Quantile Regression Analysis of Exchange Rate Exposure in Cross-Country Sector Portfolios

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Abstract

This study empirically examines the impact of exchange rate exposure on firms' foreign currency competiveness (FCC) using cross-country sector value-weighted portfolios. We analyze bilateral Swedish krona and euro currency's competiveness exposure on similar sectors across small, open and export-oriented nations of Sweden and Finland. These two economies represent an interesting case study as they have similar industrial structure, similar exportable products and similar trading partners, which are mainly in Europe, yet Sweden still uses its Swedish krona, while Finland discarded its Finnish markka and embraced the euro in 1999. The results from our analysis indicate that Finnish Sector portfolios have a greater impact of exchange rate movements with regards to Swedish excess returns and returns from global market index in the post-euro period. Furthermore, using quantile regression we find comprehensive estimates across distribution with evidence of significant FCC exposure at different quantiles in different sectors.

JEL: F15, F31, F36

Keywords: Quantile Regression; Robust Conditional Distribution; Firms' Foreign Currency Competitiveness; Cross-Country Sector Returns; Small Open Economies; Pre-and Post-Euro.

Draft: Jan 2012

1. Introduction

Recently, there is an increasing debate about the possibility of solvency of a euro member nation. Some euro nations have come under colossal scrutiny and several media reports have prompted an idea of euro nations to revert back to their own respective currencies, which they had before joining the European single common currency. Furthermore, another argument is to allow the euro nation to exit the common currency, especially under extreme monetary distress. Many have argued that with their respective currencies these nations are better off. Among other reasons, one prominent reason for reverting back is that these nations could regain the flexibility to devalue their currencies without restrictions, which at present they cannot do because they are part of the eurozone with European Central Bank (ECB) having the monetary decision supremacy. In fact, by devaluing their individual currencies their exporting firms will become more competitive, hence gaining from international competition, as per the rationale from the media.

In this regard, the principal currency of exporting firms affects the firm's competitiveness, either gaining or loosing from international competition. In similar context, we study the firm's competitiveness of two north European nations namely Sweden and Finland, in pre- and post-euro periods. We investigate the connection between exchange rate shocks and cross-border value-weighted sector portfolios of these nation's equity markets using quantile regression approach. In other words, we analyze the Finnish firms' foreign currency competitiveness (FCC) in connection with their Swedish counterpart firms in the same sectors. Our study focuses on the firms that are listed on the respective equity markets of these nations. Nevertheless, there are many private unlisted firms in both nations that cannot be included due to data limitations.

The reason for selecting Finland and Sweden is because they are two adjacently located, small, open and export-oriented economies in northern Europe with free-floating exchange rate regimes[1]; therefore greater effect from exchange-rate movements. These nations have similar industry structure, similar export products, and similar trading partners, which are mainly in Europe. Furthermore, there is bulk of cross-country trade with an increasing number of company mergers across borders. Also, their respective stock exchanges have merged on September 2003[2]. However, the trading of listed companies is still done in their respective currencies, that is, Swedish krona for Sweden and the euro for Finland.

Globally, there are few such closely linked economies, which have such a comparable mix of industrial structure, export products and trading partners[3]. Additionally, Sweden still uses its Swedish krona whereas Finland discarded its Finnish markka and joined the European single currency in 1999, thus uses euro as its currency. Consequently, our selection of these comparable nations represents a natural laboratory, which is quite unique. Especially, with similar comparable mix as indicated earlier, Finland has joined the euro whereas Swedish keeps its currency, hence greater discretionary power for Sweden as they are free to fix their own exchange rate and can execute currency interventions if necessary. In other words, Swedish central bank possesses the power to implement monetary policies, regulate money supply, adjust interest rate, repo rate, and supervise its banks, etc. in order to maintain Sweden's price stability; whereas Finland's central bank does not have such power. Their decision for monetary policies, maintaining price stability, etc. is set by ECB, which is common for all euro member nations[4]. In other words, Finland's monetary policy is set by ECB while Sweden sets its own independent monetary policy, without ECB's interference. And well-maintained monetary policy with controlling inflation and stabilization of real economy is crucial for any nation's economic wellbeing.

In this regard, the contribution of the paper is to re-examine Gulati, Knif and Kolari (2009, 2010) study by investigating Griffin and Stulz (2001) international firms' competitiveness hypothesis using alternative econometric approach for Finnish and Swedish economies. In other words, we test the competitiveness hypothesis of Griffin and Stulz (2001) in the same framework as that of Gulati, Knif and Kolari's (2009, 2010) study; however, we use more robust quantile regression methodology. Intuitively, significant positive (negative) coefficient of Swedish sector's excess return with regards to Finnish sector suggest that an increase in exchange rate is more (less) beneficial for that sector in comparison to the overall stock market. The main question focuses on whether there is significant impact of exchange rate across conditional distribution on firm's excess return. Furthermore, does this exchange rate exposure affect firm's competitiveness across borders? Our expectation is based on the existence of robust exchange rate exposure across sectors. Additionally, with regards to previous studies of Griffen and Stulz (2001) and Gulati, Knif and Kolari (2009, 2010) we expect no competitive exposure. In fact, our expectation is to find positive coefficients of Swedish sectors and its interactive terms of exchange rates; hence we expect greater equity market integration in general between Sweden and Finland, especially in post-euro period. However, with our robust econometric methodology of quantile regression, we expect some negative coefficients for different sectors at different estimated quantiles for Swedish excess returns, which could support the firm's FCC. Furthermore, we expect such exposure to be asymmetric across distribution, i.e. different for upper and lower estimated quantiles.

