Why did French Savers buy Foreign Asset before 1914? Decomposition of the Diversification Benefit

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Abstract:

The diversification effect is analysed through history using mainly data on French, Russia and US markets. Before 1914, financial markets appear integrated since various international assets are coherent with each other in terms of risk and return despite a weak correlation. This weak correlation explains incentive to export capital before 1914. But integration does not mean correlation. A new methodology to decompose the benefit from international diversification is proposed. This benefit is divided between a higher foreign return and a lower portfolio correlation deduced from a counterfactual hypothesis of a perfect correlation between the French and foreign markets. French savers were mostly attracted by low foreign correlation and not by higher returns because they could achieve a higher risk/return portfolio on domestic market. Long-run French-US correlation shows a gradual increase throughout the twentieth century, starting a second time from zero after WWII probably following an increase in GDP correlation. Today, the diversification benefit given by a foreign investment is more limited and has declined for the past 25 years

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This study aims at explaining the international diversification throughout time. Before 1914, European savers invested a large part of their portfolio in foreign securities. At this time individual investor held a lot of securities from overseas companies whereas the cost of holding foreign assets seemed to be stronger than today. This exportation of capital was often presented as one cause of the long depression of the end of the XIXth century in Europe and as manifestation of European financial imperialism. Bank fees on foreign issues was also presented as an explanation (Bouvier, 1961). Political link are frequently used to explain countries of capital exportation. Feis (1930), White (1933), Cameron (1961) and Levy-Leboyer (1977) conclude that French investment abroad was politically driven (for a survey see Parent & Rault, 2002). At least, higher foreign return is the common explanation for this exportation of capital. A classical counterparty of this higher foreign return is a higher foreign risk. But Edelstein (1982) shows that foreign assets for a British investor achieve a higher risk after adjustment for risk. However, Goetzmann & Ukhov (2006) demonstrate the crucial role of low correlation to explain diversification. What was the respective role of higher foreign return and low correlation to explain French diversification before 1914?

Tools offered by Modern Portfolio Theory are used to analyse incentives to diversify from the investor point of view. To achieve a strong result these tools require high quality data. High quality data are needed since a few default in methodology in the construction of the data has been magnified with the time. High quality data implies dividend/coupon series since dividends were the major source of return before 1914 (Siegel, 1992). Unfortunately, these kind of data are not easily available. Consequently, this study focuses only on few markets and assets with high quality data: US and France since 1854 and mainly Russian bonds between 1870 and 1913.

The first step for analysing international diversification is to validate international market integration at the beginning of the modern stock market era. Facts seem to agree with this hypothesis but this integration is difficult to prove. Once the integration hypothesis is accepted, the second step is to analyse the incentives of international diversification for a French investor. A new methodology is proposed to decompose international diversification benefit. Using a hypothetical hypothesis of perfect correlation between foreign and French markets, international diversification profit is decomposed into two parts: profit from weak correlation is obviously stronger than profit from higher return. This test shows that French investors bought US stocks and Russian bonds (and probably other foreign assets) more for

the low correlation effect than for receiving higher return. A French investor could achieve the same higher risk/return level on the domestic market. However, the diversification effect is huge before 1914 thanks to a low correlation with foreign markets.

A third step is an evaluation of the variation in incentive to diversify. International correlations are not stable over time, as early studies have shown (Goetzmann, Lingfeld, Rouvenhorst, 2002). The high level of correlation observed during the last 25 years offers a weak incentive to export money for a French saver in US stocks (or the reverse). This increase in stock market correlation follows probably an increase in French and US GDP correlation. For the last 25 years, we can speak about a second era of globalisation as before the First World War. But these two eras of globalisation differ obviously on the level of stock correlation.

Section I aims at measuring the market integration before 1914 trough the price of risk on different assets. Section II shows that the incentive for holding foreign assets was more a low asset correlation than higher expected returns. Section III measures a gradual increase in stock market correlations and test an explanation of stock correlation level using the relationship between the two GDP. Section IV concludes.

I MARKET INTEGRATION BEFORE 1914

A rich literature studies the market integration for the long run. Using high quality data, the prices of risk of various assets across different countries are compared.

Some previous studies

International integration means equalization of prices on different markets. O'Rourke and Williamson (1999) focus on two kinds of convergences: productions factors (capital, work, land) follow prices products. They show a first convergence movement until 1914 followed by a regressive period which stops at the end of 1950's. The spread in price of wheat between London and Chicago decreases from 57,5 % in 1870 to 15,6 % in 1913. British and Ukrainian market for the grain were fully integrated in 1906. Same movements are observed for textile or cotton. US and British prices gaps fall for cotton textiles from 13.7% to -3.6%,

for iron bars from 75% to 20.6%, for pig iron from 85.2% to 19.3% and from 32.7% to -0.1% for cooper (O'Rourke and Williamson, 1994). It was the same between Europe and Asia, with the London-Rangoon rice price gap falling from 93% to 26%, or the Liverpool-Bombay cotton price spread falling from 57 % to 20 % (Findlay and O'Rourke 2007). This equalization of prices is due to a decline in transport cost: - 50 % between 1870 and 1913. This trend to equalization in prices is also observed for work price across 8 countries. But how do we do to measure international financial integration?

Price equalization of identical securities quote in different markets is not enough to qualify for international financial integration. This easy arbitrage does not need important capital flow. Arbitrage can be realized with weak international exchanges. Equality of prices for identical securities demonstrates only a free market and a correct information flow. At the middle of 19th century, communication means telegraph (Garbade & Silber, 1978). By 1860, three lines were in operation between England and the Continent. The first fully successful Atlantic cable was completed in 1866. In one single day, in december 1886, ten thousand messages have been exchanged between the two bourses of London end New-York[2]. The price lag between London and New-York for a same stock (*New-York and Erie Railroad*) decreased from ten to zero days. Few months after the first transatlantic cable, Hoag (2006) and Kaukiainen (2001) found the same effect of cable introduction comparing colonial dispatch times to London before and after the introduction of telegraph. The dispatch time between London and Bombay decreased from 145 days by post in 1820 to 3 days in 1870 by telegraph.

This first globalization existed on capital market too. Feldstein and Horioka (1980) found a strong relationship between investment and savings in different countries in 1960's and 1970's. This relationship implies a low capital mobility: investment in a given country depends on its national saving level. Before the Fisrt World War, Feldstein and Horioka test showed that low domestic saving rate came along with a high investment rate for a panel of countries. This difference is necessary the result of importation of capital. According to Obstfeld and Taylor (2002), foreign assets values were just 7 % of World GDP in 1870 and 20 % before WWI. This ratio fell to a low point of 5 % in 1945. Since a few decades, this ratio rose quickly: 25 % in 1980, and then dramatically to 62 percent in 1995. However, this

[2] *The North american Review*, « Wall Street as an economic factor », novembre 1888

macroeconomic observation does not only measure globalization since the economic role of financial market (measured by the ratio market capitalization on GDP) varies across time. In France (Le Bris & Hautcoeur, 2008), the ratio of stock market capitalization on GDP was above 20 % in 1914 but less than 2 % in 1950 and more than 20 % again only since 1997. The role of financial market in the French economy respects a perfect U-shape as pointed out by Rajan and Zingales (2001) in financial development for a panel of countries. Thus, the foreign assets / World GDP ratio measures both globalisation and the financial market role in the economy.

Others authors analysed the returns of the same class of assets around the world. Obstfeld & Taylor (1998) found a low spread between US and British Bills. Flandreau & Zumer (2004) used the spread between foreign bonds and British ones as indicator of financial integration. Mauro, Sussman & Yafeh (2002) compared State bonds spread in emerging countries today and during the first globalization. Ferguson and Schularick (2006) argued that members of the British Empire benefited from their colonial status through substantially reduced interest rates. Edelstein (1982) used a set of 566 common and preferred stocks and bonds, domestic, colonial, and foreign annual quotes, between 1870 and 1913 and computed realized rates of return (without dividends or coupon). He found a higher return adjusted for risk (1,58 %) for overseas investments compared to English investments.

Another way to measure international integration is to analyse the part of portfolios invested in foreign assets. According to Edelstein (2004), British investors held about 32 % of their investments in overseas assets. Clemens and Williamson (2004) provide econometric evidence that British capital exports went to countries with abundant supplies of natural resources, immigrants, and young, educated, urban populations and not to countries where labour was cheap. Using the Modern Portfolio Theory, Goetzmann & Ukhov (2006) focus on diversification benefit for British savers using a panel of securities prices (43 annual prices from Edelstein, 1982). They find a strong incentive to export capital, even if foreign assets have hypothetically the same return as the British ones. They provide historical evidence of strategies of diversification before the First World War and before formalisation of modern portfolio management (see Lowenfeld, 1909). According to Michalet (1968), French investors had about one third of their wealth invested in financial markets in foreign securities. Parent & Rault (2004) use 22 annual domestic and foreign prices indices (without dividends) to show the rationality of French savings over 1891-1913 period.

Data

Compared to prior analyses on investment in foreign securities using modern portfolio approach (Edelstein, Parent & Rault and Goetzmann & Ukhov), data used in this paper cover a reduced geographic area but have a higher quality (monthly quotes and dividends/coupons). Total returns are measured using price variation and dividend or coupon for stocks and bonds. For short term rates, the total return is the interest rate only. All series are presented in appendix 1 but the most used are detailed here. A new database, between 1854 and 1996, for French stocks is used (Le Bris & Hautcoeur, 2008). Basically, the "Cac 40" is a monthly index of the 40 most prominent stocks among French firms, ranked (each year) by market capitalisation, thus avoiding survivor's bias. The index is weighted by these capitalisations. 40 firms represent the major part of the total market capitalisation. Today, the Euronext's Cac 40 represents about 70 % of the French market capitalisation and it was about 90 % at the beginning of the period.

US data are *Old Nyse* from Goetzmann, Ibbotson and Peng (1854 to 1870), Cowles (1871-1924) and Shiller's S&P (1925 to present). Data on US bonds come from Macauley (1938). Macaulay proposes three series of yield of US bonds: municipal bonds, railroad bonds and railroad high grade bonds.

Russian bonds are computed from the monthly spread, compared to UK Consols Bonds, indicated in *Investor's Monthly Manual* mentioned in Ferguson N. & R. Batley (1994). The authors also offer the spread of Germany, Italy, Argentina, Spain and France between 1870 and 1913. Using these spreads and adding UK Consol rate, monthly rates of these government are obtained and used to approximate each month the annual total return. It is the spread observed on the London market since no data are available on the French market. But as explain before, many studies show a strong financial integration for identical securities quoted in several markets after the introduction of the telegraph. As a result, these data from London can be used to represent foreign investment for a French investor. Any adjustments are realized for exchange rate during this period of gold standard. As explain by Fergusson (2006) only France, UK and Germany can borrow in their own currency. It is gradually also the case for the United States. Other countries are obliged to link the interest of their bonds to one of the gold currencies.

