from 10 countries) for SIGINTER, compared to 84 (from 9 countries) for Paribas Gestion, and 163 (from 11 countries) for Rothschild Expansion.

Between the three extremes that the France-oriented SICAV, the "SICAV immobilières" and the "international SICAV" appear to constitute, lie all the other SICAV: For instance, SICAV which are as sensitive to French factors than Sliva-france, but much more sensitive to world factors (Actions Selectionnées, France Croissance, Optima and Sogevar), with various degrees of diversification; or SICAV with average sensitivities to both the world and French factors.

This table is not complete, since it omits other national factors to which some SICAV might be sensitive; in particular, we have seen that for six SICAV at least, the Japanese factor was significant. For SOGINTER, using the results from Table V C4, the sensitivity to the Japanese factor is 0.15, and the sensitivities for the other five SICAV would be lower. However, the French and world factors together explain a large percentage of the variance of the returns, and considering only these two factors seems a reasonable approximation in most cases.

The basis for Table V E2 is equation (8), and therefore Table V C1. The sensitivity to the French factor has the same definition as above, but the estimates for β_{FS} are now those of Table V C1 (instead of table V A1), which explains the slight differences. The sensitivity to the world factor is now computed by using γ instead of γ', and we have already noted how the interpretations of these two measures differ. The resulting sensitivities to the world factor are larger but the same categories of funds emerge.

TABLE V A1

TIME-SERIES REGRESSIONS RESULTS FOR
THREE-MARKETS MODEL (40 STOCK SICAV)

SICAV	CONSTANT	FRENCH BONDS	FRENCH STOCKS	WORLD INDEX	R-SQUARED
Actanea	-0.3892	1.021	0.8140	0.5231	0.8795
	(1.16)	(0.38)	(7.38)	(4.62)	
Actions Selectionnées	-0.1382	1.470	1.072	0.3467	0.9290
	(1.08)	(1.88)	(17.06)	(6.10)	
Aedificandi	0.1410	3.579	0.3586	0.1203	0.7960
	(0.58)	(2.93)	(5.01)	(1.31)	
America-Valor	-0.2486	-1.867		1.735	0.688
	(0.61)	(0.88)		(9.98)	
CIP	-0.1361	0.6419	0.9101	0.2497	0.8943
	(0.54)	(0.61)	(9.27)	(2.46)	
Credinter	0.1812	-0.7920	1.410	0.3563	0.8125
	(0.50)	(0.41)	(6.46)	(2.39)	
Drouot Investissement	-0.2909	2.384	1.056	0.5763	0.7342
	(0.73)	(1.05)	(4.16)	(3.48)	
Elysées Valeurs	-0.3674	1.273	1.313	0.6072	0.8983
	(2.25)	(1.46)	(11.90)	(7.82)	
Epargne Croissance	0.2911	-2.306	1.527	0.6411	0.9073
	(1.27)	(1.70)	(8.73)	(5.82)	
Epargne Mobilière	-0.1224	1.422	1.163	0.4518	0.9121
	(0.92)	(1.93)	(13.77)	(7.12)	
Epargne Unie	-0.0332	0.8562	1.186	0.4245	0.8330
	(0.11)	(0.56)	(7.10)	(3.05)	
Epargne Valeur	-0.0910	0.9983	1.088	0.4266	0.9352
	(0.82)	(1.47)	(16.44)	(8.08)	
Eurocroissance	-0.6279	3.832	0.7135	0.6581	0.6286
	(1.60)	(1.54)	(2.58)	(3.71)	
Fortune 1	-0.3663	-0.9057	1.100	0.4514	0.9427
	(1.74)	(0.71)	(12.80)	(4.69)	

TABLE V A1 (CONT)

SICAV	CONSTANT	FRENCH BONDS	FRENCH STOCKS	WORLD INDEX	R-SQUARED
France Croissance	-0.2220 (0.94)	-0.5832 (0.43)	1.061 (10.44)	0.4848 (4.65)	0.8974
France Investissement	-0.2956 (1.48)	0.6066 (0.54)	1.393 (8.82)	0.6199 (5.88)	0.8230
France Placement	-0.0389 (0.14)	-2.494 (1.29)	1.455 (6.30)	0.7559 (5.97)	0.7648
Gestion Mobilière	-0.3674 (1.18)	1.959 (0.97)	1.033 (6.07)	0.5977 (4.77)	0.8359
IMSI	0.8081 (1.98)	-0.8005 (0.42)	0.5248 (3.69)	-0.0914 (0.51)	0.4607
Indovaleurs	0.1328 (0.63)	-0.0254 (0.02)	1.098 (9.75)	0.4462 (4.55)	0.8958
Intercroissance	0.4203 (0.72)	2.409 (0.80)	1.089 (3.41)	0.5758 (2.39)	0.6708
Interselection	-0.2191 (0.69)	2.507 (1.09)	0.9856 (7.90)	0.2728 (1.99)	0.8262
Livret Portefeuille	0.0078 (0.04)	1.955 (2.11)	1.058 (12.47)	0.0283 (0.29)	0.8346
Optima	-0.1463 (0.54)	-0.2678 (0.18)	1.526 (6.49)	0.6875 (5.20)	0.7414
Paribas Gestion	0.0997 (0.33)	-1.337 (0.77)	1.081 (6.47)	0.7852 (6.28)	0.8457
Pierre Investissement	-0.1465 (0.54)	6.007 (4.15)	0.2320 (2.45)	0.1076 (0.87)	0.6719
Priges	-0.3685 (0.83)	1.489 (0.74)	1.321 (4.03)	0.7211 (3.96)	0.7628
Rothschild Expansion	-0.4921 (2.12)	1.318 (1.00)	0.9571 (4.06)	0.8568 (8.24)	0.8377
Selection Croissance	-0.3601 (1.72)	2.072 (1.63)	1.080 (8.88)	0.6025 (7.79)	0.9087

TABLE V A1 (CONT)

