# Financial Market Integration: Evidence from Cross-Listed French Firms

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**ABSTRACT**

The characteristics of the financial results of Japan's banks for fiscal 2016 are summarized in three points below. First, net income declined for all types of banks; major banks, regional banks, and shinkin banks. Main factors are the decline in net interest income through the shrinking domestic lending margins and realized losses on U.S. Treasury bondholdings due to the rise in U.S. long-term interest rates mainly among major and regional banks. On the other hand, low and stable credit cost ratios and the widening of the extent to which realized gains exceeded losses on stockholdings, including sales of strategic stockholdings at major and regional banks, have supported the level of net income. Second, operating profits from core business, which show core profitability, decreased for all types of banks and the declining trend accelerated somewhat in regional and shinkin banks. This is attributable to a) a decline in net interest income through shrinking domestic lending margins and b) a decline in fees and commissions associated with sales of financial instruments such as investment trusts and insurance products. Third, financial institutions have maintained their financial soundness as a whole. With regard to the generation of credit cost, credit cost ratios remained low at major banks as the occurrence of loan-loss provisions to certain domestic large firms was outweighed by the decline in the occurrence of loan-loss provisions to overseas exposure to the commodity sector. Credit cost ratios continued to be restrained at regional and shinkin banks. Meanwhile, the amount of capital continued to increase mainly at major banks, due to the accumulation of retained earnings.

Introduction

The last several decades have witnessed a dramatic increase in the globalization of investment. Some reasons for this increase include the promise of higher rates of return and the opportunity to diversify risk internationally. Moreover, considerable progress has been made in integrating and deepening financial markets during the first decade of the 21st century. Empirical papers investigating stock market integration have analyzed the degree of integration from various angles.1 One aspect of the literature investigates equity market integration using high frequency data (see e.g., (Hasbrouck 1995; Werner and Kleidon 1996; Lowengrub and Melvin 2002; Hupperets and Menkveld 2002)). These authors tested the hypothesis that the listing of a firm on a foreign exchange should have no effect on the price of the firm where the markets are perfectly integrated. In fact, the mechanism of adjustment should equalize the prices paid for the same firm on different exchanges. In other words, the same set of risky cash flows should be assigned the same value irrespective of the location of the trade. If not, then arbitrageurs should stand ready to close any "market gap" that exists between the prices on two different exchanges of a given firm. In order to test this hypothesis, these studies are based on intraday observations described by patterns2 where price volatility on a single exchange is high within an hour or so after its

opening, then falls during part of the trading day, and then slowly and gradually rises up until the closing bell. This price action can be seen in Figure 1. By analyzing the intraday patterns of UK stocks cross-listed on the US market. (Werner and Kleidon 1996) concluded that these markets are segmented (non-integrated). Inspired bythis idea, (Lowengrub and Melvin 2002) examined the evidence of the effect of ADRs3 on German home market stock volatility and volume over the trading day. This study concluded that "the data is consistent with an integrated global trading environment rather than two segmented markets". Thus, where two markets are perfectly integrated, the intraday pattern of volatility and volume on both combined markets should resemble the U-shape documented for single market (see Figure 2). (Hupperets and Menkveld 2002) examined Dutch firms cross-listed in the US market. Their findings suggest that price discovery depends on the origin of information. Accordingly, the adjustment rate is substantially higher for a foreign market (US) in an earlier time zone that is responding to the domestic market (Dutch) in a later time zone.

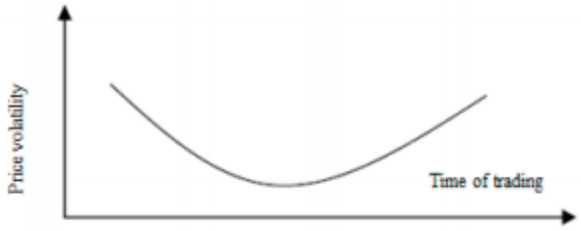


**Figure 1.** Stylized intraday pattern for a firm's stock on a single exchange.

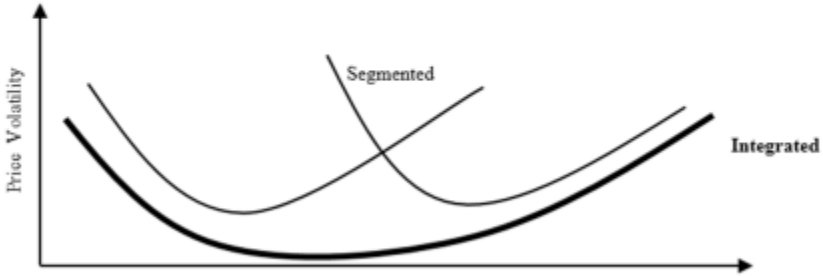


**Figure 2.** Stylized intraday pattern for cross-listed stock. Note: The thick black line traces out the elongated U-shape that is the predicted intraday pattern for volatility and trading volume as presented by (Werner and Kleidon 1996).