To test the quality of these data, the rate obtained through Consol rate majored by the French spread is compared with the French rate really observed on the French market. Figure 1 shows the monthly changes of these two rates. The R^2 of the regression is very high (0.95) and the difference between the two series comes probably only from slightly asynchronous data. In deed, UK and French rates and French spread are not observed exactly the same day but only the same month. As a result, a low gap exists between the two series but the quality of the rate obtained using UK Consol rate majored by the spread is high. This is probably also the case for the other countries.

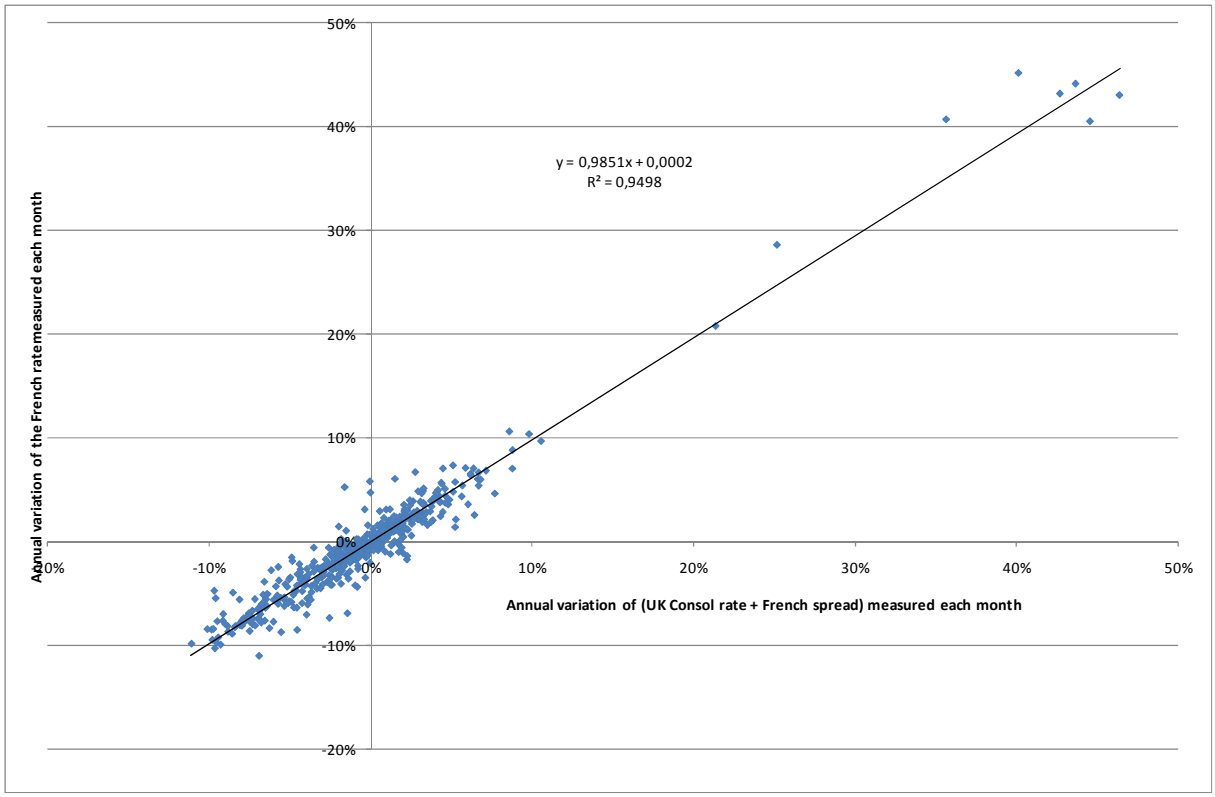

Figure 1: Test of the quality of the spreads mentioned in Investor's Monthly Manual comparing French rate approximated by the spread and the rate really observed.
Sources: Ferguson and Batley and author

The long-term price of risk in various assets

The product trade on financial markets is the risk. Therefore, to test the integration of financial market before 1914, the price of risk on different markets is measured. The relationship between risk and return in various assets can be shown in a graphical way. Since Black, Jensen, Scholes (1972) on NYSE stocks over 1931 to 1965, different studies found a consistent risk line. Arithmetic mean can't be used to test the relation between risk and return

because the arithmetic mean depends on the level of standard deviation. Therefore an artificial correlation exists between arithmetic mean and standard deviation. As a consequence, return observed in this test is the geometric mean of the total annual return. An international risk line is reconstituted before 1914 for various assets with high quality data. Using the standard deviation and not the beta, this line respects equation (1).

$$R_t^i = \alpha_i + \gamma_i \hat{\sigma}_i + \epsilon_{i,t} \qquad (1)$$

with, R_t^i: the return of the asset *i* on date *t* measured by the geometric mean, α_i: the risk free rate, γ_i: the price of the risk, $\hat{\sigma}_i$: the quantity of risk and $\epsilon_{i,t}$: an error term.

The test of this international risk line is realized with monthly data on various assets and periods before 1914. It is impossible to achieve a high return without a high risk.

a) Height international assets, 1854-1913:

Using data between January 1854 and December 1913, a clear international security market line exists. Total returns are calculated with dividend/coupon series and 720 monthly price variations. All these returns are nominal in their respective currencies; During this period, inflation did not really exist and foreign exchange between franc, dollar and sterling were almost stable[3]. The Y axis corresponds to the average return and the X axis to the standard deviation of this return.

[3] The Mint Act of 1792 put the United States on a bimetallic (gold and silver) standard, which prevailed until the suspension with the civil war. Convertibility is restored in 1879, but only into gold.

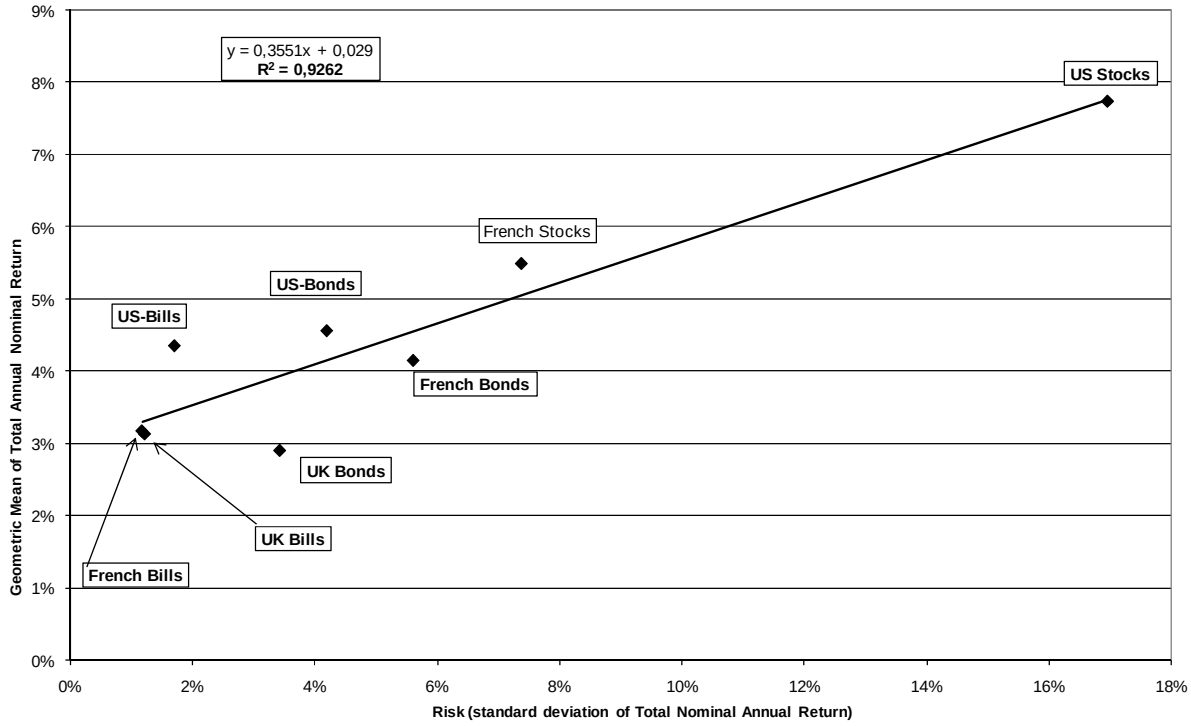

Figure 2: Risk line for various French, Bristish and US assets over 1854-1913 are consistent with each others
Sources: see appendix 1

The coherence of this international risk line has two consequences. First, this observed line constitutes a validation of the theory which links risk and return and the correct approximation of the risk by the standard deviation of the return. Secondly, French, US and British financial markets appear integrated on this period. Despite the weak signification of the regression, since only 8 assets are used, it is interesting to note the high level of R^2 (0,93). Other international assets are probably close to this line, however, there is no data available to confirm this.

b) Seventeen international assets, 1870-1913:

The same analyse is provided for a shorter period but with more assets from more countries. The spreads from *Investor's Monthly Manual* provide 528 monthly data for 5 foreign bond markets in addition to the monthly series used in the prior section and Macauley (1938) provide data on three kinds of US bond markets. As a consequence, the solidity of the regression increases thanks to seventeen assets from height international markets (figure 3). The R^2 stay high with 0,61. All these assets are consistent with each other despite some special situation. For example, Spanish bonds are riskier than US stocks but provide a

coherent higher return. During this period Spain suffers from the last Carlist war and a foreign war against the USA in 1898: each time its bond rate was above 10%. Argentina has problems to pays its debt between 1888 and 1893 and again in 1893 (see Goetzmann & Ukhov, 2006).