SICAV	CONSTANT	FRENCH BONDS	FRENCH STOCKS	WORLD INDEX	R-SQUARED
Selection Mondiale	-0.5671 (1.26)	1.469 (0.59)	1.578 (2.29)	0.8093 (4.85)	0.7276
Si Est	-0.1307 (0.55)	0.3444 (0.26)	1.233 (7.06)	0.5721 (5.06)	0.7653
Slivafrance	0.0807 (0.79)	1.298 (2.62)	1.035 (25.17)	-0.0358 (0.68)	0.9498
Slivam	-0.2142 (2.18)	0.3441 (0.72)	1.288 (19.75)	0.4162 (8.41)	0.9521
Sogevar	-0.1082 (0.79)	0.9723 (1.30)	1.225 (13.82)	0.4732 (6.78)	0.9078
Soginco	-0.7032 (1.84)	3.636 (1.73)	0.7277 (2.59)	0.6595 (4.60)	0.6664
Soginter	0.0729 (0.24)	-0.6650 (0.38)	2.136 (4.65)	0.8253 (5.84)	0.7080
Solei l Investissement	0.1181 (0.40)	-0.9794 (0.73)	1.434 (7.35)	0.5605 (4.40)	0.8482
UAP Investissement	-0.3833 (1.36)	0.8716 (0.60)	1.270 (7.33)	0.5930 (5.75)	0.9010
Valorem	0.0136 (0.10)	0.4787 (0.60)	1.292 (15.48)	0.3633 (5.78)	0.9212
Worms Investissement	-0.6453 (1.48)	3.670 (1.59)	0.4405 (2.24)	0.4439 (2.54)	0.6175

NOTES:

1. Figures in parentheses are t-statistics
2. For the exact number of periods for each SICAV, see Chapter 4, Table IV A3, for instance
3. The constants are in percent per month

TABLE V A2

SUMMARY STATISTICS FOR THREE MARKETS MODEL

(40 STOCK SICAV)

	Constant	French Bonds Coef.	French Stocks Coef.	World Index Coef.
Mean	-0.146	0.946	1.109	0.517
Standard dev.	0.300	1.785	0.357	0.303

	R^2	t-statistic constant	Standard Error Fr. Bonds Coef.	Standard Error Fr. Stocks Coef.	Standard Error World Index Coef.
Mean	0.813	0.970	1.535	0.176	0.118
Standard dev.	0.112	0.613	0.635	0.123	0.043

TABLE V A3

CROSS SECTIONAL REGRESSION FOR THREE-MARKETS MODEL

(40 STOCK SICAV)

Independent Variable	Estimated Coefficient	Standard Error	Predicted Value
Constant	-0.073	0.128	0
French Bonds Coefficient	0.509	0.216	1
French Stocks Coefficient	1.582	0.745	1
World Index Coefficient	0.664	0.240	1

$R^2 = 0.252$

Standard Error of the Regression = 0.273

TABLE V A4

CROSS SECTIONAL REGRESSION FOR THREE-MARKETS MODEL

(33 STOCK SICAV)

Independent Variable	Estimated Coefficient	Standard Error	Predicted Value
Constant	-0.049	0.126	0
French Bonds Coefficient	0.447	0.225	1
French Stocks Coefficient	1.101	0.703	1
World Index Coefficient	0.721	0.198	1

$R^2 = 0.348$

Standard Error of the Regression = 0.197

TABLE V B1

TIME-SERIES REGRESSIONS RESULTS FOR
TWO MARKETS MODEL (40 STOCK SICAV)

SICAV	CONSTANT	FRENCH STOCKS	WORLD INDEX	R-SQUARED
Actanea	-0.3873 (1.72)	0.8143 (7.87)	0.5232 (4.78)	0.8766
Actions Selectionnées	-0.1103 (0.94)	1.074 (17.24)	0.3485 (6.19)	0.9273
Aedificandi	0.5218 (2.93)	0.4195 (5.94)	0.1267 (1.28)	0.7196
America-Valor	-0.4420 (1.16)		1.719 (9.82)	0.6770
C.I.P.	-0.1998 (1.19)	0.8965 (10.20)	0.2491 (2.51)	0.8863
Credinter	-0.0651 (0.26)	1.327 (6.68)	0.3527 (2.37)	0.7965
Drouot Investissement	-0.1262 (0.44)	1.124 (5.00)	0.5826 (3.57)	0.7166
Elysees Valeurs	-0.3476 (2.34)	1.315 (12.06)	0.6085 (7.93)	0.8964
Epargne Croissance	-0.0933 (0.50)	1.341 (7.66)	0.6536 (5.35)	0.8762
Epargne Mobilière	-0.0933 (0.76)	1.167 (13.95)	0.4537 (7.21)	0.9095
Epargne Unie	-0.0527 (0.25)	1.178 (8.06)	0.4244 (3.11)	0.8231
Epargne Valeur	-0.0910 (0.90)	1.088 (16.66)	0.4266 (8.18)	0.9343
Eurocroissance	-0.3270 (1.13)	0.8467 (3.37)	0.6688 (3.75)	0.5952
Fortune 1	-0.5979 (4.08)	1.041 (13.27)	0.4571 (4.62)	0.9339
France Croissance	-0.4017 (2.25)	1.023 (10.57)	0.4724 (4.53)	0.8882

TABLE V B1 (CONT)

SICAV	CONSTANT	FRENCH STOCKS	WORLD INDEX	R-SQUARED
France Investissement	-0.3222	1.387	0.6184	0.8195
	(1.77)	(8.93)	(5.92)	
France Placement	-0.2554	1.391	0.7411	0.7460
	(1.00)	(5.94)	(5.73)	
Gestion Mobilière	-0.2653	1.067	0.6006	0.8275
	(1.20)	(6.99)	(4.87)	
IMSI	0.5282	0.4695	-0.0891	0.4161
	(1.88)	(3.63)	(0.46)	
Indovaleurs	0.0318	1.063	0.4449	0.8892
	(0.20)	(10.55)	(4.58)	
Intercroissance	0.6107	1.153	0.5825	0.6519
	(1.51)	(4.09)	(2.47)	
Interselection	-0.0889	1.011	0.2776	0.8177
	(0.36)	(8.61)	(2.05)	
Livret Portefeuille	0.0779	1.059	0.0343	0.8275
	(0.44)	(12.47)	(0.36)	
Optima	-0.2365	1.490	0.6846	0.7339
	(0.95)	(6.47)	(5.21)	
Paribas Gestion	-0.1734	0.9884	0.7689	0.8292
	(0.77)	(6.40)	(6.09)	
Pierre Investissement	0.4893	0.3725	0.1221	0.4534
	(2.07)	(3.67)	(0.83)	
Priges	-0.2893	1.352	0.7249	0.7498
	(0.99)	(4.59)	(4.09)	
Rothschild Expansion	-0.4552	0.9822	0.8577	0.8291
	(2.65)	(4.70)	(8.38)	
Selection Croissance	-0.2381	1.121	0.6088	0.9021
	(1.58)	(10.08)	(7.94)	
Selection Mondiale	-0.5038	1.633	0.8112	0.7160
	(1.71)	(2.67)	(4.99)	
S.I. Est	-0.1716	1.223	0.5720	0.7614
	(0.78)	(7.11)	(5.10)	

TABLE V B1 (CONT)