This article proceeds as follows: Section 2 presents the data; Section 3 describes the methodology for analyzing intraday volatility and volume on both the EURONEXT and NYSE markets; Section 4 introduces the Flexible Fourier Form (FFF) model to estimate intraday trading patterns; Section 5 examines the results of this methodology; Section 6 tests the hypothesis of market integration byfocusing on price discovery during the overlap time and by reporting empirical results; Section 7 sets forth some implications for future research; and, Section 8 consists of concluding remarks2. Data For our data, we use price and volume quotes for eight widely-held and actively traded French firms cross-listed on both the EURONEXT and New York stock exchanges. These quotes are taken at 15-min intervals during the 2-h window of each trading day in which such cross-listed trading occurs. We examine one year of intraday data5 from 3 January 2005 through 30 December 2005. The eight French companies6

we used for our data are sometimes described as blue chips7 . They are diverse in terms of both industry and market capitalization, and consist of Air France KLM (AF), France Telecom (FTE), Alcatel (ALC), AXA, Sanofi (SAN), Veolia (VEO), Thomson (TMS), and Rhodia (RHD). For these stocks, continuously compounded returns are calculated as R it,n = ln P it,n/P i t,n−1 where R it,n and P i t,n−1 represent the price and the return, respectively, for firm i at day t and time n. Summary statistics for the eight French firms are presented in Table 1

**Table 1.** Summary statistic.

| | | Mean | Std. Dev | Minimum | Maximum | AC abs [a] Return | Nb of Obs. | Nb of Shares |
|---|---|---|---|---|---|---|---|---|
| PARIS | AF | 0.0028 | 0.22 | −2.58 | 4.55 | 0.151 | 8986 | 38,924 |
| NY | AF ADR | 0.0055 | 0.47 | −3.82 | 4.90 | 0.059 | 6540 | 11,200 |
| PARIS | FTE | −0.0016 | 0.21 | −3.95 | 3.93 | 0.106 | 8963 | 288,608 |
| NY | FTE ADR | −0.0045 | 0.29 | −4.33 | 1.99 | 0.028 | 6540 | 5689 |
| PARIS | VEO | 0.0041 | 0.20 | −1.88 | 1.83 | 0.174 | 8987 | 43,916 |
| NY | VEO ADR | 0.005 | 0.33 | −3.56 | 2.39 | 0.112 | 6540 | 827 |
| PARIS | RHD | 0.0005 | 0.63 | −1.79 | 11.78 | 0.077 | 8948 | 27,497 |
| NY | RHD ADR | −0.0049 | 1.03 | −1.75 | 7.67 | 0.117 | 6540 | 2060 |
| PARIS | AXA | 0.0044 | 0.20 | −2.81 | 2.77 | 0.098 | 8986 | 203,737 |
| NY | AXA ADR | 0.004 | 0.26 | −2.71 | 1.98 | 0:015 | 6540 | 11,912 |
| PARIS | TMS | −0.001 | 0.24 | −3.32 | 5.45 | 0.104 | 8986 | 59,102 |
| NY | TMS ADR | −0.0045 | 0.35 | −2.90 | 3.89 | 0.050 | 6540 | 2696 |
| PARIS | SAN | 0.0025 | 0.21 | −2.46 | 4.13 | 0.104 | 8986 | 115,074 |
| NY | SAN ADR | 0.0014 | 0.24 | −3.05 | 3.54 | 0.071 | 6540 | 36,555 |
| PARIS | ALC | −0.0037 | 0.29 | −7.97 | 5.09 | 0.106 | 8987 | 315,642 |
| NY | ALC ADR | −0.0011 | 0.38 | −9.77 | 9.05 | 0.065 | 6540 | 38,980 |

[a] Autocorrelation of absolute return Lag 1.