There are few studies investigating how the exposure is associated with cross-country industry competitiveness and the empirical results are partly contradicting. Griffin and Stulz (2001) examined the exchange rate movements and industry competitiveness using stock return data in a cross-country industry setup. They investigated whether returns on similar industries across borders can be economically affected by corresponding bilateral exchange rates shocks. They regressed Japanese industry's excess over-the-market returns on the changes in exchange rate, U.S. industry's excess over-the-market returns, and these variables' non-linear interaction. They concluded that common shocks across industries are more important than competitive shocks in the exchange rates. Furthermore, both industry and exchange rate shocks are more important for industries that produce internationally traded goods. However, the exposure had little economic significance.

Likewise, based on forex exposure analyses of German investors in European countries, De Santis, Gerard, and Hillion (2003) inferred that currency risks in Europe would have little economic impact, which is similar to Sentana (2002). Additionally, based on evidence from eight non-U.S. countries, Dominguez and Tesar (2006) found that forex exposure was correlated with firm size, multinational status, foreign sales, international assets, and trade at the industry level. Unfortunately, only weak evidence of a link between international trade, competition, and exchange rate exposure on the firm level was found.

On the contrary, Williamson (2001) found significant exposure to exchange rate shocks among automotive firms in the U.S. and Japan. Time variation of exchange rate exposure as competitive conditions changed and variation in exposure among firms with different levels of foreign sales were consistent with the notion that multinational firms competing in global markets are sensitive to exchange rate movements. Bodnar, Dumas, and Marston (2002) also examined how exchange-rate exposures are associated with the competitive nature of export-intensive Japanese industries. They confirmed that, as substitutability increased, keeping market share fixed, pass-through declined and exchange rate exposure increased. However, holding substitutability fixed, increases in market share reduced both pass-through and exposure elasticities. Moreover, Allayannis and Ihrig (2001) analyzed the cross-section of U.S. industries overtime and indirectly examined the competitiveness issue. They found that 4-out-of-18 industries were significantly exposed to exchange-rate movements through the effect of industry competitive structure, export share, and imported input share.

Furthermore, Gulati, Knif and Kolari (2009, 2010) used similar empirical methodology as of Griffin and Stulz (2001) and examined bilateral exchange rate exposure and firm's competitiveness in small open economies. They tested the forex competitive hypothesis in Finnish and Swedish cross-country industry setup and found statistically significant exchange rate exposure in the post-euro period for almost all the Finnish industry portfolios. However, the exposure was of little economic significance. Hence, their results are consistent with Griffin and Stulz (2001). In other words, their results indicated that the Finnish equity market was more homogeneous regarding exchange rate shocks in the pre-euro period. However, in the post-euro period the exposure became more sector and industry dependent. The results clearly indicated a positive correlation between excess industry returns across border and even more so in the post-euro period. Consequently, in both the studies firm's foreign currency competitiveness (FCC) hypothesis was rejected as more integration was found instead of competitiveness across border.

Overall, previous studies have found contradicting results on exchange rate exposure and its impact on firm's forex competitiveness. It could be that there are extreme shocks at different parts of the return distribution, which may not be properly accounted for in the regression models. Therefore, our study contributes to the FCC hypothesis by using alternative and more robust econometric methodology of quantile regression. The motivation is based on the fact that regression models, which are used in previous studies, are concerned with analyzing the conditional mean of a dependent variable. However, the parts of the return distribution in which the investor and risk managers are concerned are extreme outcomes in the tails; hence quantile regression seems more appropriate as it provide comprehensive estimates across the distribution.

This paper is organized as follows: section 2 provides the literature review regarding exchange rate exposure. Section 3 discusses our selected econometric methodology of quantile regression. Section 4 is a data section. In section 5, we report our empirical results. Finally, section 6 concludes the study.