SICAV	CONSTANT	FRENCH STOCKS	WORLD INDEX	R-SQUARED
Slivafrance	0.1010 (1.06)	1.036 (25.38)	-0.0349 (0.67)	0.9487
Slivam	-0.2627 (2.83)	1.284 (19.51)	0.4138 (8.28)	0.9495
Sogevar	-0.1101 (0.87)	1.224 (14.02)	0.4730 (6.86)	0.9060
Soginco	-0.3906 (1.33)	0.8631 (3.30)	0.6710 (4.65)	0.6323
Soginter	-0.0447 (0.16)	2.085 (4.57)	0.8197 (5.81)	0.6998
Soleil Investissement	-0.1854 (0.85)	1.310 (7.28)	0.5630 (4.33)	0.8285
UAP Investissement	-0.4017 (2.16)	1.263 (8.27)	0.5928 (5.89)	0.8961
Valorem	-0.0241 (0.20)	1.288 (15.57)	0.3601 (5.78)	0.9192
Worms Investissement	-0.2923 (0.94)	0.5397 (3.02)	0.4380 (2.49)	0.5646

NOTES:
1. Figures in parentheses are t-statistics.
2. For the exact number of periods for each SICAV, see Chapter IV, Table IV A3, for instance
3. The constants are in percent per month.

TABLE V B2

SUMMARY STATISTICS FOR TWO MARKETS MODEL

(40 STOCK SICAV)

	CONSTANT	FRENCH STOCKS COEF.	WORLD INDEX COEF.	R^2
Mean	-0.142	1.111	0.518	0.794
Standard dev.	0.280	0.323	0.300	0.131

	t-STATISTIC CONSTANT	STANDARD ERROR FRENCH STOCKS COEFFICIENT	STANDARD ERROR WORLD INDEX COEFFICIENT
Mean	1.278	0.164	0.119
Standard dev.	0.875	0.111	0.043

TABLE V B3

CROSS SECTIONAL REGRESSION FOR TWO-MARKETS MODEL

(40 STOCK SICAV)

Independent Variable	Estimated Coefficient	Standard Error	Predicted Value
Constant	-0.060	0.113	0
French Stocks Coefficient	1.250	0.693	1
World Index Coefficient	0.542	0.239	1

$R^2 = 0.150$

Standard error of the regression: 0.270

TABLE V C1

TIME-SERIES REGRESSIONS RESULTS FOR
THREE-MARKETS ORTHOGONALIZED MODEL (41 STOCK SICAV)

SICAV	CONSTANT	FRENCH BONDS	FRENCH STOCKS	WORLD INDEX	R-SQUARED
Actanea	-0.3236 (0.94)	1.074 (0.39)	0.8152 (7.30)	0.8533 (8.09)	0.8778
Actions Selectionnées	-0.0248 (0.20)	1.439 (1.88)	1.078 (17.37)	0.8089 (16.52)	0.9314
Aedificandi	0.1879 (0.76)	3.567 (2.91)	0.3588 (4.99)	0.3119 (3.67)	0.7951
America-Valor	-0.2487 (0.61)	-1.849 (0.87)		1.743 (10.01)	0.6903
CIP	-0.0716 (0.28)	0.6613 (0.64)	0.9176 (9.46)	0.6502 (7.06)	0.8976
Credinter	0.2713 (0.74)	-0.8453 (0.44)	1.444 (6.54)	0.7590 (5.58)	0.8156
Drouot Investissement	-0.2258 (0.56)	2.375 (1.04)	1.046 (4.12)	0.8821 (5.71)	0.7317
Elysées Valeurs	-0.246 (1.56)	1.314 (1.55)	1.334 (12.36)	1.050 (15.81)	0.9041
Epargne Croissance	0.3684 (1.54)	-2.374 (1.71)	1.522 (8.49)	1.057 (10.19)	0.9031
Epargne Mobilière	-0.016 (0.12)	1.449 (1.97)	1.168 (13.76)	0.8865 (15.93)	0.9120
Epargne Unie	0.0681 (0.22)	0.8519 (0.56)	1.184 (7.16)	0.8574 (6.79)	0.8349
Epargne Valeur	0.013 (0.12)	0.984 (1.45)	1.093 (16.51)	0.8658 (18.92)	0.9356
Eurocroissance	-0.6213 (1.55)	3.918 (1.55)	0.6622 (2.39)	0.9185 (5.50)	0.6193
Fortune 1	-0.2593 (1.21)	-0.9254 (0.72)	1.106 (12.83)	0.9661 (10.85)	0.9430

TABLE V C1 (CONT)

SICAV	CONSTANT	FRENCH BONDS	FRENCH STOCKS	WORLD INDEX	R-SQUARED
France Croissance	-0.1282 (0.54)	-0.7823 (0.57)	1.075 (10.43)	0.9184 (9.49)	0.8975
France Epargne	-0.1535 (0.71)	0.6008 (1.15)	1.302 (6.80)	0.8935 (5.77)	0.7959
France Investissement	-0.191 (0.97)	0.7891 (0.71)	1.398 (8.97)	1.045 (11.19)	0.8272
France Placement	0.055 (0.20)	-2.525 (1.31)	1.463 (6.37)	1.164 (10.46)	0.7683
Gestion Mobilière	-0.3036 (0.95)	1.915 (0.94)	1.033 (5.99)	0.9293 (7.96)	0.8334
IMSI	0.8643 (2.14)	-0.8346 (0.45)	0.5382 (3.86)	0.1860 (1.18)	0.4806
Indovaleurs	0.2534 (1.15)	-0.1486 (0.10)	1.101 (9.56)	0.8757 (9.52)	0.8928
Intercroissance	0.4853 (0.82)	2.413 (0.80)	1.095 (3.43)	0.9354 (4.17)	0.6717
Interselection	-0.1032 (0.33)	2.346 (1.04)	1.006 (8.07)	0.7096 (5.80)	0.8318
Livret Portefeuille	0.117 (0.62)	1.834 (2.01)	1.064 (12.74)	0.6338 (7.76)	0.8401
Optima	-0.026 (0.10)	-0.080 (0.05)	1.556 (6.63)	1.063 (9.06)	0.7471
Paribas Gestion	0.2033 (0.66)	-1.624 (0.93)	1.110 (6.55)	1.119 (9.46)	0.8482
Pierre Investissement	-0.1168 (0.42)	6.002 (4.14)	0.2324 (2.44)	0.2416 (2.16)	0.6708
Priges	-0.3262 (0.73)	1.498 (0.74)	1.299 (4.03)	1.033 (5.99)	0.7632
Rothschild Expansion	-0.4332 (1.83)	1.270 (0.96)	0.9708 (4.06)	1.083 (11.13)	0.8372