For all of the firms, taken together, the 15-min mean return is nearly zero. However, the minimum and maximum returns during this one year period are sizeable. The minimum return during the period studied for each firm is greater than its respective standard deviation. For example, AXA experienced a minimum return of −2.81%; while it had a standard deviation of 0.20%. This suggests that a series of price “spikes” (up or down) occurred during this period.8 Whether measured by the number of shares traded or by the mean of the shares traded, EURONEXT is a more active market than the NYSE. The positive autocorrelation of absolute returns indicates the presence of volatility clustering9 , which is consistent with Figure 3. Indeed, for the firm AXA, we can observe the structure of the volatility and volume as shown by its coefficient of the autocorrelation of the absolute returns.

3.Methodology

There is a “jump” (υ2) at 3:30 pm Central European time (CET) for both volatility and volume corresponding to the NYSE open. We observe an increase in volume accompanied by a brief decrease in volatility at 3:30 pm. The volatility increases gradually from around 3:45 pm (CET) until the close of the EURONEXT market for the majority of the eight French firms studied. However, for Air France and Rhodia, this observation is less pronounced

We next look at whether the way in which the NYSE opens with respect to a given French firm provides information about that firm. Indeed, it is possible that non-systematic or private information may be revealed through the start of trading at the NYSE in the individual cross-listed French stocks. If we assume that perfect market integration exists, then the opening of the NYSE should be incorporated through trading in a given French firm on the EURONEXT market. However, the empirical evidence for

French cross-listed firms rejects the hypothesis of perfect market integration as discussed by (Hupperets and Menkveld 2002), as shown in Figure 5. Increased volatility and volume during the 2-h overlap time period do not appear to be consistent with the stylized U-shape pattern for a single market

The validity of the model depends on the validity of two hypotheses. First, the series should be integrated of order one and, if this is true, both series should be cointegrated. Dickey-Fuller test statistics show that both of these assumptions are valid for all eight French firms. This test concludes that the two log-price series contain a unit root, while the returns are stationary. The return series are integrated of the order one I (1). In order to examine whether a long-term relationship exists between the EURONEXT and NYSE series, we test for cointegration. The residuals from the cointegrating regression can be considered stationary and the series are cointegrated C (1, 1). In the next stage, we use the Engle Granger 2-step approachThe results in Table 4 indicate that the error correction term (ECT) is significant in all models. It should be noted, though, that the ECT is sometimes significant for the EURONEXT equation only, sometimes for the NYSE equation only, and sometimes for both. For Air France, α nyse is significantly positive for the NYSE. This implies that, for the French firms studied, the NYSE adjusts to price differences with the EURONEXT market. For Veolia, Sanofi and Thomson both the EURONEXT market and the NYSE adjust for price differences. For the rest of the French firms studied, the error correction mechanism—in which the mean (α euxt) is significantly negative—reflects the EURONEXT market adjusting to price differences with the NYSE. In addition, the variable γ1 is positive and highly significant for the NYSE. This suggests that the prices of the French firms listed on the EURONEXT market lead the prices of their cross-listed shares on the NYSE market. Stated alternatively, lagged changes in the prices of French firms on the EURONEXT market lead to subsequent changes in the prices of ADRs on the NYSE. On the other hand, β1 is significantly positive for only two EURONEXT stocks. Hence, markets are integrated, since differences in prices are temporaryOur research focuses on a period of relative calm in the EURONEXT market. An implication for future research involves examining one or more periods of relative market instability. It is possible that, during a period of relative market instability, the reversion to the mean of price differences is nonlinear in nature and can be represented by an ESTAR model that is consistent with transaction costs. Another implication for future research involves the imposition13 in 2013 of a 0.2% tax on the purchase of stocks and ADRs of certain French firms. This 0.2% tax should have a significant effect on the trading volumes and prices of the eight cross-listed French firms contained in our study given that most of the other countries in Europe have so far declined to follow France's lead on this issue

Conclusions

Using data on cross-listed stocks allows testing for financial integration between stock markets without having to make a joint hypothesis on the equilibrium stock return model. We investigate the financial integration between the Euronext stock market and the NYSE by using trading data oncross-listed French firms. Focusing on the 2-h "overlap" between the Euronext Paris and the NYSE, we study the dynamics of price differences between the two markets for eight French blue chip firms during the year 2005. First, the result showed that the average price difference does not increase notably, but its volatility and volume increase during the overlap time, which is not consistent

with the stylized U-shape pattern for a single market as demonstrated in the literature. Second, the price difference in these two markets is stationary and the speed of mean reversion varies according the stock. Roughly the result conformed to the law of one price reasonably. We suppose that arbitrage opportunities appeared to exist when stock-broking houses trade for their own accounts, obviously with no transaction costs

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