2. Literature Review

Jorion (1990) investigated the exchange rate exposure of U.S. multinationals to foreign currency risk and revealed that the exposure was positively correlated with the degree of foreign involvement. In other words, the co-movement between stock returns and the value of the dollar was found to be positively related to the percentage of foreign operations of U.S. multinationals. Furthermore, He and Ng (1998) explored the exchange rate exposure of Japanese firms and found that a depreciating (appreciating) yen has a favorable (adverse) impact on Japanese multinationals whose exports comprise at least 10 percent of their total sales. Additionally, Doukas, Hall and Lang (2003) examined the exchange rate exposure of 1,079 Japanese firms and 25 industries over the 1975-1995 periods. Regarding fluctuations in foreign value of the yen using unconditional and conditional testing procedures, they identified consistent relation between contemporaneous stock returns and unanticipated yen fluctuations. Moreover, this relation is greater for firms with foreign economic links and ties. Williamson (2001), in his study of exchange rate exposure and competition focusing on evidence from the automotive industry, found statistically significant competitive effects of exchange rate shocks between Japan and the U.S. in a specification that regresses the difference in automotive industry returns between the two countries on the US dollar/yen exchange rate return.

Doidge, Griffin and Williamson (2006) measured the economic importance of exchange rate exposure on the firm's value by using a database of non-financial firms from over 18 countries. Their main contribution was the application of a portfolio approach to investigate the economic importance of exposure. In contrast to previous literature, their empirical evidence showed that exchange rate movements can have an economically significant impact on the firm value. Dominguez and Tesar (2006), in their study regarding the relationship between exchange rate movements and firm value, acknowledged that firms dynamically adjust their behavior in response to exchange rate risk. They found the exposure was correlated with firm size, multinational status, foreign sales, international assets, competitiveness and trade at the industry level.

Recently, Bartram and Karolyi (2006) examined whether the introduction of the euro is associated with lower stock return volatility, market risk exposures and foreign exchange-rate risk exposures. Their data consisted of 3,921 non-financial firms from 18 European countries, the United States and Japan. They found that the euro led to a greater decrease in the volatility of trade-weighted exchange rates of European countries and that stock market volatility generally increased but less in the euro area and non-euro Europe than outside Europe. Moreover, Antell and Vaihekoski (2007) investigated international asset pricing models and currency risk. In their study, they focused on Finland. They used conditional international asset pricing models to investigate whether the global, local and currency risks are priced in the Finnish equity market. Their results presaged that the price of world and local risk is time-varying, as though local risk is more significant for the Finland than for US stock market. The currency risk is priced in the Finnish market but it is not time-varying. Additionally, Koutmos and Knif (2011) investigated asymmetric first- and second-moment exchange rate exposure of the stock exchange of Finland. They sub-divided the data into pre-and post-euro periods for their analysis. They found significant market-level and residual exchange rate exposure in the pre-euro period. On the contrary, in post-euro period there was no significant exchange rate exposure at both market-and portfolio level. Therefore, there existed profound impact on the exchange rate exposure of the Finnish stock exchange.

Likewise, Entorf, Moebert and Sonderhof (2007) examined the foreign exchange rate exposure and followed the approach of Adler and Dumas (1984). Their results, based on 27 countries, show that national foreign exchange rate exposures are significantly related to the current trade balance variables of corresponding economies. Their main assumption is that export leaders with positive exchange beta reflects the exporting countries to profit by a depreciating of their own currency and import oriented nations with negative betas, the opposite holds. Moreover, in one of their results, Finland seems to exhibit positive beta while Sweden reflects negative beta. Also, the size of the coefficient for Finland is about three times larger than that for Sweden, confirming both nations as export oriented economies.

Nguyen, Faff and Marshall (2006) studied the impact of the introduction of the euro on exchange rate exposure for French companies and examined the corporate use of foreign currency derivatives to hedge exchange-rate exposure in the post-euro period. They found that the introduction of the euro is associated with both a reduction in the number of firms that have significant exchange-rate exposure and the absolute size of exposure. Also, the use of foreign currency derivatives was found to be associated with lower exchange rate exposure. Similarly, Muller and Verschoor (2006) examined 817 European multinational firms, whereby they uncover that a depreciating (appreciating) euro against foreign currencies has a net negative (positive) impact on European stock returns. Also, short-term exposure seems to be relatively hedged, where considerable evidence of long-term exposure is found and foreign exposure increases with firm size. Rees and Unni (2005) investigated the pre-euro exposure and uncovered that the exchange rate sensitivity is considerably stronger and firms in UK, France, and Germany typically gain value when their local currency depreciates against the US dollar. However, many UK companies lost values when the sterling depreciates against the European currency unit.

There is an interesting study by Joung and Sjöholm (1999), which sheds light on the choice of exchange-rate system facing Finland and Sweden adopting the theory of optimum currency areas. They argued that countries with a similar industrial structure will be affected in a similar way by sector-specific asymmetrical disturbances. The authors provided details about Finland and Sweden, displaying strong interdependence in regard to monetary policy and industrial structure. Moreover, in the euro area there seems to be an understanding that with the introduction of the euro, an increase in the trade activity of euro member states has taken place. However, the magnitude varies across different studies[5].