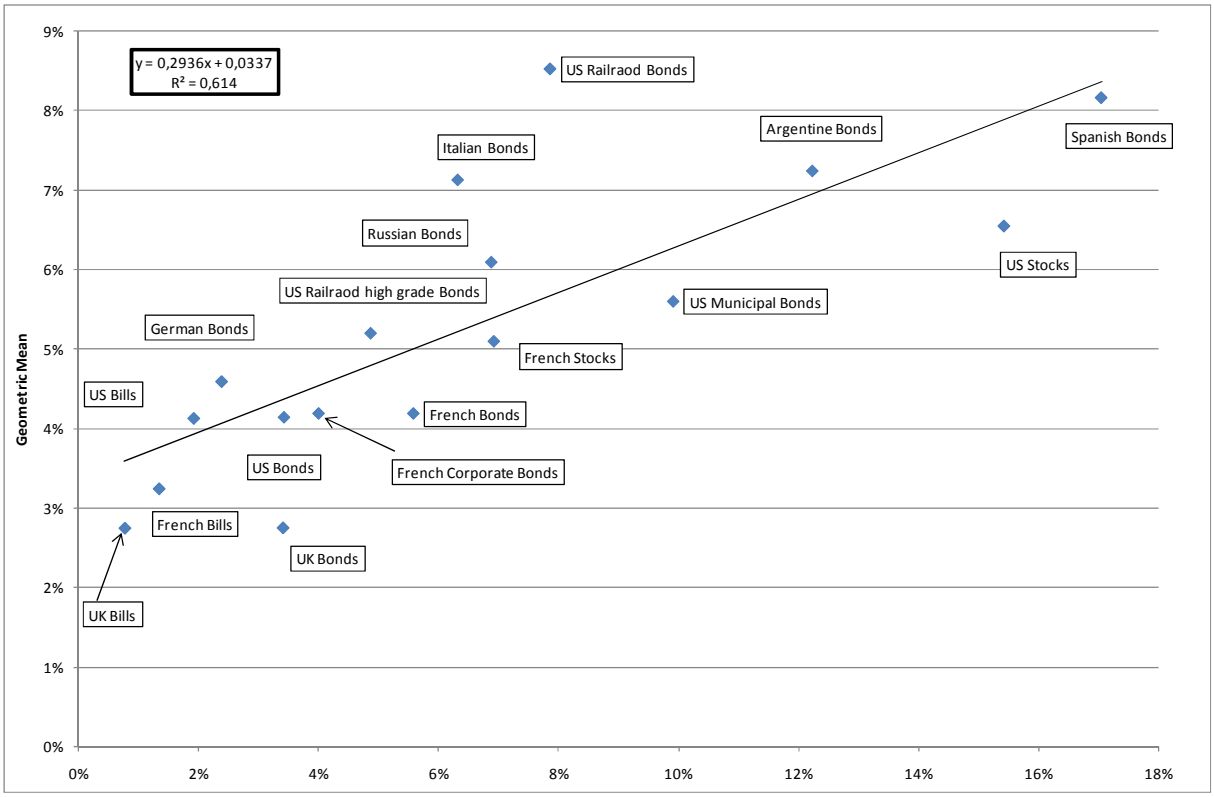

Figure 3: Risk line for various assets from height international market over 1870-1913 are consistent with each others
Sources: see appendix 1

II FOREIGN ASSETS ALLOW FOR A BETTER DIVERSIFICATION RATHER THAN FOR BETTER RETURNS

When international market integration is achieved, incentive for buying foreign assets should not exist since integration means equalization of prices (here returns) for the same risk. Low correlation can be the main motivation to export capital. A method to decompose the international diversification benefit is proposed. The method is then applied to two cases: French versus US stocks and French versus Russian bonds.

Decomposition of diversification benefit between weak correlation and higher return

Assuming a strong international market integration (and thus an equalization of the price of risk) the exportation of capital before 1914 could be mainly motivated by the achievement of low international correlation. The profit of international investment for the French savers is decomposed between profit from low correlation and profit from higher foreign returns. As Goetzmann & Ukhov (2006) assume, "*asset returns does not just indicate a different rate but can also show the degree of correlation between different investments thus the diversification benefits available to individual investors*". A general explanation of diversification is "not to put all eggs in one basket", i.e. spreading the wealth between different assets reduces the portfolio risk. The modern portfolio theory (Markowitz, 1952) is built on this idea using mean/variance optimization. Investing in low correlated assets reduces the volatility of the portfolio and leads to a better risk adjusted portfolio return. Diversification can not achieve a better return since the portfolio return is the weighted average of each asset return. But diversification allows a decrease in the risk level. Consequently, the price of risk increases and for a given level of risk, a better return is achieved.

The effect of this diversification depends on the correlation between the returns of the two assets. Graphically, if the correlation is perfect, all combinations draw a line between the two assets (the doted line on graph. 4). This line is close to the international security market line identified on graph 1.[4] Risk and return progress in a linear way. Return of such a portfolio increases only with the rise of risk. In case of an hypothetical perfect correlation (*hyp*) between the two assets, return and standard deviation of any combination respect the following formulas. Let X be the weight (in %) of one market with $X_a + X_b = 1$,

r is the total return

σ is the standard deviation

Total Return of the Hypothetical Portfolio: $r_{hyp} = X_a r_a + X_b r_b$ (2)

Standard Deviation of the Hypothetical Portfolio: $\sigma_{hyp} = X_a \sigma_a + X_b \sigma_b$ (3)

[4] If the integration was total and the measure of risk and return, perfect, it would be exactly the same line.

At the other extreme, with a very low correlation, the possible combinations draw a curve with a high curvature (black line on the graph. 4). All possible combinations between pure domestic and pure foreign asset allocation (if short sale does not exist) are on this curve. The benefit of a strategy of diversification can be measured through long term series of diversified portfolio. To simplify calculations, we assume the average and standard deviation of any combination of two assets respect the formulas (4) and (5)

σ_{ab} is the covariance between the returns *a* and *b*

Total Return of the Portfolio: $r_P = X_a r_a + X_b r_b$ (4)

Standard Deviation of the Portfolio: $\sigma_P = \left[X_a^2 \sigma_a^2 + X_b^2 \sigma_b^2 + 2 X_a X_b \sigma_{ab}\right]^{1/2}$ (5)

But a higher risk/return portfolio does not require foreign asset allocation. This portfolio can be achieved on the domestic market. From a micro-economic point of view, an investor can choose the level of risk he is willing to take. If he looks for a high risk/return portfolio, he can choose to increase the weight of risky assets. For example, he can concentrate his portfolio allocation on risky stocks rather than bonds. The investor can also invest on future markets, very liquid at that time (Viaene, 2005). Another way to increase the portfolio risk/return level is to use a leverage and buy assets for more than 100 % of the initial wealth. The macroeconomic result of this strategy should probably be a rise in the price of the assets and in the general level of debt. A leveraged investor obtains better returns on average but more volatile one. Since average returns on stocks are higher than the cost of debt, a better portfolio performance is achieved using debt. However, the fixed amount of interest to pay for the debt causes a worse performance when the stock returns are inferior to the cost of debt. Accordingly, the volatility of returns (standard deviation) of the leveraged portfolio is higher than only stocks one. This possibility to indebt himself is the easiest way to build a comparative model.

To design a Leveraged Strategy (LS), it is necessary to select an interest rate to pay to buy more assets than 100 % of the investor's wealth. This interest rate is defined as the money market rate. Risk and return of the leveraged strategies draw a grey line on the graph 4. All possible combinations of leverage are on this line; the end of the line is only the end of the "bank's credit" of the investor. Formally, the return of this leveraged strategy is obtained as the return of one portfolio with one negative weight for the short term rate and more than 100

% for French asset. For example, for a 25 % debt portfolio, X_a = 1,25 and X_{MMR} = -0,25, with *MMR* for Money Market Rate with a rate of r_f. You have always $X_a + X_{MMR} = 1$

Thus,

$$r_{LS} = X_a r_a + X_{MMR} r_f \quad (6)$$

$$\sigma_{LS} = X_a \sigma_a \quad (7)$$

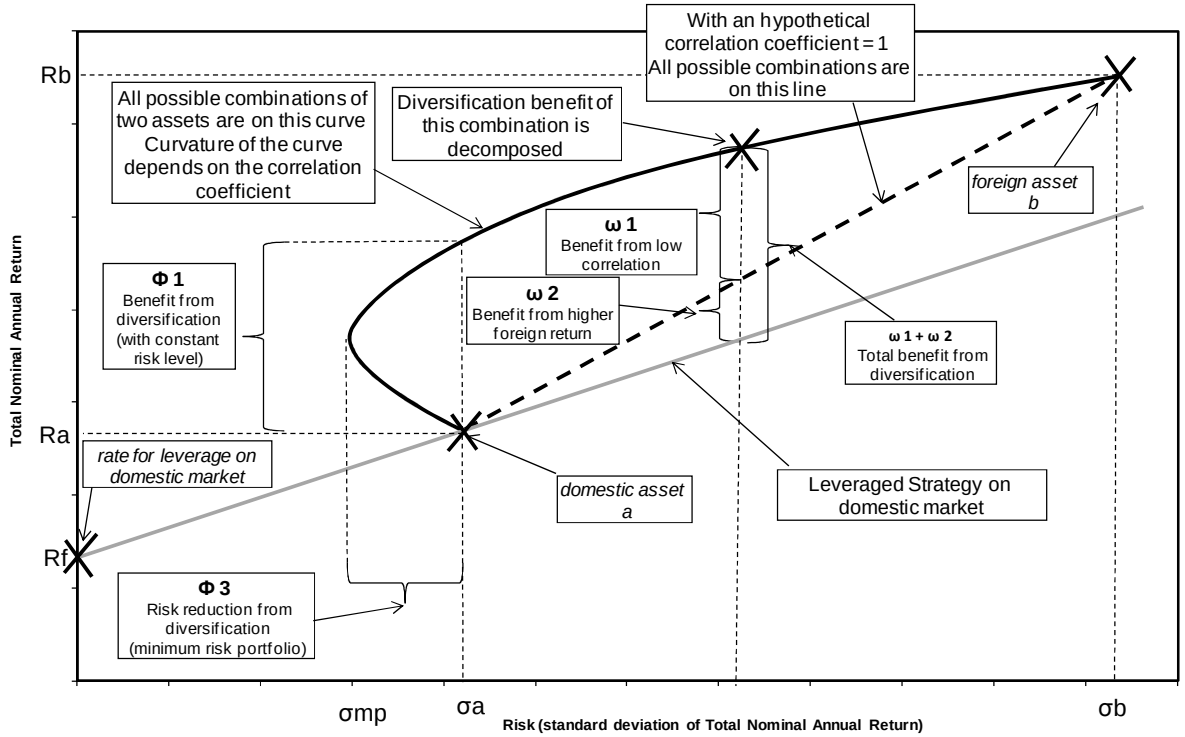

Figure 4: Scheme of the decomposition of the diversification benefit between part from higher foreign return and part from low correlation
Sources: author

As the prior graph indicates, for a given portfolio (or level of risk) a decomposition of the benefit obtained through international diversification is possible.[5] The total diversification benefit is the difference in return between what is obtained on diversified portfolio (black curve) and what can be obtained on domestic market thanks to leverage (grey line). Diversification benefit is decomposed between higher return and low correlation. A French investor can select his level of risk on his domestic market: his portfolio is on the grey line. He can diversify with a foreign asset with a higher risk/return level. The rise of his risk/return

[5] The same analyse can be realized with the decrease of the risk for a constant level of returns.

level is achieved through a higher foreign return (ω2) and thanks to the low correlation between foreign and domestic assets (ω1). For a given level of risk:

$$\omega_1 = r_p - r_{hyp} \tag{8}$$

$$\omega_2 = r_{hyp} - r_{LS} \tag{9}$$

A classical analysis (Kandel, McCulloch, and Stambaugh, 1995) can also be realized on the diversification effect thanks to several statistics. The first one, ϕ1, measures the expected return benefits of international diversification for a constant level of risk. This measure can be interpreted as the profit of international diversification after controlling for risk:

$$\phi_1 = Max\left\{r_P - r_a \middle| \sigma_p^2 \leq \sigma_a^2\right\} \tag{10}$$

ϕ1 can thus be seen as the gain in returns (percentage per year) obtained by international diversification for a level of risk equal to the domestic market. A second measure, ϕ2, is to express this gain in percentage of return relative to domestic return. This better performance is free of higher risk.

$$\phi_2 = \frac{r_c - r_a}{r_a} \tag{11}$$

The second measure of benefit from international diversification is measured by the decrease in risk allowed by diversification. ϕ3 is the decrease in standard deviation provided by the minimum variance portfolio relative to the French benchmark.

$$\phi_3 = \sigma_{mp} - \sigma_a \tag{12}$$

with *mp*, the portfolio with the minimum standard deviation.