TABLE V C1 (CONT)

SICAV	CONSTANT	FRENCH BONDS	FRENCH STOCKS	WORLD INDEX	R-SQUARED
Selection Croissance	-0.2549 (1.21)	2.035 (1.63)	1.096 (0.09)	0.9823 (13.76)	0.9116
Selection Mondiale	-0.5107 (1.10)	1.283 (0.51)	1.567 (2.23)	0.9801 (6.19)	0.7247
SI EST	-0.036 (0.15)	0.5721 (0.44)	1.239 (7.22)	0.9633 (9.79)	0.7713
Slivafrance	0.2143 (2.11)	1.281 (2.59)	1.036 (25.21)	0.6313 (13.84)	0.9499
Slivam	-0.1269 (1.28)	0.3343 (0.70)	1.285 (19.56)	0.9343 (21.88)	0.9513
Sogevar	-0.0093 (0.07)	0.9982 (1.32)	1.217 (13.65)	0.9449 (15.19)	0.9062
Soginco	-0.6473 (1.66)	3.577 (1.70)	0.7370 (2.59)	0.8629 (6.38)	0.6648
Soginter	0.1562 (0.51)	-0.6153 (0.36)	2.148 (4.66)	1.145 (9.24)	0.7097
Soleil Investissement	0.1886 (0.62)	-09747 (0.72)	1.429 (7.22)	0.9985 (8.55)	0.8449
UAP Investissement	-0.2837 (0.97)	0.7303 (0.49)	1.292 (7.19)	0.9101 (9.38)	0.8980
Valorem	0.0838 (0.61)	0.5236 (0.64)	1.278 (15.01)	0.8856 (16.04)	0.9173
Worms Investissement	-0.6114 (1.38)	3.603 (1.55)	0.4346 (2.20)	0.6150 (3.84)	0.6147

NOTES:

1. Figures in parentheses are t-statistics
2. For the exact number of periods for each SICAV, see Chapter IV, Table IV A3, for instance
3. The constants are in percent per month

TABLE V C2

SUMMARY STATISTICS FOR THREE-MARKETS
ORTHOGONALIZED MODEL (41 STOCK SICAV)

	CONSTANT	FRENCH BONDS COEF.	FRENCH STOCKS COEF.	WORLD INDEX COEF.	R^2
Mean	-0.068	0.920	1.119	0.885	0.814
Standard dev.	0.305	1.768	0.357	0.260	0.109

	t-STATISTIC CONSTANT	STANDARD ERR. FRENCH BONDS COEFFICIENT	STANDARD ERR. FRENCH STOCKS COEFFICIENT	STANDARD ER. WORLD INDEX COEFFICIENT
Mean	0.835	1.526	0.177	0.109
Standard dev.	0.561	0.655	0.123	0.042

TABLE V C3

CROSS SECTIONAL REGRESSION FOR
THREE-MARKETS ORTHOGONALIZED MODEL

(41 STOCK SICAV)

Independent Variable	Estimated Coefficient	Standard Error	Predicted Value
C	0.080	0.079	0
French Bonds Coefficient	0.348	0.194	1
French Stocks Coefficient	-0.512	0.708	1
World Index Coefficient	0.300	0.296	1

$R^2 = 0.262$

Standard error of regression = 0.266

TABLE V C4

TIME-SERIES REGRESSION RESULTS FOR
FOUR MARKETS ORTHOGONALIZED MODEL, INCLUDING JAPAN

(6 STOCK SICAV)

SICAV	CONSTANT	WORLD INDEX	FRENCH BONDS	FRENCH STOCKS	JAPAN	R-SQUARED
France Placement	0.0633	1.158	-2.923	1.423	0.8350	0.7962
	(0.24)	(10.98)	(1.60)	(6.52)	(2.45)	
Intercroissance	0.2658	0.8254	2.371	1.006	1.748	0.8025
	(0.56)	(4.55)	(0.99)	(3.94)	(3.54)	
Rothschild Expansion	-0.4646	1.056	1.089	0.9495	0.4575	0.8529
	(2.03)	(11.12)	(0.85)	(4.11)	(1.82)	
Selection Mondiale	-0.6164	0.9045	0.9131	1.439	0.5950	0.8238
	(1.61)	(6.86)	(0.44)	(2.50)	(3.26)	
Soginco	-0.7220	0.8370	3.505	0.7120	0.7789	0.6810
	(1.85)	(6.17)	(1.68)	(2.51)	(1.25)	
Soginter	0.1428	1.136	-0.7643	2.091	0.8123	0.7413
	(0.49)	(9.60)	(0.46)	(4.75)	(2.29)	

TABLE V D1

TIME-SERIES REGRESSIONS RESULTS FOR
TWO MARKETS ORTHOGONALIZED MODEL

(41 STOCK SICAV)

SICAV	CONSTANT	FRENCH STOCKS	WORLD INDEX	R-SQUARED
Actanea	-0.3168 (1.39)	0.8160 (7.78)	0.8541 (8.63)	0.8749
Actions Selectionnées	0.0014 (0.01)	1.080 (17.56)	0.8114 (16.76)	0.9298
Aedificandi	0.5749 (3.20)	0.4195 (5.92)	0.3502 (3.92)	0.7193
America-Valor	-0.4408 (1.15)		1.727 (9.86)	0.6787
C.I.P.	-0.1328 (0.80)	0.9050 (10.38)	0.6441 (7.30)	0.8900
Credinter	0.0126 (0.05)	1.358 (6.73)	0.7313 (5.51)	0.7994
Drouot Investissement	-0.0578 (0.20)	1.112 (4.92)	0.9076 (6.18)	0.7141
Elysées Valeurs	-0.223 (1.55)	1.336 (12.52)	1.052 (16.07)	0.9022
Epargne Croissance	-0.0334 (0.17)	1.334 (7.43)	1.019 (8.95)	0.8711
Epargne Mobilière	0.015 (0.13)	1.172 (13.93)	0.8899 (16.19)	0.9094
Epargne Unie	0.0474 (0.22)	1.177 (8.10)	0.8565 (7.09)	0.8253
Epargne Valeur	0.012 (0.12)	1.093 (16.72)	0.8657 (19.22)	0.9347
Eurocroissance	-0.3067 (1.04)	0.7981 (3.18)	0.9794 (6.16)	0.5857
Fortune 1	-0.4992 (3.39)	1.046 (13.27)	0.9443 (10.44)	0.9341

TABLE V D1 (CONT)