3. Empirical Methodology

In this paper, we analyze the expected excess return distribution of six sector portfolios, which are formed by the value weighted log-returns of 71 Finnish and 87 Swedish firm's stocks, using quantile regression. As previously stated, the use of quantile regression permits a comprehensive description of the conditional distribution. Thus, it allows us to describe, for instance, how the median, or the 10th or 95th percentile of the response variable, are affected by regressor variables. Quantile regression does not rely on assumptions as restrictive as those of classical linear regression. Though more traditional models such as least squares regression are widely used, however, quantile regression yields more robust understanding of asymmetry across the conditional distribution. Koenker and Bassett (1978) argued that the conventional least squares estimator may be seriously deficient in linear models with non-Gaussian errors. They showed the estimator that minimizes the sum of absolute residuals as a special case. Also, they suggested the estimators that have comparable efficiency to least squares for Gaussian linear models while substantially out-performing the least-square estimator over a wide class of non-Gaussian error distributions. The authors introduced new class of statistics for the linear model which they called regression quantiles since they appear to have analogous properties to the ordinary sample quantiles of the location model. Natural generalization based on regression quantiles of linear combinations of sample quantiles and trimmed means which appear to have promising robustness properties are then proposed for the general linear model[6].

In other words, they provided a way to explore sources of heterogeneity in the response that are correlates with the covariates. The classical OLS regression minimizes the sum of squared residuals. The OLS is widely used due to its simplicity, however, the LAD seems to more robust when compared to the method of least squares. The least absolute deviation method minimizes the sum of absolute errors. If the errors have a Laplace distribution it can be similar to maximum likelihood estimation. In LAD we find a function f such that: $f(x_i) \approx y_i$. And to obtain unknown parameters that minimize the sum of absolute values of the residuals:

$$\sum_{i}^{n} |y_i - f(x_i)| = \sum |\varepsilon_t|$$

Instead of the traditional LAD regression, we minimize the asymmetric sum of absolute residuals. That is LAD is expanded further to form Quantile regression. In other words, the quantile regression (Koenker and Bassett 1978)) minimizes the asymmetric sum of absolute residuals and models the Quantiles of the dependent variable given a set of conditioning variables. Furthermore, Barnes and Hughes (2002) further explains the quantile regression is an extension of the classical least square estimation of the conditional mean to a collection of models for different conditional quantile functions. The median (quantile) regression estimator minimizes the symmetrically weighted sum of absolute errors (where the weight is equal to 0.50) to estimate the conditional median (quantile) function. Also, other conditional quantile functions are estimated by minimizing asymmetrically weighted sum of absolute errors, where the weights are functions of the quantiles of interest. In Quantile regression results are a function of tau (τ). The tau value near zero implies more weights on negative residuals, whereas, on the other extreme with highest tau values it indicates more weights on positive residuals. The models are estimated for each of the deciles, i.e. 10 quantiles (though it can be done for few or more number of quantiles). As the quantile regression uses absolute values instead of squares it is also more robust and less sensitive to outliers. Following is the quantile regression equation

$$\min\left[\sum_{i}^{n}\tau\left|y_i - f(x_i)\right| + \sum_{i}^{n}(1-\tau)\left|y_i - f(x_i)\right|\right]$$

The simple regression equation with Finland's Market Index (OMXH CAP) as dependent variable which regresses exogenous variable of bilateral exchange rate and the control variable of global market index (MSCI world Index).The regression equation is:

Equation: 1

$$r_{m,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \tag{1}$$

Firm's equity returns are calculated as continuously compounded returns. Furthermore, shocks to exchange rates are measured as log-returns of one currency relative to the other currency, i.e. Swedish krona per Finnish markka. Therefore, a positive return on the exchange rate indicates that the Finnish markka has appreciated against the Swedish krona. LAD regression that minimizes the sum of absolute residuals is presented as:

$$\sum\left|r_{m,t}^{FI} - \hat{a} - \hat{b}r_t^{FX} - \hat{g}r_{i,t}^{WI}\right| = \sum\left|\varepsilon_t\right| \tag{1a}$$

In our case, the quantile equation is:

$$\min\left[\sum_{\tau:r_{m,t}^{FI}\geq\hat{a}+\hat{b}r_t^{FX}+\hat{g}r_{i,t}^{WI}}\tau\left|r_{m,t}^{FI} - \hat{a} - \hat{b}r_t^{FX} - \hat{g}r_{i,t}^{WI}\right| + \sum_{\tau:r_{m,t}^{FI}<\hat{a}+\hat{b}r_t^{FX}+\hat{g}r_{i,t}^{WII}}(1-\tau)\left|r_{m,t}^{FI} - \hat{a} - \hat{b}r_t^{FX} - \hat{g}r_{i,t}^{WI}\right|\right] \tag{1b}$$

$$\text{for}\quad \tau = \{0.10, 0.20, \ldots, 0.90\}$$

Furthermore, assuming the information on macroeconomic variables, etc is already priced in both the stock markets, we found it interesting to analyze over and above the stock market indices, i.e. excess over-the-market returns. Furthermore, by forming excess over-the-market sectors, we can compare results from previous studies of Griffen and Stulz (2001) and Gulati, Knif and Kolari (2009, 2010). Excess returns over the market has been used in the following equations[7]