To determine which portfolio (combination) on the curve is decomposed, it is assumed that the optimal portfolio is the best choice. The optimal portfolio in a mean/variance analysis

is built. Using, the French risk free asset (*money market rate* is the proxy), it is possible to build the Capital Allocation Line. All efficient portfolios are on this line joining the risk free asset and the optimal portfolio. According to his risk aversion, an investor chooses a combination of the optimal stock portfolio and risk-free asset. This Capital Allocation Line is the tangency between the risk free asset and the efficient frontier on point with the minimum risk. It is the line with the higher slope. This slope is the Sharpe ratio. Thus the optimal proportion of US stocks is obtained through the "target value method" seeking for the higher Sharpe ratio:

$$Sharpe\ ratio = \frac{\left(r_O - r_f\right)}{\sigma_O} \tag{13}$$

with r_O, the total return of the optimal portfolio and r_f, the return of the risk free asset.

Formula of the Capital Allocation Line follows:

$$r_P = r_f + \left[\frac{\left(r_O - r_f\right)}{\sigma_O}\right]\sigma_P \tag{14}$$

Analysis by decomposition of French-US stock portfolio, 1854-1913

This decomposition of the international diversification benefit is first computed for the French and US stock market data (720 monthly stock prices and 60 annual dividends, see annexe 1). The choice of US stocks to realize this decomposition is not really consistent with history since less than 5 % of the French foreign investment was in this country (see table 4 in appendix 2). But this choice is driving by the availability of high quality data for the US market. Moreover, the US data allow (in III) a long term comparison which is not possible with Russian or Ottoman data for example.

Performances of international portfolios are measured. The next figure shows the risk/return of pure French and US stocks portfolios, identical than on the graph 1. Nine possible portfolios combining US and French stocks are also calculated following formulas (4) and (5). The first one is constituted by a constant 10 % of US stocks and 90 % of French, the second one 20 % of US stocks and 80 of French… All possible combinations between French and US stocks are on the curve. Risk and return of the same nine French-US portfolios

are also calculated with the hypothetical perfect correlation following formulas (2) and (3). These portfolios are on the dotted line on Graph. 5. The decrease of risk resulting of the low correlation appears clearly on Graph 5. For a given proportion of US stocks, actual and hypothetical portfolios present the same return but a different risk. These same returns can be illustrated by a horizontal line between each point of the same proportion of US stocks. According to formulas (6) and (7), five portfolios, between 25 % and 125 % of leveraged strategy are realized. Characteristic of these leverages strategies are on the inferior grey line.

Classical measures of benefit from international diversification are high thanks to a low correlation between the French and the US markets. This correlation over 1854-1913 period is 0,23 using annual total return (only 0.06 using monthly price variation as in Graph. 7). From 1854 to 1913, Φ 1 is about 0,58 % and implies a portfolio with 18 % of US stocks. Average return of such a portfolio is 6,33 %, 0,58 % better than pure French stocks with exactly the same level of risk. Φ 2, is this gain in percentage of return relative to French return. The increase in return for French investor through US diversification is 10,45 %. The minimum risk portfolio implies 9 % of US stocks and achieves a risk reduction of 0,15 points (Φ 3) of the standard deviation or, in percentage, 2 %.

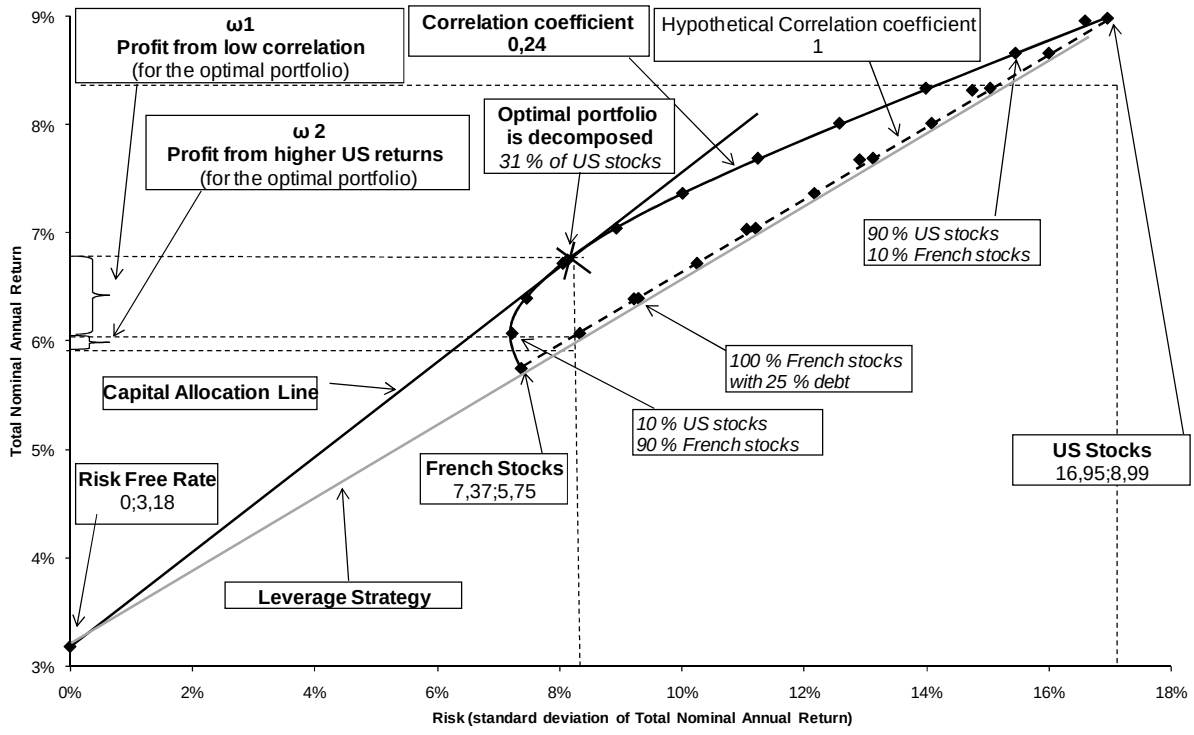

Figure 5: Optimal portfolio and decomposition of the diversification benefit between US and French stocks over 1854-1913
Sources: see appendix 1

This optimal portfolio indicates an optimal part of US stocks for a French investor about 31 % with a risk σ_O of 8,13 %. Thanks to the US diversification, the Sharpe ratio increases to 0,40 from only 0,31 on the pure French stock market. Accepting US stocks as a proxy for all international stocks, the optimal portfolio of foreign stock for a French saver is 31 %. This proportion is very close to observations of actual portfolios at least at the end of the period (Michalet, 1968, see annexe 2). Goetzmann and Ukhov (2006) provide the same kind of analyse for several countries available for British investor and find an optimal portfolio with 38 % of foreign assets.

The decomposition of the diversification benefit is realized by calculation of the return of a Leveraged Strategy and the return of an hypothetical perfect correlation. These returns are those obtained for the same level of risk as the optimal portfolio
($\sigma_{LS} = \sigma_{hyp} = \sigma_O = 0.0813$).

Return of the Leveraged Strategy:

Using formula (7) with a risk level of French stocks equal to 7,37 %.

$X_a = \frac{0.0813}{0.0737} = 110{,}28\ \%$, thus, $X_{MMR} = -10{,}28\%$

the weight of French stock (X_a) necessary to achieve a risk level of 8,13 % is 110,28 % thus the weight of Money Market Rate is -10,28 %.

According to formula (6), the return of the leveraged strategy on the domestic market is:

$r_{LS} = 110{,}28\% * 0.0575 \ \ -10{,}28\% * 0.0318 = 6.01\%$

Return of the hypothetical perfect correlation:

To achieve a level of risk equal to those of the optimal portfolio, $\sigma_{DS} = \sigma_O = 8{,}13$, the weight of French stocks is obtained using formula (3) :

$\sigma_{hyp} = X_a \sigma_a + X_b \sigma_b \quad$ with $1 = X_a + X_b$

$$\sigma_{hyp} = X_a \sigma_a + (1 - X_a)\sigma_b$$

Therefore, $X_a = \frac{\sigma_{hyp} - \sigma_b}{\sigma_a - \sigma_b} = \frac{0.0813 - 0.1695}{0.0737 - 0.1695} = 92\ \%$, thus 8 % of US stocks

According to formula (2), the return of an hypothetical perfect correlation is:

$$r_{hyp} = 0.92 * 0.0575 \ + 0.08 * 0.0899 = 6{,}01\%$$

Result of the decomposition

Using the three returns, the part of the diversification benefit from low correlation (ω_1) and the part from higher US returns (ω_2) are measured following formulas (8) and (9).

$$\omega_1 = 0.0675 - 0.0601 = 0{,}74\%$$
$$\omega_2 = 0.0601 - 0.0601 = 0{,}00\%$$

Obviously, profit from low correlation is more important than profit from higher US returns, i.e. $\omega_1 > \omega_2$. Using a level of risk equal to those of the optimal portfolio $\sigma_O = 8{,}13\%$, the total gain from the international diversification compared to a leveraged strategy on the domestic market is 0,74 % per year with ω_1= 0,74 % and ω_2 only 0,00 %. As a result, all the benefit achieved by US diversification comes from low correlation since leverage on domestic market provides an identical risk/return than a diversification with an hypothetical perfect correlation.

Result of the decomposition on two sub-periods

Maybe, the period covers on the prior case conceals time differences. The same analysis is realized on two sub-periods. The break used is 1890 since this year can be view as a turning point for free-trade. During this year the McKinley tariff is adopted increasing tariff rate for import to the US. Two years later, the Tariff Méline rise the tax for product imported to France. Thus, the first sub-period starts in January 154 and ends in December 1889 when starts the second sub-period with his end in December 1913.

The first sub-period appears close to the entire period. The correlation level is higher (0.28 versus 0.23) but the optimal portfolio indicates a similar part for US stocks (35 % versus 31 %). The rise in Sharpe ratio allowed by the US diversification is close, 0.45 from 0.35 on pure French stocks over 1854-1889 and 0.44 from 0.35 on the entire period. In the two cases the quasi-totality of the diversification benefit comes from the low correlation.

The second period offers a different face (see in appendix 4). The optimal weight for US stocks is only 14 % and offers only a modest increase (only due to low correlation) in the Sharpe ratio (0.51 from 0.43). Graphically, the grey line of the leverage strategy is close to the Capital Allocation Line. Thanks to the strong difference between the money market rate (cost of the debt) and French stock return during this period, a stock investor can achieve an efficient leverage strategy on his domestic market only. This weak incentive for a French stockholder to hold US stocks is consistent with the low export of capital to United States from France at this time.