SICAV	CONSTANT	FRENCH STOCKS	WORLD INDEX	R-SQUARED
France Croissance	-0.3335 (1.84)	1.030 (10.47)	0.8371 (9.34)	0.8870
France Epargne	-0.2638 (1.64)	1.234 (7.36)	0.8681 (5.78)	0.7516
France Investissement	-0.205 (1.14)	1.395 (9.09)	1.043 (11.35)	0.8242
France Placement	-0.168 (0.66)	1.399 (6.01)	1.131 (10.04)	0.7492
Gestion Mobilière	-0.2043 (0.90)	1.065 (6.89)	0.9421 (8.45)	0.8251
IMSI	0.5738 (2.07)	0.4829 (3.78)	0.1659 (1.06)	0.4358
Indovaleurs	0.1361 (0.85)	1.062 (10.30)	0.8595 (9.65)	0.8857
Intercroissance	0.6801 (1.66)	1.159 (4.09)	0.9631 (4.53)	0.6531
Interselection	0.0154 (0.06)	1.029 (8.80)	0.7237 (6.10)	0.8241
Livret Portefeuille	0.178 (1.02)	1.065 (12.78)	0.6393 (7.87)	0.8341
Optima	-0.105 (0.43)	1.529 (6.64)	1.054 (9.09)	0.7408
Paribas Gestion	-0.1107 (0.49)	1.001 (6.39)	1.069 (9.20)	0.8294
Pierre Investissement	0.5349 (2.24)	0.3731 (3.66)	0.3363 (2.61)	0.4526
Priges	-0.2446 (0.83)	1.329 (4.55)	1.044 (6.41)	0.7505
Rothschild Expansion	-0.4008 (2.31)	0.9922 (4.67)	1.089 (11.86)	0.8287

TABLE V D1 (CONT)

SICAV	CONSTANT	FRENCH STOCKS	WORLD INDEX	R-SQUARED
Selection Croissance	-0.1336	1.135	1.002	0.9053
	(0.89)	(10.28)	(14.97)	
Selection Mondiale	-0.4715	1.602	0.9846	0.7136
	(1.56)	(2.60)	(6.58)	
S.I. Est	-0.063	1.234	0.9611	0.7683
	(0.29)	(7.29)	(9.88)	
Slivafrance	0.2335	1.037	0.6326	0.9489
	(2.46)	(25.43)	(13.99)	
Slivam	-0.1763	1.281	0.9302	0.9487
	(1.89)	(19.32)	(21.61)	
Sogevar	-0.0094	1.217	0.9449	0.9044
	(0.07)	(13.84)	(15.45)	
Soginco	-0.3324	0.8705	0.9104	0.6317
	(1.12)	(3.28)	(6.97)	
Soginter	0.040	2.103	1.132	0.7019
	(0.14)	(4.60)	(9.20)	
Soleil Investissement	-0.1209	1.306	0.9638	0.8253
	(0.54)	(7.16)	(8.27)	
UAP Investissement	-0.3233	1.278	0.9064	0.8930
	(1.69)	(8.07)	(9.79)	
Valorem	0.0492	1.275	0.8812	0.9154
	(0.40)	(15.12)	(16.22)	
Worms Investissement	-0.2601	0.5317	0.6452	0.5635
	(0.82)	(2.97)	(4.06)	

NOTES:

1. Figures in parentheses are t-statistics.
2. For the exact number of periods for each SICAV, see Chapter IV, Table IV A3, for instance.
3. The constants are in percent per month.

TABLE V D2

SUMMARY STATISTICS FOR TWO-MARKETS
ORTHOGONALIZED MODEL (41 STOCK SICAV)

	Constant	French Stocks Coef.	World Index Coef.	R^2
Mean	-0.069	1.117	0.886	0.794
Standard dev.	0.279	0.322	0.249	0.129

	t-statistic Constant	Standard Error French Stocks Coefficient	Standard Error World Index Coefficient
Mean	1.059	0.165	0.107
Standard dev.	0.871	0.110	0.040

TABLE V D3

CROSS SECTIONAL REGRESSION FOR
TWO-MARKETS ORTHOGONALIZED MODEL

(41 STOCK SICAV)

Independent Variable	Estimated Coefficient	Standard Error	Predicted Value
Constant	0.037	0.075	0
French Stocks Coefficient	-0.326	0.713	1
World Index Coefficient	0.286	0.295	1

$R^2 = 0.154$

Standard error of regression = 0.267

TABLE V D4

TIME-SERIES REGRESSION RESULTS FOR THREE-MARKETS ORTHOGONALIZED MODEL, INCLUDING JAPAN

(6 STOCK SICAV)

SICAV	CONSTANT	WORLD INDEX	FRENCH STOCKS	JAPAN	R-SQUARED
France Placement	-0.1834	1.22	1.355	0.7681	0.7731
	(0.75)	(10.36)	(6.03)	(2.17)	
Intercroissance	0.4546	0.8522	1.067	1.751	0.7900
	(1.37)	(4.95)	(4.69)	(3.60)	
Rothschild Expansion	-0.4540	1.058	0.9564	0.4589	0.8454
	(2.68)	(11.76)	(4.65)	(1.86)	
Selection Mondiale	-0.6283	0.9032	1.429	0.5945	0.8168
	(2.51)	(7.24)	(2.81)	(3.35)	
Soginco	-0.4182	0.8824	0.8409	0.8006	0.6496
	(1.39)	(6.73)	(3.19)	(1.28)	
Soginter	0.0165	1.123	2.043	0.7968	0.7326
	(0.06)	(9.52)	(4.65)	(2.25)	

TABLE V E1

DIVERSIFICATION AND SENSITIVITY TO WORLD AND FRENCH FACTORS, FOR 40 STOCK SICAV, AT TNE END OF 1972

	WORLD FACTOR	FRENCH FACTOR	R^2
Actanea	0.460	0.396	0.8795
Actions Selectionnées	0.271	0.587	0.9290
Aedificandi	0.083	0.205	0.7960
America-Valor	1.202	0.000	0.6888
C.I.P.	0.178	0.345	0.8943
Credinter	0.237	0.316	0.8125
Drouot Investissement	0.430	0.327	0.7342
Elysées Valeurs	0.439	0.458	0.8983
Epargne Croissance	0.440	0.348	0.9073
Epargne Mobilière	0.308	0.454	0.9121
Epargne Unie	0.274	0.386	0.8330
Epargne Valeur	0.290	0.429	0.9352
Eurocroissance	0.425	0.244	0.6286
Fortune 1	0.304	0.512	0.9427
France Croissance	0.429	0.515	0.8974
France Investissement	0.403	0.459	0.8230
France Placement	0.544	0.481	0.7648
Gestion Mobiliere	0.457	0.337	0.8359
IMSI	-0.062	0.243	0.4607
Indovaleurs	0.327	0.375	0.8958
Intercroissance	0.393	0.285	0.6708