Equation: 2

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \tag{2}$$

The robust LAD regression minimizes the sum of absolute residuals

$$\sum\left|\tilde{r}_{i,t}^{FI} - \hat{a} - \hat{b}r_t^{FX} - \hat{g}r_{i,t}^{WI}\right| = \sum\left|\varepsilon_t\right| \tag{2a}$$

Quantile Regression for equation 2 with LAD.

$$\min\left[\sum_{\tau:\tilde{r}_{i,t}^{FI}\geq\hat{a}+\hat{b}r_t^{FX}+\hat{g}r_{i,t}^{WI}}\tau\left|\tilde{r}_{i,t}^{FI}-\hat{a}-\hat{b}r_t^{FX}-\hat{g}r_{i,t}^{WI}\right| + \sum_{\tau:\tilde{r}_{i,t}^{FI}<\hat{a}+\hat{b}r_t^{FX}+\hat{g}r_{i,t}^{WI}}(1-\tau)\left|\tilde{r}_{i,t}^{FI}-\hat{a}-\hat{b}r_t^{FX}-\hat{g}r_{i,t}^{WI}\right|\right] \tag{2b}$$

Equation: 3

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \tag{3}$$

The robust LAD regression minimizes the sum of absolute residuals

$$\sum\left|\tilde{r}_{i,t}^{FI}-\hat{a}-\hat{b}r_t^{FX}-\hat{d}\tilde{r}_{i,t}^{SW}-\hat{g}r_{i,t}^{WI}\right| = \sum|\varepsilon_t| \tag{3a}$$

Quantile Regression for equation 3 with LAD.

$$\min\left[\sum_{\tau:\tilde{r}_{i,t}^{FI}\geq\hat{a}+\hat{b}r_t^{FX}+\hat{d}\tilde{r}_{i,t}^{SW}+\hat{g}r_{i,t}^{WI}}\tau\left|\tilde{r}_{i,t}^{FI}-\hat{a}-\hat{b}r_t^{FX}-\hat{d}\tilde{r}_{i,t}^{SW}-\hat{g}r_{i,t}^{WI}\right| + \sum_{\tau:\tilde{r}_{i,t}^{FI}<\hat{a}+\hat{b}r_t^{FX}+\hat{d}\tilde{r}_{i,t}^{SW}+\hat{g}r_{i,t}^{WI}}(1-\tau)\left|\tilde{r}_{i,t}^{FI}-\hat{a}-\hat{b}r_t^{FX}-\hat{d}\tilde{r}_{i,t}^{SW}-\hat{g}r_{i,t}^{WI}\right|\right] \tag{3b}$$

$$\text{for} \quad \tau = \{0.10, 0.20, \ldots, 0.90\}$$

Equation: 4

Quantile Regression for equation 3 with LAD:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i|r_t^{FX}| + d_i\tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX}\tilde{r}_{i,t}^{SW} + f_i|r_t^{FX}|\tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \tag{4}$$

$$\sum\left|\tilde{r}_{i,t}^{FI}-\hat{a}-\hat{b}r_t^{FX}-\hat{c}\left|r_t^{FX}\right|-\hat{d}\tilde{r}_{i,t}^{SW}-\hat{g}r_{i,t}^{WI}-\hat{e}r_t^{FX}\tilde{r}_{i,t}^{SW}-\hat{f}r_t^{FX}\left|\tilde{r}_{i,t}^{SW}\right|\right| = \sum|\varepsilon_t| \tag{4a}$$

$$\min\left[\sum_{\tau:\tilde{r}_{i,t}^{FI}\geq\hat{a}+\hat{b}r_t^{FX}+\hat{c}\left|r_t^{FX}\right|+\hat{d}\tilde{r}_{i,t}^{SW}+\hat{g}r_{i,t}^{WI}+\hat{e}r_t^{FX}\tilde{r}_{i,t}^{SW}+\hat{f}r_t^{FX}\left|\tilde{r}_{i,t}^{SW}\right|}\tau\left|\tilde{r}_{i,t}^{FI}-\hat{a}-\hat{b}r_t^{FX}-\hat{c}\left|r_t^{FX}\right|-\hat{d}\tilde{r}_{i,t}^{SW}-\hat{g}r_{i,t}^{WI}-\hat{e}r_t^{FX}\tilde{r}_{i,t}^{SW}-\hat{f}r_t^{FX}\left|\tilde{r}_{i,t}^{SW}\right|\right| + \right.$$
$$\left.\sum_{\tau:\tilde{r}_{i,t}^{FI}<\hat{a}+\hat{b}r_t^{FX}+\hat{c}\left|r_t^{FX}\right|+\hat{d}\tilde{r}_{i,t}^{SW}+\hat{g}r_{i,t}^{WI}+\hat{e}r_t^{FX}\tilde{r}_{i,t}^{SW}+\hat{f}r_t^{FX}\left|\tilde{r}_{i,t}^{SW}\right|}(1-\tau)\left|\tilde{r}_{i,t}^{FI}-\hat{a}-\hat{b}r_t^{FX}-\hat{c}\left|r_t^{FX}\right|-\hat{d}\tilde{r}_{i,t}^{SW}-\hat{e}r_t^{FX}\tilde{r}_{i,t}^{SW}-\hat{e}r_t^{FX}\left|\tilde{r}_{i,t}^{SW}\right|-\hat{g}r_{i,t}^{WI}\right|\right] \tag{4b}$$