Analysis by decomposition of French-Russian State bonds portfolio, 1870-1913

The same analysis than the one for French-US stock portfolio is computed for French and Russian bonds. French and Russian bonds are measured by 528 monthly rates (see annexe 1). The decomposition of the Russian diversification benefit for French bond investors is very consistent with what was historically observed since about 25 % of the French foreign investment was in this country. Russia is the larger borrower in the world at the beginning of the XXth century (Ukhov, 2003) and the first country for French foreign investments. The second French investment destination is Spain-Portugal with a proportion of only 16 % in 1900 (see table 4 in appendix 2). Russian state bond is the first choice of investment for French savers. A study of 1 032 French portfolio in 1897 shows that the first investment is the Russian state bond accounting for between 17% and 37 % of the total portfolio investment. Another hard data exists at the end of the First World War thanks to the *Office des Biens et Intérêts Privés à Recenser* (décret of the 10 september 1918): 1 600 000 individual declarations. Compared to 11 809 000 households in 1918, it represents about 14 %.

The level of correlations measured among international assets is very low compared to current observations. Russian bonds have a low correlation with French bonds. For a saver holding French state bonds, investing in French Corporate Bonds provides a bad

diversification since the correlation coefficient between the annual total return is 0,76. On the other hand, investing in Russian bonds provide a high level of diversification since the correlation coefficient is only 0,11 close to those observed with US railroad Bonds or US municipal bonds (0.12 and 0.14). Argentine bonds offer an exceptional opportunity of diversification thanks to a negative correlation with French bonds. Spanish bonds constitute a special case with a negative correlation but with a high volatility due to the war events. But Argentine and US railroad bonds are riskier than Russian one (see graph. 3). The less correlated bonds was the German one (0.04) but the political context after the defeat of 1870 make probably difficult the French investment in Germany. Italian, Spanish, US and UK Bonds provide all a correlation coefficient superior to 0,15 and thus a bad diversification. Therefore, Russian bond was one of the best investment opportunities to diversify a French bond portfolio.

	French Bonds	*French stocks*	*French Corp. Bonds*	*US Bonds*	*UK Bonds*	*Spanish Bonds*	*German Bonds*
French Bonds	1						
French stocks	0.27	1					
French Corp. Bonds	0.76	0.21	1				
US Bonds	0.33	0.30	0.42	1			
UK Bonds	0.18	0.26	0.33	0.28	1		
Spanish Bonds	-0.15	0.04	0.01	0.09	-0.12	1	
German Bonds	0.04	-0.11	-0.05	0.01	-0.48	0.14	1
Italian Bonds	0.17	0.05	0.24	0.21	-0.02	0.21	0.44
Argentine Bonds	-0.09	-0.06	-0.14	0.06	0.03	0.34	0.15
Russian Bonds	0.11	0.01	0.10	0.08	-0.08	-0.16	0.29
US railroad Bonds	0.12	0.16	0.07	0.31	0.20	-0.14	0.00
US railroad HG Bonds	0.34	0.26	0.44	0.75	0.39	0.09	0.11
US municipal Bonds	0.14	0.24	0.01	-0.07	0.11	-0.09	-0.08

	Italian Bonds	*Argentine Bonds*	*Russian Bonds*	*US railroad bonds*	*US railroad HG bonds*	*US municipal Bonds*
Italian Bonds	1					
Argentine Bonds	0.04	1				
Russian Bonds	0.23	0.04	1			
US railroad Bonds	-0.01	-0.14	0.02	1		
US railroad HG Bonds	0.28	0.16	0.10	0.26	1	
US municipal Bonds	-0.04	0.01	0.02	0.18	0.03	1

Table 1: Cross correlation of annual total return measured each month (528) of various assets, 1870-1913
Sources: see appendix 1

The next figure shows the risk/return of pure French and Russian bonds, identical than on the graph 2. Nine possible portfolios combining Russian and French bonds are also calculated following formulas (4) and (5). The first one is constituted by a constant 10 % of Russian bonds and 90 % of French, the second one 20 % of Russian bonds and 80 of French… All possible combinations between French and Russian bonds are on the curve.

Classical measures of benefit from international diversification are very high thanks to a very low correlation between the French and the Russian bond markets. From 1870 to 1913, Φ 1 is about 1,52 % and implies a portfolio with 77 % of Russian bonds. Average return of such a portfolio is 5,87 % %, 1,52 % better than pure French state bond with exactly the same

level of risk. Φ_2, is this gain in percentage of return relative to French return. The increase in return for French investor through Russian diversification, is 34,95 %. The minimum risk portfolio implies 38 % of Russian bonds and achieves a risk reduction of 1,02 points (Φ_3) of the standard deviation or, in percentage, 18 %.

According to formulas (6) and (7), four portfolios, between 25 % and 100 % of leveraged strategy are realized. The cost of debt support by these portfolios is the money market rate. Characteristic of these leverages strategies are on the inferior grey line. As for French-US stock portfolio analysis, to determine which portfolio (combination) on the curve is decomposed, it is assumed that the optimal portfolio is the best choice.

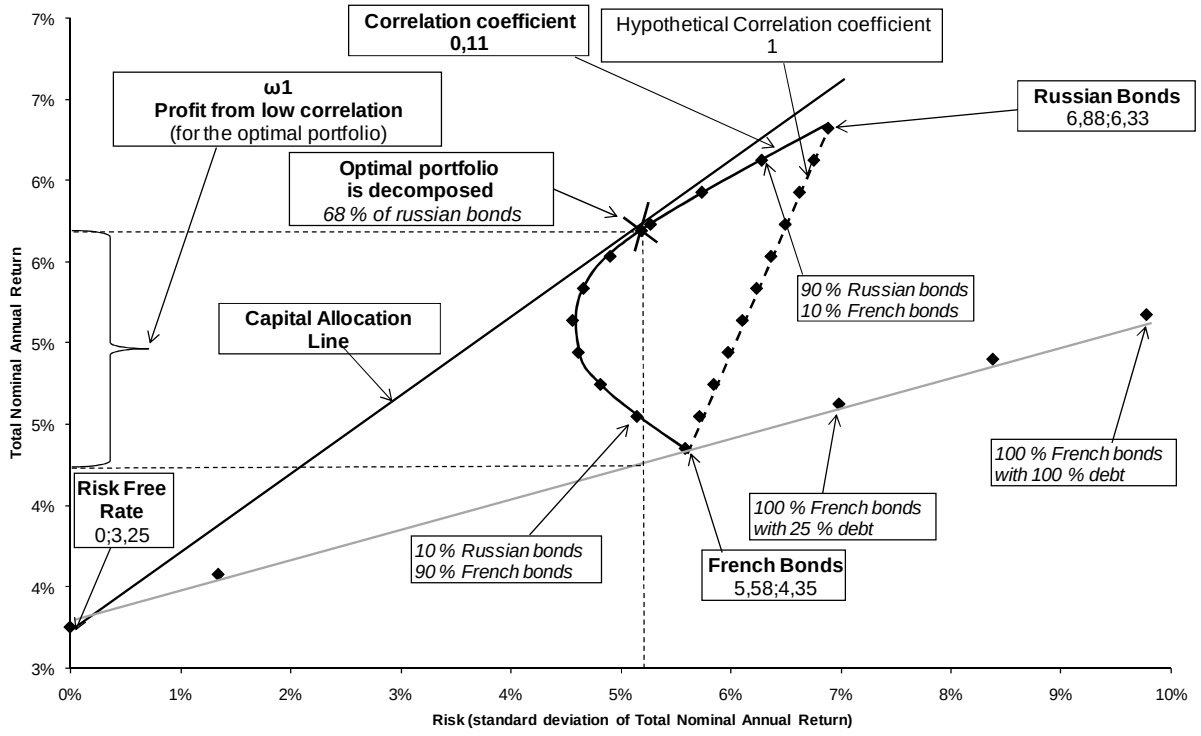

Figure 6: Optimal portfolio and decomposition of the diversification benefit between Russian and French bonds over 1870-1913
Sources: see appendix 1

This optimal portfolio indicates an optimal part of Russian bonds for a French investor of about 68 %[6] with a risk σ_O of 5,19 %. Thanks to the Russian diversification, the Sharpe ratio increases to 0,47 from only 0,22 on the pure French bond market. This optimal percentage of Russian bond combined with French state bonds was not exactly observed but

[6] Goetzmann & Ukhov (2006) find an optimal weight of all foreign securities for British investor equal to 63.4 %.

about 40 % of the French portfolio was in foreign state bonds (see table 2 and 3 in appendix 2). A non-optimal (in mean/variance analysis) limit of foreign bond exists probably. And calculations of one more complex optimal portfolio with several assets modify probably this optimal part of about 70 % of Russian bonds.

The decomposition of the diversification benefit is realized by calculation of the return of a Leveraged Strategy and the return of an hypothetical perfect correlation. These returns are those obtained for the same level of risk as the optimal portfolio
($\sigma_{LS} = \sigma_{hyp} = \sigma_O = 0.0519$).

Return of the Leveraged Strategy:

Using formula (7) with a risk level of French bonds equal to 5,58 %:

$X_a = \frac{0.0519}{0.0558}$ = 93,01 %, thus, $X_{MMR} = +6{,}99\%$

the weight of French bonds (X_a) necessary to achieve a risk level of 5.19 % is 93,01 % thus the weight of Money Market Rate is + 6,99 %. This result means that to support on domestic market the same level of risk than that offer by the optimal internationally diversified portfolio, an investor need to buy only 93 % of French bonds and put 7 % in the money market.

According to formula (6), the return of the leveraged strategy on the domestic market is:

$r_{LS} = 93.01\% * 0.0435 + 6.99\% * 0.0325 = 4{,}27\%$

Return of the hypothetical perfect correlation:

To achieve a level of risk equal to those of the optimal portfolio, 5,19 %, the weight of French bonds is obtained using formula (3) :

$\sigma_{hyp} = X_a\sigma_a + X_b\sigma_b$ with $1 = X_a + X_b$

$\sigma_{hyp} = X_a\sigma_a + (1 - X_a)\sigma_b$

Therefore, $X_a = \frac{\sigma_{hyp} - \sigma_b}{\sigma_a - \sigma_b} = \frac{0.0519 - 0.0688}{0.0558 - 0.0688}$ = 130 %, thus -30 % of Russian bonds

As Graph 6 shows, this choice cannot exist and since the optimal portfolio is situated on the left of the French bonds, all the benefit of the international diversification comes from low correlation. This special situation is the result of the very low correlation between French and Russian bonds.

Result of the decomposition

Since the return obtained by an hypothetical perfect correlation does not exist, all the benefit comes from low correlation (ω_1):

$\omega_1 = 0.0569 - 0.0427 = 1{,}42\%$

$\omega_2 = 0\%$

This low correlation explains why so many French savers bought Russian bonds. With a part of Russian bonds to complete a portfolio of French bonds, they reduce their risk level and increase strongly their returns. It was a very efficient asset management until the Red Revolution. The choice of Russian bonds was not only the result of the political situation but a really efficient investment strategy since the Russian bond correlation with the French state bond is one of the lowest. Results of this study confirm Goetzman and Ukhov (2006) results. Of course, this decomposition is different with another level of risk. The part of higher returns in the total international diversification profit increases for higher risk/return levels.