TABLE V E1 (CONT)

	WORLD FACTOR	FRENCH FACTOR	R^2
Interselection	0.196	0.393	0.8262
Livret Portefeuille	0.018	0.525	0.8346
Optima	0.455	0.608	0.7414
Paribas Gestion	0.621	0.402	0.8457
Pierre Investissement	0.059	0.110	0.6719
Priges	0.509	0.285	0.7628
Rothschild Expansion	0.575	0.210	0.8377
Selection Croissance	0.442	0.409	0.9087
Selection Mondiale	0.565	0.184	0.7276
SI Est	0.420	0.472	0.7653
Slivafrance	-0.021	0.610	0.9498
Slivam	0.283	0.401	0.9521
Sogevar	0.347	0.526	0.9078
Soginco	0.499	0.222	0.6664
Soginter	0.603	0.369	0.7080
Soleil Investissement	0.365	0.328	0.8482
UAP Investissement	0.437	0.346	0.9010
Valorem	0.255	0.392	0.9212
Worms Investissement	0.313	0.166	0.6175

TABLE V E2

SENSITIVITY TO WORLD AND FRENCH FACTORS
FOR 40 STOCK SICAV, AT THE END OF 1972

	FRENCH FACTOR	WORLD FACTOR
Actanea	0.399	0.747
Actions Selectionnées	0.591	0.633
Aedificandi	0.201	0.215
America-Valor	0.000	1.206
C.I.P.	0.349	0.462
Credinter	0.323	0.505
Drouot Investissement	0.325	0.657
Elysées Valeurs	0.464	0.759
Epargne Croissance	0.346	0.727
Epargne Mobilière	0.457	0.607
Epargne Unie	0.384	0.555
Epargne Valeur	0.430	0.592
Eurocroissance	0.226	0.595
Fortune 1	0.516	0.654
France Croissance	0.524	0.815
France Investissement	0.461	0.683
France Placement	0.483	0.834
Gestion Mobilière	0.336	0.712
IMSI	0.250	0,128
Indovaleurs	0.375	0.644
Intercroissance	0.285	0.642

TABLE V E2 (CONT)

	FRENCH FACTOR	WORLD FACTOR
Interselection	0.403	0.512
Livret Portefeuille	0.526	0.397
Optima	0.622	0.704
Paribas Gestion	0.413	0.886
Pierre Investissement	0.109	0.131
Priges	0.281	0.728
Rothschild Expansion	0.212	0.725
Selection Croissance	0.416	0.719
Selection Mondiale	0.183	0.685
SI Est	0.475	0.705
Slivafrance	0.613	0.371
Slivam	0.401	0.632
Sogevar	0.524	0.689
Soginco	0.226	0.651
Soginter	0.372	0.840
Soleil Investissement	0.327	0.651
UAP Investissement	0.351	0.670
Valorem	0.388	0.625
Worms Investissement	0.162	0.437

NOTE: The Sensitivity to the world factor is defined for this table as the product of the average international systematic risk and the percentage of assets the SICAV has invested in stocks.

CHAPTER VI

SUMMARY OF CONCLUSIONS

A. Summary of results

Forty[1] stock SICAV have been analyzed in this study. At least two years of data were available for each fund, and their combined assets amounted to more than 93% of the assets of the 54 stock SICAV in existence at the end of 1972.

Three different models have been applied. First, a French market model, second a single index world model, and finally a multiple index model intermediate between the first two. Two specification of the multiple index model were used: orthogonalized and non-orthogonalized. Table VI 1 presents summary results for each model.

The French market model explained an average 68% of the variance of the monthly SICAV returns. It provided monthly volatility measures which had an average t-statistic of 9.64. The SICAV constant terms (α) were rarely significant (at the 95% level of confidence); however, they were usually positive (31 out of 42) and the average ($\bar{\alpha}$) was significantly greater than zero at the 1% level ($\bar{\alpha} = + 0.179$, $t_{\bar{\alpha}} = + 3.84$). The cross sectional regression however explained only 0.3% of the

---

1. This is the base sample. In Chapter IV, the "Victoire" fund (investing mainly in other SICAV) was also considered, but its particular portfolio did not allow its analysis in Chapter V. In part of Chapters IV and V, France Epargne, a bond SICAV which can also be considered as a stock SICAV was also included with stock SICAV.

variance of the returns.

The world single index model explained on average 45.7% of the variance of the monthly returns. The volatility measures had an average t-statistic of 5.46. The constant terms were not usually significant and were usually negative (30 out of 42). The average SICAV constant term ($\bar{\alpha}$) was significantly less than zero at the 1% level ($\bar{\alpha} = 0.165$, $t_{\bar{\alpha}} = 3.80$). The cross sectional regression did not validate this model: The slope of the line was equal to 0.480, with a standard error of 0.129, which is less than the theoretical value of 1 at the 5% level.

Three factors were included in the multinational index model: The World index, a French market factor, and a French bond index. Two slightly different specifications of the model were used: In the first, the non-orthogonalized version, the French market index was used; in the second, the orthogonalized version, the residual from the regression of the French index on the World index (the French national factor) was used. 81% of the variance of the monthly returns was explained in both cases. The coefficients for the World and French stock market indices were generally very significant, but those for French bonds were not. The constant terms were not usually significant at the 5% level, and were typically nega-

tive. The average SICAV constant term ($\bar{\alpha}$) was significantly less than zero at the 5% level in the non-orthogonalized version ($\bar{\alpha}$ = -0.146, $t_{\bar{\alpha}}$ = 3.08), but was not in the orthogonalized version ($\bar{\alpha}$ = -0.068, $t_{\bar{\alpha}}$ = 1.41).

Two cross sectional regressions were run for the non-orthogonalized version: The first included the French bonds, and the second did not. In either case, the coefficients did not differ significantly from their predicted values, except for the coefficient of the French bonds which was too low (see Table VI 1). The nature of the orthogonalized version of the multinational index model did not permit a cross sectional analysis since the average value of the French national factor is close to zero by construction.

For six funds having more than 10% of their assets in Japan, a four-factor orthogonalized version of the multinational index model including the Japanese national factor[2] was also used. The average percentage of variance explained increased by 5.35% for these six funds, and all but one of the measures of the volatility on the Japanese stock market were significant. As expected, the other coefficients did not differ significantly from those estimated without including the Japanese national factor.