$$\text{for} \quad \tau = \{0.10, 0.20, \ldots, 0.90\}$$

4. Data

The data consists of four different sets of weekly returns for both Finland and Sweden: (1) stock market total return indexes (TRI[8]) for firms, (2) aggregate total stock markets indices returns (i.e., the OMX Helsinki Cap index denoted OMXH CAP[9] and OMX Stockholm index denoted OMXS[10], respectively), (3) exchange rate series for the Finnish (FIM) and Swedish (SEK) currencies expressed in U.S. dollars (USD), and (4) MSCI world market index[11], which is taken as a proxy to account for global market integration and any related affect. The exchange rate series is converted to bilateral FIM/SEK exchange rates. Global Industrial Classification Standard (GICS) codes have been used to categorize different stocks into sectors.[12] All in all, six sector portfolios have been formed in consideration with GICS. These six sectors are: materials, industrials, consumer discretionary, consumer staples, financials, and information technology. Firm's median market capitalizations values across pre-and post-euro period have been used to compute weighted log-returns for different sector portfolios for both Finnish and Swedish stock markets. The reason for selecting the excess returns from different sector portfolios is because the firms in some sectors are more export-oriented than others; hence different sectors are likely to have different exchange rate exposure. In case of Finland, the materials, industrials, and information technology sectors [13]have more than 70% of their exports outside Finland. Whereas, the consumer discretionary, consumer staples and financials sectors have about 70% of their sales in Finland itself[14]. In case of Sweden, the listed firms have been classified in similar comparable sectors as that of Finland. The listed firms that have been selected in the materials sectors have 100 percent export orientation, whereas industrials and information technology sectors have greater than 70 percent of their sales in exports. On the contrary, firms under consumer discretionary, consumer staples and financials have equal or greater than 70% of their total sales in Finland, hence more domestic oriented sectors. Moreover, the fact that different industries may be differently exposed to the exchange rate movements is had been investigated by Krishnamoorthy(2001). The author found results that justified the usage of separate industries data and analyzing the respective exchange rate exposure.

Consequently, the selected sector portfolios consist of 71 Finnish and 87 Swedish companies that are listed on their respective stock exchanges. The selected number of listed firms is based on the availability of the comparable data between Finland and Sweden. The material sector has 9 firms from Finland and 6 from Sweden. Similarly, for the industrial sector the selected companies are 27 from Finland and 33 from Sweden. In addition, consumer discretionary sector comprise of 13 Finnish and 10 Swedish firms. Furthermore, consumer staples portfolios include 6 firms from Finland and 2 from Sweden. Moreover, financial sector portfolios include 12 Finnish and 25 Swedish companies. Last but not the least; information technology sector contains 4 companies from Finland and 11 Swedish companies. The preliminary descriptive statistics at different quantiles regarding both Finnish OMXHCAP market index and Swedish OMXS market index are presented in Table 1.

[Insert Table 1]

5. Empirical Analysis

This section discusses our empirical results of the four econometric models that have been presented in the methodology. Our models are referred as equations, hence, The quantile results of equation 1 analyzes the overall impact of returns from bilateral exchange rate (FIM/SEK), denoted as r_t^{FX} and global markets, denoted as $r_{i,t}^{WI}$, on the Finnish stock market indicated as $r_{m,t}^{FI}$ (OMXH CAP index).

In equation 2, we provide quantile regression of the exchange rates and the global market index with regards to Finnish sectors' over the market excess returns. Furthermore, equation 3 extends equation 2 further by an additional Swedish sector over the market excess return parameter. Moreover, the equation 4 extends equation 3 with three additional regressors. First, is the absolute value of exchange rate; second is an interactive term of exchange rate and Swedish sector's excess return and third is also interactive term of exchange rate and the absolute value of Swedish sector's excess return. Details of all these equations have been discussed previously in the methodology section.