Result of the decomposition on two sub-periods

The result of this decomposition is different on two sub-periods. Large French investment in Russia starts only at the end of the XIXth century. The first significant loan in France was issued in November/december 1888 (Ukhov, 2003). Monthly data availability allow for two sub-periods. Diplomatic alliance between France and Russia is chooses as the break. A military convention is signed the 17th august 1892. Therefore, the first period start in

January 1870 and ends in July 1892, the second one starts in August 1892 and ends in December 1913.

In each case, Russian diversification appears to be very rational because she provides a huge increase in Sharpe ratio thanks to a constant low correlation. During the first period, the optimal portfolio implies 54 % of Russian bonds and permits a rise in Sharpe ratio from 0.28 to 0.42. During the second period, the optimal weight is 88 % of Russian bonds and offers an increase of the Sharpe ratio from 0.09 to 0.59. But the decomposition of these important benefits shows a large change in components.

The first sub-period looks like the entire period: all the benefit of diversification comes from the low correlation (see annexe 6). During the second period, the story is quite different. At this time, French government bonds provide an exceptional low rate of returns. Yield on French bonds experiments an historical weak level as indicated by the Sharpe ratio on French bonds equal to only 0.09. The total benefit from diversification over 1892-1913 with an optimal part of 88 % of Russian bonds is 2.69 % extra return each year with 2.42 % from higher foreign return and only 0.26 % due to the low level of correlation. Using a more realistic proportion of Russian bonds (about 50 %) in the portfolio, the decomposition of the diversification benefited appears to be equally due to higher foreign return and low correlation.

Therefore, old explanations are not necessary to defend French investment in Russia since this choice provide a huge increase in return for a constant level of risk and thus was very rational. This strategy was very efficient thanks to the low level of correlation between French and Russian bonds compared to what is observed today. By the way, the suggestion of a moral hazard effect (French government assume a part of the Mexican debt after the default of 1867) on incentive to buy Russian bonds is not necessary to explain the behaviour of the French savers (Oosterlinck & London-Lane, 2006). This low level of correlation explains a large part of the benefit of the diversification for most of the possible portfolios on the majority of the period. But at the end of the century, the low rate on French government bonds leads to observe that higher Russian return alone causes a majority of the diversification benefit of portfolio with more than 50 % of Russian bonds.

III THE GRADUAL INCREASE IN STOCK CORRELATIONS

Stock market correlation is not stable through time. The correlation between French and US stocks show a gradual increase maybe due to an increase in GDP relationship.

Changes in correlation through history

We saw that the first incentive to buy foreign assets is the low correlation between domestic and foreign assets. What is the variation of the correlation among international stock markets? Longin and Solnik (1995) show changes in correlation over the 1960-1990 period and reject the hypothesis of a stable correlation. Mauro, P., Sussman N., Yafeh (2002) use correlation coefficients for the spreads of emerging markets. Correlation coefficients are significantly higher in modern times than in historical times. The average correlation coefficient is 0,77 in modern times compared with 0,45 in historical times for the full sample, and 0,42 for the high-quality-data sample. Dimson and Marsh (2001) compared US and UK assets returns between 1955 and 2000. Statman & Scheid (2005) find a strong increase in correlation between US and international stocks from 0,54 during 1969-1973 to 0,86 during 1999-2003 period. Goeztman, Lingfeld & Rouwenhorst (2002) used stock prices from Global Financial Database, the Jorion and Goetzmann (1999) sample of equity markets, the Ibbotson Associates database of international markets and the IFC database of emerging markets to construct correlation on 5 years rolling window, through international markets. They find four peaks in correlation of prices variations: around 1860, just before 1914, during 1930's and since 1970's; Level reached during the 1930's is higher than current one. Obstfeld and Taylor (2002) on ten years rolling window show a weak correlation before the beginning of the twentieth century, a quick increase just before 1914, a low correlation during the First World War another time of high correlation during the 1930's and gradual increase since the low level observed at the end of the Second World War.

A low correlation before 1914 is more consistent with the period of important exportation of capital. If the price of risk is equal between several countries, the only motivation to export money is to choose markets with a low correlation. French or English savers find probably incentives to exports overseas rather than in European countries after 1880. Perhaps, first countries of capital exportation (Europe as Spain, Austria-Hungary or Italia) are more correlated after this date thus investors search more exotic countries. High

quality data are not available to make a correct comparison among several stock markets but the correlation between France and US have a great explanative power. Using Cac 40 and Old-Nyse-Cowles-S&P index, a long-term measure of US-French stock market correlation is realized.

The correlation coefficient of monthly price variations is preferred to the correlation of annual total return correlation. Monthly price variations are used to calculate the correlation coefficient[7]. This choice makes comparison possible with prior measure of long term correlation (Goeztman, Lingfeld & Rouwenhorst, 2002 and Obstfeld & Taylor, 2002). But, these monthly variations are more sensitive to a gap in the exact date of the price during the month or to the unknown date of payment of the dividend/coupon. The correlation coefficient is measured through a ten years rolling window. Thus, a date on the graph corresponds to the ten years prior itself.

Monthly exchange rate between US $ and French Franc are not available. Using annual data of currency rate, three correlation coefficients are provide: one annual jump in price due to currency change, gradual change thanks to one linear interpolation for monthly exchange rate and the last one without change for exchange rate. Take account for exchange rate does not modify major movements in long term correlation. All these correlation coefficients are underestimated since a lag exists between French and US data: French one are the first Friday price when US are the last day of month. This lag is constant over time, thus, it is without impact on variations of observations. During several periods, capital flaw was difficult or totally forbidden as during WWII. It is possible to not show these periods on the graph but it is interesting to see that during WWII, which is the worst period for the freedom of capital, correlation coefficients are consistent: they are negative.

The main result is that the correlation is obviously stronger today than before 1914. The “first” and the “second” globalizations are totally different on this aspect. This weakest correlation before 1914 is a coherent explanation for massive buy in foreign assets. This correlation increases since the 1920’s and during the Great Depression. This observation is consistent with foreign issues in Paris: between 1892 and 1913, foreign assets made up about 53 % of the total stocks issues in Paris (and 96 % for state bonds). This part of foreign assets

[7] The same correlation coefficient calculated using total annual return shows a different result: more volatile and a high short period of correlation at the beginning of the 1880’s.

falls during the interwar period to a maximum level of 15 % (in 1930 and 1931)[8]. But this increase in correlation is partially due to the increase in standard deviation of assets. To compare if the correlation increases not only following the rise in volatility, it is possible to adjust the level of correlation for the change in standard deviation (Forbes and Rigobon, 2002). However, from the investor point of view, the origin of the rise in correlation does not matter: he has to support this high correlation. World War II causes a negative correlation for several years. Correlation increase again since 1950's but decrease during 1980's. The rise of the correlation is very strong since 1990; The current level of correlation is exceptional through history.

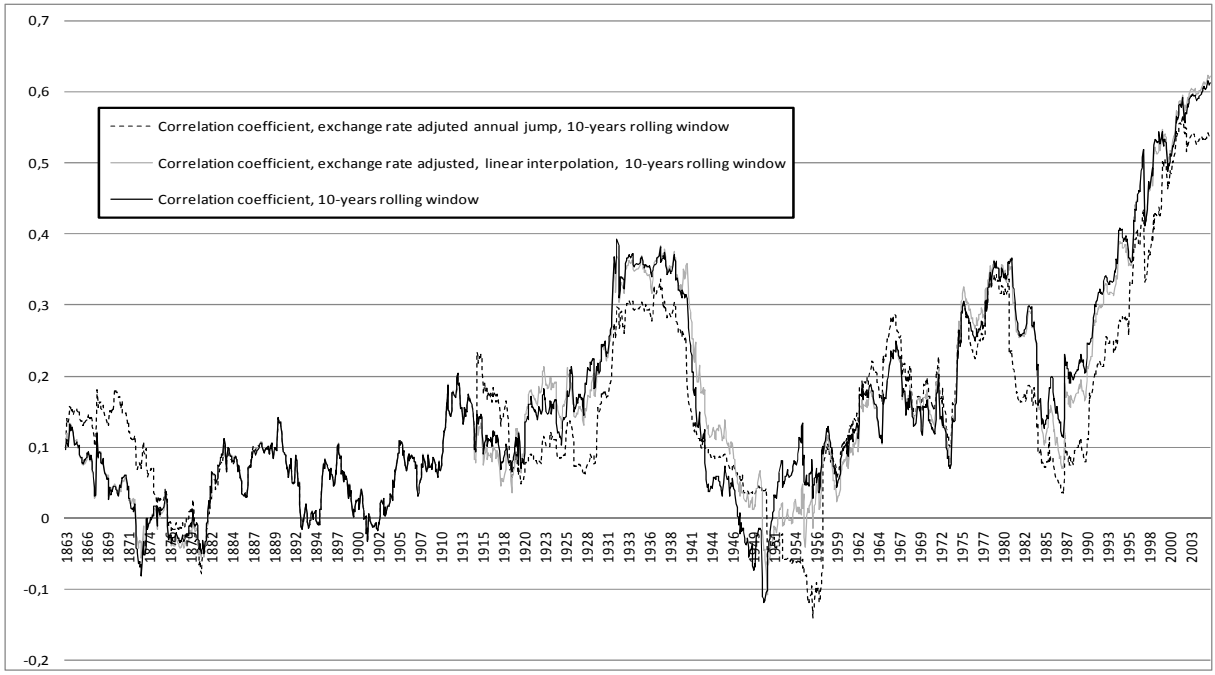

Figure 7: Correlation between US and French stock markets over 1854-2007
Sources: Goetzmann, Ibbotson & Peng, Cowles, S&P, Le Bris & Hautcoeur

[8] Crédit Lyonnais, *Un siècle d'économie française (1863-1963)*, Paris, Draeger, 1963

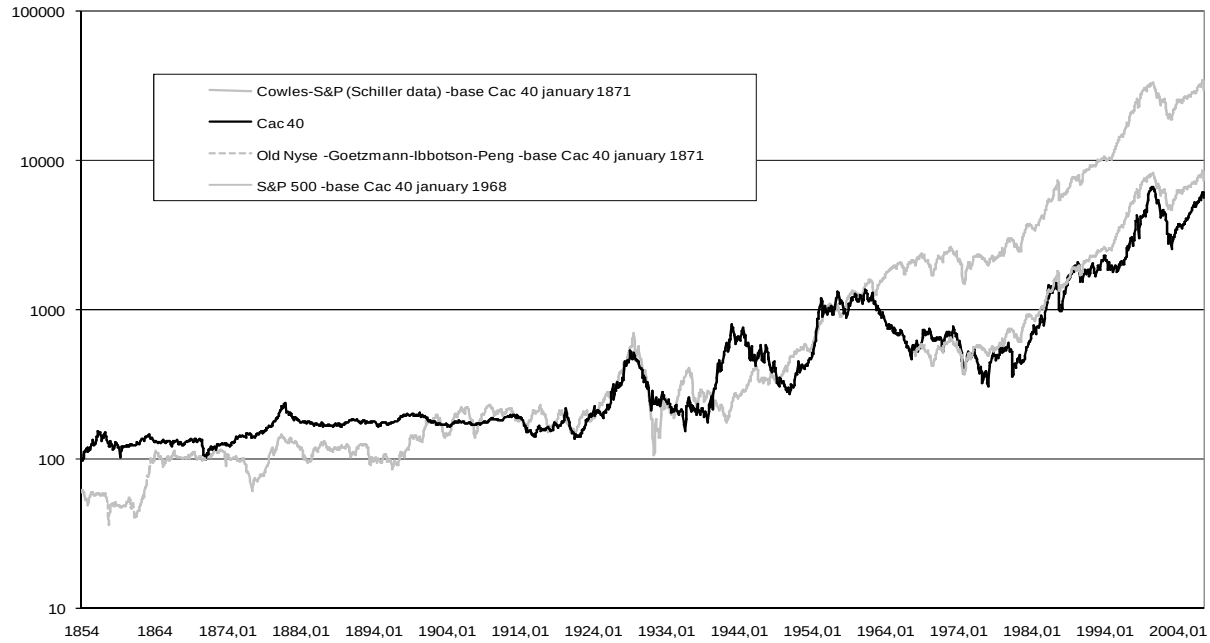

Figure 8: Stocks prices on US and French markets over 1854-2007
Sources: Goetzmann, Ibbotson & Peng, Cowles, S&P, Le Bris & Hautcoeur

Stock correlation reflects GDP correlation?