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2. Defined similarly to the French national factor

TABLE VI 1

COMPARISON OF THE RESULTS FOR FOUR DIFFERENT MODELS

(monthly returns 1969 - 1972)

Model	Average Statistics for time-series regressions						Cross Sectional Regressions Results				
	R^2	Const. (st. Error)	t-stat. Beta French Stocks	t-stat. Beta French Bonds	t-stat. Beta World Index	R^2	Const. (St. Error)	French Stocks (St. Error)	French Bonds (St. Error)	World Index (St. Error)
French Market Model (41 SICAV)	0.680	0.179 (0.245)	9.64	—	—	0.003	0.278 (0.089)	0.216 (0.605)	--	--
World single index Model (41 SICAV)	0.457	-0.165 (0.349)	-- —	-- —	5.46	0.262	0.057 (0.068)	--	--	0.480 (0.129)
Multiple index model non-orthogonalized (40 SICAV)	0.813	-0.146 (0.275)	8.50	1.119	4.68	0.252	-0.073 (0.128)	1.582 (0.745)	0.509 (0.216)	0.664 (0.240)
Multiple index model orthogonalized (41 SICAV)	0.814	-0.068 (0.279)	8.48	1.129	9.41					
						Theoretical Values	0	1	1	1

B. Implications

Of the three main models used in this study, the multinational index model has, by far, the largest explanatory power: 81% of the variance of the SICAV returns is explained, compared to 68% and 46% for the French and world models respectively. The estimates of risk on the world and French stock markets were in general highly significant. The cross sectional regression for the SICAV's point towards an international pricing of risk, but with a dependence on national factors also, as claimed by the multinational index model.

The benefit that investors can derive from international diversification has already been discussed by many authors. The aggregate performance measure of the SICAV (measured on the French stock market) was found to be significantly positive, whereas the performance measures derived from the multinational index model were in general negative. This can be interpreted as further evidence of the advantage to the investor of international diversification.

However, most SICAV are far from being completely internationally diversified: By definition, a perfectly internationally diversified portfolio should show no dependence on national factors, and the percentage of variance explained by the world index should be close to 100%, the national factors

having been diversified away.[3] This does not appear to be completely the case for the SICAV: The world index alone explains only an average of 45.7%[4] of the variance of the SICAV returns, and the French index alone explains an average of 68% of the same variance.

Several reasons can probably be given for this lack of complete world diversification of many SICAV. The first is that at least 30% of their assets have to be invested in cash or French denominated bonds. However, the variance of the returns from these investments is comparatively small and Appendix B shows that the French bond market has a very small correlation with the world (R = 0.06) and French (R = 0.04) stock markets. This legal requirement has therefore little impact on our discussion. The second reason is that, as noted in Chapter II, SICAV having at least 50% of their portfolio

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3. National factors on a world stock market are comparable to industry factors on a single stock market, and this analogy perhaps makes the point clearer.

4. The maximum is 69.72% for Rothschild Expansion. A comparison can be made with 8 international portfolios constructed, for a different purpose, by Solnik in [27], pp. 100-104. From individual stocks in the U.S. and 8 European countries, portfolios invested in three or four countries were built. Since there were 28 to 45 stocks in each portfolio, the degree of international diversification achieved cannot be expected to be very large, but does not require assets larger than those of the smallest SICAV. It appears that the percentage of variance explained by the world index varied between 51 and 89%, with averages of 63% for the four three-countries portfolios, and 78% for the four four-countries portfolios.

invested in France may be used as investments for the technical reserves of the insurance companies, and for the "participation reserves" constituted under the current profit sharing laws. This has led many SICAV to limit voluntarily their foreign investments to less than 50% of their assets. The third reason is probably the cost of investing in foreign exchanges. In particular, during the period considered, capital flows regulations in France have sometimes made it very expensive to buy shares in foreign stock markets.[5]

However, a relatively high degree of international diversification has been achieved by many SICAV. The analysis of the "performance measures" provided by the multinational index model reveals that superior performance has typically not been achieved, except perhaps in the case of three building societies funds. The preponderance of negative performance measures may well reflect the relatively high cost of investing in foreign stock markets.

Finally, the results show that the national risk factor is important in explaining SICAV returns. For completely internationally diversified portfolios, the national risk factors would be irrelevant, and only the world systematic risk would be important. For the SICAV, we have seen that the French national factor is not generally diversified away, and both measures of risk should then be considered.

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5. See McDonald [19] footnote 16

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Appendix A

Data base on the SICAV

1. RETURNS

Monthly and quarterly returns were computed in the ordinary way, including capital gains and dividends, that is.

$$R_t = \frac{P_t + D_t - P_{t-1}}{P_{t-1}}$$

where R_t is the return of period t

P_t is the price at the end of period t

D_t is the dividend paid during period t

The tax credit ("avoir fiscal"), from which SICAV shareholders benefit as well as ordinary shareholders, was taken into account. It was assumed that it was received at a constant rate over the year preceding the dividend payment to which it is attached, and this first order approximation is justified by the small size and variability of this credit.

For monthly returns calculations, the source was the DAFSA quarterly bulletin on the SICAV ([25]). The same source was used to update the quarterly returns obtained from Judith Lewent.

2. DISTRIBUTION OF ASSETS

Distributions of assets were needed in Chapter V for stock SICAV. These informations are available at the end of

each quarter in [25]; for fifteen SICAV, the data are given since the end of 1968, and for the other since the end of 1970. [2] provides the distribution of assets at the end of each year for all existing SICAV.

Convertible bonds were included in the percentage of stocks for the stock SICAV. The main reason was that this solution implied the smallest possible relative error. A more subjective reason is that, since convertible bonds are considered as bonds for the 30% requirement of cash or bonds, fund managers willing to get more risky portfolios are likely to include in their portfolios convertible bonds having stock characteristics. This approximation was of small consequences for most SICAV, since the average percentage of convertible bonds was 3.50% for the stock SICAV at the end of 1972.

Foreign bonds, which are very often convertible bonds, and account for 1.11% of the portfolios of the stock SICAV, were included in foreign stocks for similar reasons.

Linear interpolation was used to deduce from the distribution of the portfolio at given dates the average distribution of assets during a month. This first-order approximation was justified by the relatively small variation of the distributions from one quarter to the next.

Appendix B

The Market Indices

1. FRENCH INDICES

- French Stock market index

The index used was the CAC index ("Indice de cours des valeurs françaises à revenu variable") computed by the "Compagnie des agents de change" (CAC), the brokers association. The Index is weighted by the market values, and the sample of stocks used is updated at the end of each year. At the start of 1968, 437 stocks were used to compute the index, representing 89% of the market value and 92% of the share turnover of the Paris Stock Exchange. The index is not adjusted for dividends, and the adjustment was made from the dividend yields found in the OECD Financial Statistics. The correction takes into account the tax credit attached to dividends.