[Insert Table 2]

In Table 2, different quantiles of the *OMXH CAP Finnish equity market* returns, denoted as $r_{m,t}^{FI}$, has been regressed on the returns of bilateral exchange rates and returns from global equity market index. The estimated coefficient of exchange rate shocks$(\hat{b})$ exhibits a negative and statistically significant exposure for all (except one at 10% level) quantiles in pre-euro period. However, in post euro period all quantiles are significant with the same negative sign as in the pre-euro period. On the contrary, the estimated quantile coefficients of global equity market index ($\hat{g}$) exhibit positive significant values at all tau values for both pre-and post-period. Moreover, graphs of quantile regression process (at different tau values) are presented in Appendix A. It shows that in the pre-and post-euro period, the exchange rate shocks and world index quantile regression estimates are below and above zero, respectively. In addition, the magnitude of global market integration, as indicated by positive coefficient, on average across quantile almost doubled in the post-euro as compare to pre-euro period. It explicitly indicates that the equity market of Finland is affected by the exchange rate and global equity markets fluctuations.

[Insert Table 3]

In Table 3, the Quantile regression of *Finnish materials sector* excess returns has been regressed on exchange rate shocks for both pre- and post-euro period. With regards to the Quantile results of equation 2, at all value of tau, indicate no statistically significant exchange rate exposure in the post-euro results. However, there is significant though negative exchange rate exposure in the pre-euro period. Additionally, the global market index seems to show positive and statistically significant results in the post-euro period only. It indicates greater integration of Finnish stock market with global markets, which happened in the post-euro period. Furthermore, equation 3 and 4, which takes into account the Swedish stock markets excess return ($\tilde{r}_{i,t}^{SW}$), exhibit Finnish stock market excess return ($\tilde{r}_{i,t}^{FI}$) to be positively and highly correlated for the materials sector. In fact, they are statistically and positively integrated in both pre-and post-euro periods. Additionally, the equation 3 and 4 parameter of global market index show post-euro Finnish market integration at a statistically significant level, which is similar to equation 2. Moreover, the exchange rate coefficient for the equations 3 and 4 are statistically significant in the pre-euro period, which is similar to equation 2 results. It may indicate the markets have better accounted the exchange rate exposure in the post-euro period.

Furthermore, the estimated interactive term coefficient $\hat{e}$ is significant for quantiles 0.40, 0.50, and 0.60 in the pre-euro period, while in the post-euro period, quantile 0.20 and 0.30 are significant. Moreover, detailed graph of quantile regression process for the materials sector with various quantiles (tau values) are presented in Appendix B (for equation 3) and Appendix H (for equation 4 of quantile regression). In both the Appendices, the graphs of estimated quantile process shows that in the pre-and post-euro Swedish sector excess return quantile coefficients are above zero. Moreover, global market return quantiles coefficients are above zero, in the post-euro period only. It indicates significant asymmetric exposure do exists.

[Insert Table 4]

In Table 4, Quantile regression of *Finnish industrials sector* excess returns regressed on exchange rate shocks and world market index. It seems there is no significant exchange rate exposure in the pre-euro period, whereas in the post-euro period the exposure is significantly evident in quantiles 0.10 to 0.60. Furthermore, the control variable of global markets seems insignificant in the pre-euro period and in the post-euro period it has become highly significant for all the Quantiles. Additionally, the world market coefficient exhibit negative coefficient indicating the inverse relation of Finnish industrial sector to the world proxy of industrial sector. Additionally, the Swedish industry coefficients are not significant in the pre euro period, whereas, it become significant in post-euro period from Quantiles 0.10 to 0.50.

Furthermore, the estimated interactive term coefficient $\hat{e}$ is significant for quantiles 0.10 in the pre-euro period and not significant for any quantiles in the post-euro period. However, in the post-euro period, another estimated interactive term coefficient $\hat{f}$ is significant for quantile 0.70. These interactive term estimated coefficients are only significant under ten percent level, which may just indicate not much of an impact when overall sector is looked upon. Moreover, detailed graph of quantile regression process for the industrials sector with various quantiles (tau values) are presented in Appendix C (for equation 3) and Appendix I (for equation 4).In Appendix C, it seems only in the post-euro period all the quantile coefficients for global market index are below zero. Similarly, in Appendix I, it is only in the post-euro period the global market estimates are below zero.

[Insert Table 5]

In Table 5, Quantile regression of *Finnish consumer discretionary* sector excess returns regressed on exchange rate shocks. The exchange rate exposure coefficient $\hat{b}$ is significant in lower weights of tau, i.e. from 0.10 to the median quantile in pre-euro period while at quantiles 0.10 and 0.20 for post-euro period. Also, the least square coefficient does not exhibit any significant exposure in the post-euro period. Similarly, the quantile regression estimates for Swedish sector portfolio coefficient $\hat{d}$ exhibit mixed results where only for some quantile the values are significant for both pre-and post-euro. However, the world market index coefficient $\hat{g}$ shows negative sign for all the Quantiles with highly significant at 1% level in the post euro period (but only quantile 0.8 and 0.9 in the pre-euro). It could be interpreted as consumer discretionary sector not as integrated with the world stock markets as some of other sectors.