Quinn & Voth (2008) show the relation between long term stock market correlation and the level of financial liberalization: open countries have maintained higher correlations levels than closed ones. They question the nineteenth century low correlation and large capital freedom and suggest that it comes from the low correlation of economic fundamentals. A higher correlation means that traded assets (French and US stocks) are similar. A stock similar to another one means a same risk or more exactly an identical time distribution of risks. A part of the risk on futures payments depends on variation of GDP: one major reason of the increase of French and US stocks correlation is probably the rise of GDP correlation. Using annual data[9], the correlation coefficient between US and French change in GDP is calculated on a ten-years rolling window. The correlation level of GDP seems to be correlated with the correlation level of stocks (R^2=0,16). High stock market correlation implies high GDP correlation. The current higher stock correlation is probably partially due to a stronger integration of the economy. Therefore, incentive to export money decreases with increase of economic integration.

[9] Levy-Leboyer, Bourguignon (1985) and INSEE for France and Historical Statistics of the United States (1975)

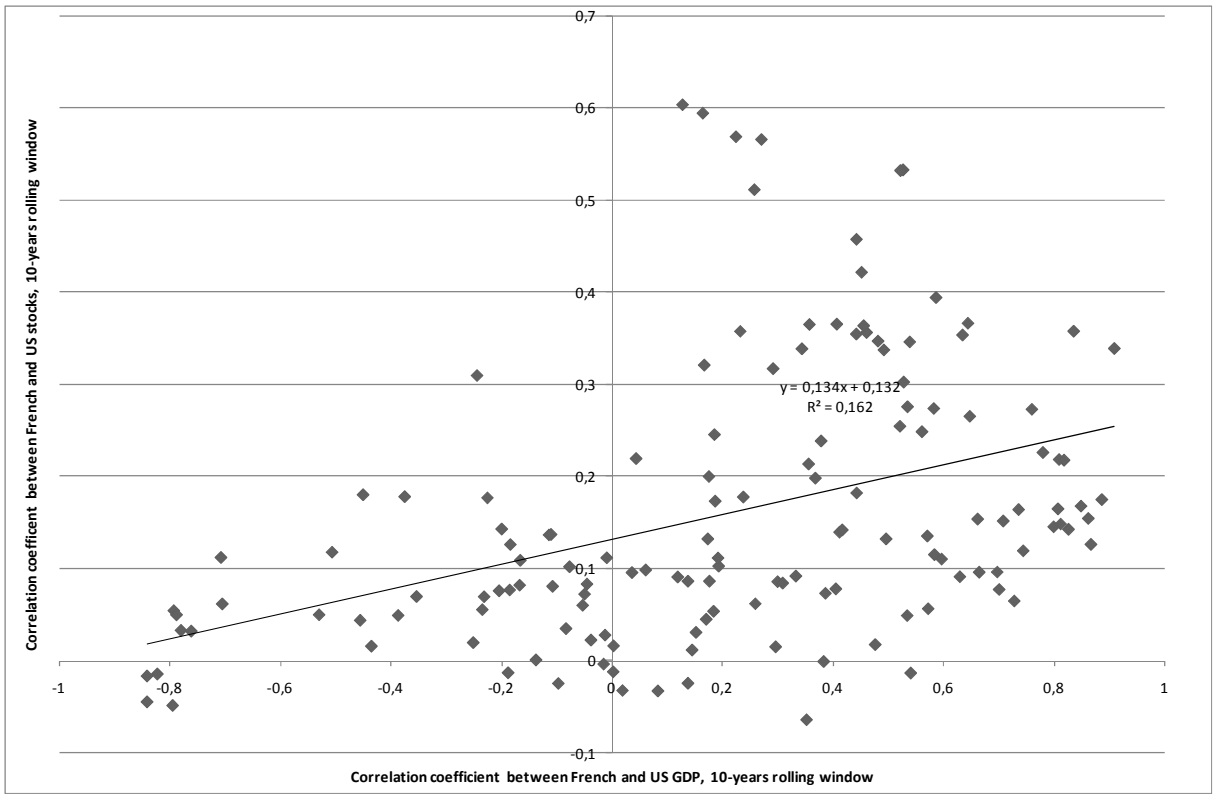

Figure 9: Relationship between US and French stock markets correlation and US and French GDP correlation over 1854-2007
Sources: Goetzmann, Ibbotson & Peng, Cowles, S&P, Lévy-Leboyer & Bourguignon, INSEE, Historical Statistics of the United States, Le Bris & Hautcoeur

IV CONCLUSION

Before 1914, according to the results on French-US stocks and French-Russian bonds, an investor can achieve an important portfolio diversification through foreign securities since international markets are integrated but low correlated. Investors were not mainly attracted by higher foreign return since they can perform a same risk/return level on domestic market. In most of the cases, the profit from higher foreign return is obviously weak compared to profit from low foreign correlation. Saver was looking for low correlation abroad. The choice of Russian bonds for a French saver appears efficient thanks to the very low correlation between those two bond markets. Focusing on the period of the end of the XIXth century, US stocks appears to be not very attractive for a French stockholder, what is consistent with historical behaviour. At the reverse, during the same period Russian bonds provide both higher foreign return and low correlation. Since 1914, the US-French stocks market correlation level tends to increase following probably an increase in GDP correlation. As a result a gradual decrease in incentive to buy foreign stocks. Today, the historically high level

of stock correlation provides only a weak incentive to buy foreign stocks compared to prior 1914.

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Appendix 1: Sources
Data sources

US Stocks : 1854-1870 : monthly data, Goetzmann, Ibbotson, Peng (2000)
1871-2008: monthly data, Cowles-S&P according to Shiller version, available online: http://www.econ.yale.edu/~shiller/data.htm

US long term rates:
1854-1871: New England selected interest rates, annual data interpolated, Homer & Sylla (1998)
1871-1913: monthly data, Schiller online

US Bills: 1854-1913: open market rate of discount, annual average interpolated, Homer & Sylla (1998)

US Railroad bonds:
1870-1913: monthly data, Macaulay (1938) available online: http://www.nber.org/databases/macrohistory/contents/chapter13.html

US Railroad bonds high grade:
1870-1913: monthly data, Macaulay (1938) available online: http://www.nber.org/databases/macrohistory/contents/chapter13.html

US Municipal bonds:
1870-1913: monthly data, Macaulay (1938) available online: http://www.nber.org/databases/macrohistory/contents/chapter13.html

French stocks: 1854-1988: approximated Cac 40, monthly data, author
1988-2008: Cac 40, monthly data, NYSE-Euronext

French long term rate:
1854-1913: Rente 3 %, monthly data, author

French Bills: 1854-1913: Banque de France‘s taux d’escompte, annual data interpolated, INSEE’s Statistical Yearbooks
1864-1913: NBER and Banque de France),

UK Consols: 1854-1913: monthly data, Kloveland (1994)

UK Bills: 1854-1913: open market rate of discount, annual average interpolated, Homer & Sylla (1998)

French, German, Argentine, Russian, Spanish, Italian spread with UK Consols:
1870-1913: Investor’s Monthly Manual, monthly data, Fergusson & Batley (2001)

Appendix 2: Part of French portfolio invest in foreign assets

Distribution of 1 032 French portfolios in 1897					
	Portfolio value between (in French franc)				
	0 2,000	15,000 2,000	60,000 75,000	100,000 150,000	150,000 100,000
Russian State Bonds	12.60%	28.30%	20.00%	38.20%	17.00%
Other Foreign State Bonds	0.20%		10.00%		23.00%
Foreign securities		4.90%	5.00%	7.60%	2.00%
French Securities	87.20%	66.80%	65.00%	54.20%	58.00%

Table 2: Distribution of 1 032 French portfolios in 1897

Sources: Congrès international sur l'étude de l'épargne in Michalet (1968), p. 153

	French Portfolio				
	1890 1895	1895 1900	1900 1905	1905 1910	1910 1914
French securities	74.60%	76.00%	72.10%	66.60%	66.30%
Foreign securities	25.40%	23.90%	27.90%	33.20%	33.70%

Table 3: Distribution of 1 032 French portfolios in 1890-1914

Sources: Michalet (1968), p. 137

Geographical repartition of the French portfolio of foreign securities		
	1900	**1914**
Russia	25%	25%
Turkey	7%	8%
Spain-Portugal	16%	9%
Austria-Hungary	9%	5%
Balkans	3%	6%
Italy	5%	3%
Switzerland, Benelux	3%	3%
Other Europe	3%	3%
French colonies	5%	9%
Other Africa	11%	7%
USA-Canada	3%	4%
South America	7%	13%
Asia	3%	5%