- French Bond Market index

The index was built from three indices computed by the INSEE, which are the indices for the three following kinds of bonds: Fixed income securities of the public sector, indexed securities of the public sector and private sector (in French: "Secteur industriel public à revenu fixe", "Secteur industriel public à revenu indexé" and "Secteur libre"). These three group indices are computed from the securities having the largest market values and are partially weighted. The appreciation of the bonds due to the interests "earned" since the previous interest payment is deducted in the computation of

these indices. The three group indices were weighted by their market values at the beginning of each year for the whole year. The index was finally corrected for the interest payments, and the yield was obtained from the INSEE "Bulletin Mensuel de Statistique".

- French risk free rate

The exact short-term interest rate used is the rate called "Argent au jour le jour contre effets privés". It is published by the INSEE in the same source as above.

2. FOREIGN STOCK MARKET INDICES

For the computation of the world index, the stock market indices of the USA, Japan, Germany, France, the United Kingdom, Italy and the Netherlands were used. They were weighted by the groww national products of these countries: The weights were computed for each month or quarter, and the GNP's for these periods were estimated by linear interpolation from yearly GNP's. The indices used were all corrected for dividends.

- USA: Composite Standard and Poor's 500

- Japan: Tokyo Stock Exchange "old" index, based on 225 securities of the Tokyo Stock Exchange first section. (Computed daily, unweighted).

- Germany: For quarterly calculations, the Deutsche Bank index. However, since this index is not computed daily, the Herstatt index was used for the monthly calculations.

- U.K.: Financial Times index for industrial ordinary shares.

- Italy: The "Indice del corso secco" published by the Bank of Italy, for quarterly calculations. This index is based on 38 major stocks, representing about 40% of the market value of the Italian Stock Exchanges. For the monthly calculations, the "Il Sole" index was used.

- The Netherlands: The "ANP/CBS Beursindice". This is a partially weighted index (group indices are weighted by share turnover, but stocks entering the group indices are not weighted).

3. FOREIGN RISK FREE RATES

The eurodollar rate in London was defined exactly as the average of daily quotations for three months deposits, and was obtained from the IMF "International Monetary Statistics".

The U.S. risk free rate was the "average tender rate for three month Treasury bills" and was obtained from the Federal Reserve Bulletin.

The indices constructed were used to get the informations summarized in Table B1 to B6 concerning the impact of the world index on the various national stock markets, and the correlation between the national stock markets.

TABLE B1

Time Series Regressions of National Indices vs. World Index (Monthly Returns, 1969-1972)

	A	Standard error of A	B	Standard error of B	R^2	R
U.S.A.	-0.0693	0.239	1.1136	0.071	0.8429	.918
Japan	1.9985	0.608	1.0603	0.180	0.4292	.66
Germany	-0.5448	0.522	0.9731	0.155	0.4619	.68
France (Stocks)	0.2078	0.553	0.6454	0.164	0.2517	.50
U.K.	-0.0046	0.650	0.7813	0.193	0.2633	.51
Italy	-0.5871	0.550	0.3883	0.163	0.1097	.33
Netherlands	0.2071	0.559	1.1578	0.166	0.5152	.72
France (Bonds)	0.2453	0.097	0.0126	0.029	0.0041	.06

NOTE: The Equation for the regressions is

$$R_i - R_{Fi} = A + B(R_w - R_{EUDL}) + e$$

with R_i Return on Market R_{Fi} Risk free rate applicable to market i

R_w Return on World Index R_{EUDL} Eurodollar Rate in London

TABLE B2

Inter Markets Correlations

(Monthly Returns, 1969-1972)

	U.S.	JAPAN	FRENCH STOCKS	FRENCH BONDS	U.K.	GERMANY	ITALY	NETH.
U.S.	1.000	0.391	0.253	-0.066	0.360	0.447	0.236	0.494
JAPAN		1.000	0.365	-0.008	0.423	0.467	0.248	0.612
FRENCH STOCKS			1.000	0.037	0.198	0.568	0.162	0.574
FRENCH BONDS				1.000	-0.017	0.001	-0.026	0.093
U.K.					1.000	0.276	-0.022	0.338
GERMANY						1.000	0.164	0.692
ITALY							1.000	0.353
NETHERLANDS								1.000

TABLE B3

COMPARISON OF CORRELATIONS BETWEEN
THE U.S. STOCK MARKET AND OTHERS

(Monthly Returns)

JAPAN	GERMANY	FRANCE	U.K.	ITALY	NETHERLANDS	
.20	.39	NA	.35	NA	NA	Agmon (1961-1965)
NA	.05	NA	.21	NA	NA	Grubel and Fadner (1965-1971)
.19	.22	.16	.20	.07	.51	Solnik (1966-1971)
.39	.45	.25	.36	.24	.49	Present Study (1969-1972)

TABLE B4

COMPARISON OF CORRELATIONS BETWEEN
THE FRENCH STOCK MARKET AND OTHERS

(Monthly Returns)

U.S.	JAPAN	GERMANY	U.K.	NETHERLANDS	ITALY	
.056	.107	.283	.113	.168	.330	Solnik (1966-1971)
.253	.365	.568	.198	.574	.162	Present Study (1969-1972)

TABLE B5

TIME SERIES REGRESSIONS OF NATIONAL

INDICES VS. WORLD INDEX (QUARTERLY RETURNS, 1964-1972)

	A	Standard error of A	B	Standard error of B	R^2
U.S.A.	0.077	0.430	1.159	0.081	0.8615
Japan	3.380	1.551	0.988	0.292	0.2577
Germany	-0.476	0.884	0.843	0.166	0.4374
France (Stocks)	-0.404	1.216	0.561	0.229	0.1538
U.K.	0.967	1.121	0.875	0.211	0.3428
Italy	-1.770	1.226	0.201	0.231	0.0224
Netherlands	-0.476	0.861	1.047	0.162	0.5586
France (Bonds)	0.525	0.195	0.062	0.037	0.0795

Same note as for Table B1

TABLE B6

Inter Markets Correlations

(Quarterly Returns, 1964-1972)

	U.S.	JAPAN	FRENCH STOCKS	FRENCH BONDS	U.K.	GERMANY	ITALY	NETH.
U.S.	1.000	0.293	0.153	0.259	0.492	0.473	-0.031	0.579
JAPAN		1.000	0.194	0.110	0.233	0.279	0.144	0.397
FRENCH STOCKS			1.000	0.088	0.177	0.535	0.282	0.448
FRENCH BONDS				1.000	0.107	0.293	-0.047	0.246
U.K.					1.000	0.318	-0.008	0.467
GERMANY						1.000	0.224	0.772
ITALY							1.000	0.178
NETHERLANDS								1.000