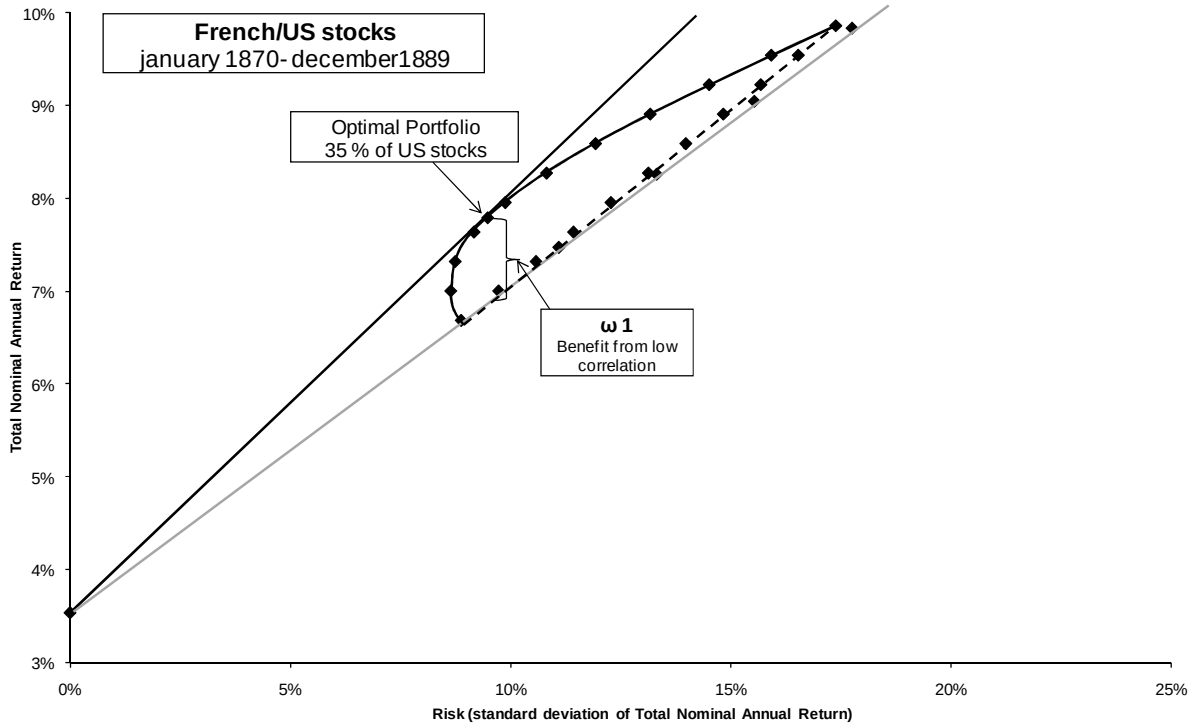
Table 4: Distribution of the French portfolio of foreign securities

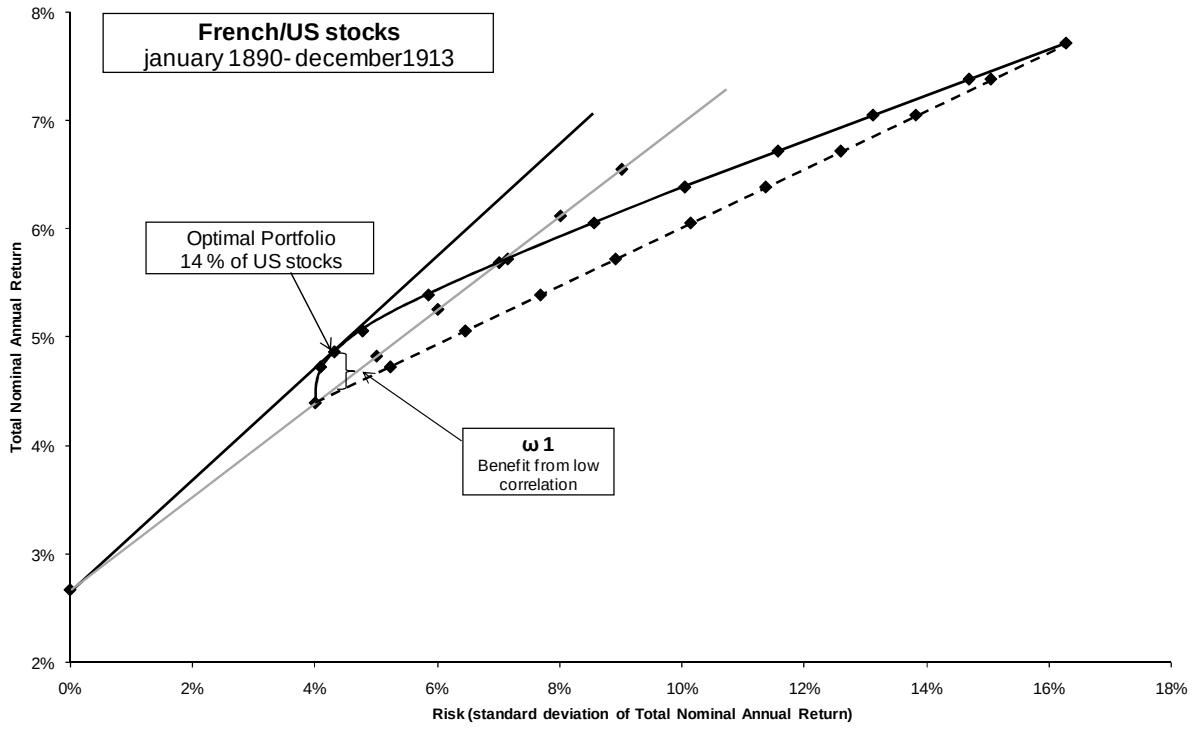
Sources: Feis H., *The World's Banker*, New-York, McKelley, 1964 in Michalet (1968), p. 147

Appendix 3: Risk and returns of assets and portfolios between French and US stocks, 1854-1913

Assets and portfolio returns, 1854-1913			
	Risk	***Mean***	***Geo mean***
Pure asset			
French Stocks (Cac 40)	7.37%	5.75%	5.50%
French State Bonds (Rente 3 %)	5.61%	4.31%	4.15%
French Corporate Bonds (Rezzae)			
French Bills	1.17%	3.18%	3.18%
US Stocks (Old NYSE-Cowles)	16.95%	8.99%	7.75%
US Bonds	4.19%	4.65%	4.56%
US Bills	1.70%	4.37%	4.36%
Consols UK	3.42%	2.96%	2.91%
UK Bills	1.22%	3.14%	3.14%
French-US stock portfolio			
10 % US stocks_90 % French stocks	7.22%	6.08%	
20 % US stocks_80 % French stocks	7.46%	6.40%	
30 % US stocks_70 % French stocks	8.05%	6.72%	
40 % US stocks_60 % French stocks	8.93%	7.05%	
50 % US stocks_50 % French stocks	10.01%	7.37%	
60 % US stocks_40 % French stocks	11.24%	7.69%	
70 % US stocks_30 % French stocks	12.57%	8.02%	
80 % US stocks_20 % French stocks	13.98%	8.34%	
90 % US stocks_10 % French stocks	15.45%	8.66%	
Optimal portfolio			
31 % US stocks_69 % French stocks	***8.13%***	***6.75%***	
French-US stock portfolio with hypothetical perfect correlation			
10 % US stocks_90 % French stocks	8.33%	6.08%	
20 % US stocks_80 % French stocks	9.29%	6.40%	
30 % US stocks_70 % French stocks	10.25%	6.72%	
40 % US stocks_60 % French stocks	11.20%	7.05%	
50 % US stocks_50 % French stocks	12.16%	7.37%	
60 % US stocks_40 % French stocks	13.12%	7.69%	
70 % US stocks_30 % French stocks	14.08%	8.02%	
80 % US stocks_20 % French stocks	15.04%	8.34%	
90 % US stocks_10 % French stocks	15.99%	8.66%	
Risk similar to optimal internationl portfolio			
8 % US stocks_92 % French stocks	**8.13%**	**6.01%**	
Leveraged strategy on domestic market			
- 25 % Debt_125 % French Stocks	9.22%	6.31%	
- 50 % Debt_150 % French Stocks	11.06%	6.88%	
- 75 % Debt_175 % French Stocks	12.90%	7.44%	
- 100 % Debt_200 % French Stocks	14.74%	8.00%	
- 125 % Debt_225 % French Stocks	16.59%	8.56%	
Risk similar to optimal internationl portfolio			
-10,28 % Debt_110,28 % French stocks	***8.13%***	***5.98%***	

Appendix 4: Decomposition of French/US stocks portfolio, 1854-1889 and 1890-1913





Appendix 5: Risk and returns of assets and portfolios between French and Russian bonds, 1870-1913

Assets and portfolio returns, 1870-1913			
	Risk	***Mean***	***Geo Mean***
Pure asset			
French Stocks (Cac 40)	6.92%	5.40%	5.10%
French State Bonds (Rente 3 %)	5.58%	4.35%	4.19%
French Corporate Bonds (Rezzae)	3.42%	4.20%	4.14%
French Bills	1.34%	3.25%	3.24%
US Stocks (Old NYSE-Cowles)	15.43%	7.65%	6.55%
US Bonds	4.00%	4.35%	4.19%
US Bills	1.92%	4.15%	4.13%
Consols UK	3.41%	2.81%	2.75%
UK Bills	0.77%	2.75%	2.75%
Spanish Bonds	17.04%	9.40%	8.17%
German Bonds	2.38%	4.62%	4.59%
Italian Bonds	6.32%	7.31%	7.13%
Argentine bonds	12.23%	7.95%	7.25%
Russian Bonds	6.88%	6.33%	6.10%
French-Russian bonds portfolio			
10 % Russian Bonds_90 % French bonds	5.14%	4.55%	
20 % Russian Bonds_80 % French bonds	4.81%	4.75%	
30 % Russian Bonds_70 % French bonds	4.61%	4.94%	
40 % Russian Bonds_60 % French bonds	4.56%	5.14%	
50 % Russian Bonds_50 % French bonds	4.66%	5.34%	
60 % Russian Bonds_40 % French bonds	4.90%	5.54%	
70 % Russian Bonds_30 % French bonds	5.27%	5.73%	
80 % Russian Bonds_20 % French bonds	5.73%	5.93%	
90 % Russian Bonds_10 % French bonds	6.28%	6.13%	
Optimal portfolio			
68 % Russian Bonds_22 % French bonds	***5.19%***	***5.69%***	
French-Russian bonds portfolio with hypothetical perfect correlation			
10 % Russian Bonds_90 % French bonds	5.71%	4.55%	
20 % Russian Bonds_80 % French bonds	5.84%	4.75%	
30 % Russian Bonds_70 % French bonds	5.97%	4.94%	
40 % Russian Bonds_60 % French bonds	6.10%	5.14%	
50 % Russian Bonds_50 % French bonds	6.23%	5.34%	
60 % Russian Bonds_40 % French bonds	6.36%	5.54%	
70 % Russian Bonds_30 % French bonds	6.49%	5.73%	
80 % Russian Bonds_20 % French bonds	6.62%	5.93%	
90 % Russian Bonds_10 % French bonds	6.75%	6.13%	
Leveraged strategy on domestic market			
- 25 % Debt_125 % French Stocks	6.98%	4.63%	
- 50 % Debt_150 % French Stocks	8.37%	4.90%	
- 75 % Debt_175 % French Stocks	9.77%	5.18%	
- 100 % Debt_200 % French Stocks	11.17%	5.45%	
- 125 % Debt_225 % French Stocks	12.56%	5.73%	
Risk similar to optimal internationl portfolio			
6,99 % Debt_93,1 % French bonds	***5.19%***	***4.27%***	

Appendix 6: Decomposition of French/Russian bonds portfolio, 1870-1892 and 1892-1913