Furthermore, in pre-euro period the estimated coefficient of interactive term $\hat{e}$ is significant for quantiles 0.70 and 0.80 only. And estimated coefficient of interactive term $\hat{f}$ is significant for quantiles 0.60, 0.70, and 0.80. Whereas, in the post-euro period, the estimated coefficient of interactive term $\hat{e}$ is significant for five out of nine quantiles, that is, at quantile 0.40 to 0.80. Also the estimated interactive coefficient $\hat{f}$ is significant for quantiles 0.30 and 0.40. However, there is no significant effect seen in the least square results. Once again the quantile regression provides robust results providing information from the tail of the distribution.

Moreover, detailed graph of quantile regression process for the consumer discretionary sector with various quantiles (tau values) are presented in Appendix D (for equation 3) and Appendix J (for equation 4).In both the Appendices, it seems for almost for all the quantiles in the post-euro period the global market index is below zero. In other words, the results are significantly same for both equation 3 and 4.

[Insert Table 6]

In Table 6, Quantile regression of *Finnish consumer staples* sector excess returns regressed on exchange rate shocks. In Panel A, pre-euro period the estimated exchange rate exposure $\hat{b}$ is significant at 0.90 quantile only while, in the post-euro period $\hat{b}$ is significant for 0.10, 0.30 and 0.80 tau values of quantile. In this regard, the least square values exhibit no statistical significance in any time period. Additionally, the global index coefficient $\hat{g}$ is significant at about two quantile values in the pre-euro whereas in the post-euro it is significant for all quantiles with a negative sign. However, the Swedish consumer discretionary excess return coefficient $\hat{d}$ is positive and significant for all the quantiles in both periods.

Furthermore, the estimated interactive term coefficient $\hat{e}$ is significant only median quantile in the pre-euro period and not significant for any quantiles in the post-euro period. However, in the post-euro period, another estimated interactive term coefficient $\hat{f}$ is also significant at median quantile. These interactive term coefficients are significant under ten percent level, which may indicate little impact on the overall sector. However, the least absolute deviation (LAD) estimation in quantile regression (indicated by significant median values) seems better fit than least-square estimated coefficients.

Moreover, detailed graph of quantile regression process for the consumer staples sector with various quantiles (tau values) are presented in Appendix E (for equation 3) and Appendix K (for equation 4). In Appendix E, both in pre-and post-euro period Swedish consumer staples sector return estimates at various quantiles are significantly above zero. Moreover, in Appendix K, it is in the pre-euro period we see all the quantile estimates of Swedish Consumer Staples are significantly above zero, while, in the post-euro, most of the estimated quantiles of Swedish consumer staples sector are above zero.

[Insert Table 7]

In Table 7, Quantile regression of *Finnish financials sector* excess returns regressed on exchange rate shocks. In the pre-euro period the exchange rate exposure coefficient $\hat{b}$ is negative and statistically significant for quantiles 0.10 to 0.40 while in the post-euro period it has positive coefficients and highly significant from 0.60 to 0.90 quantiles. Additionally, Swedish financial sector portfolio excess returns has positive coefficient and significant from 0.10 to 0.30, 0.80 and 0.90 quantile in the pre-euro period, whereas, it is positive and highly significant at all quantile with 1% significant level in the post-euro period. Similarly, world market index coefficient $\hat{g}$ is positive and not much significant in pre-euro period, while in the post-euro period the coefficient has negative sign with highly significant for quantiles 0.60 to 0.90 only. In this regards, no significant is seen in least square coefficients.

Furthermore, the financial sector's estimated interactive term coefficient $\hat{f}$ is significant for all the quantiles except for the median quantile, in the pre-euro period. However, interactive term coefficient $\hat{f}$

is significant for quantile 0.20 and interactive term coefficient $\hat{e}$ is significant for quantile 0.10 only in the post-euro period. It indicates the effect of the interactive term significant has almost disappeared in the post-euro period. Although, the least square's estimated interactive term coefficient $\hat{f}$ shows highly significant in both pre-and post-euro period, which seems contradictory at least in the post-euro period, as almost all quantiles are insignificant except one, which is significant at 10 percent level. Moreover, detailed graph of quantile regression process for the financial sector with various quantiles (tau values) are presented in Appendix F (for equation 3) and Appendix L (for equation 4).In Appendix F, it has been found that Swedish Financial sector portfolio's return estimates are significantly above zero in the post-euro period for all quantiles. Similarly, for equation 4 in Appendix L, we find that Swedish Financial sector portfolio's return estimates for all the quantiles are also significantly above zero in the post-euro period.

[Insert Table 8]

In Table 8, Quantile regression of *Finnish information technology* sector excess returns regressed on exchange rate shocks and other parameters. The exchange rate shocks coefficient $\hat{b}$ is not statistically significant in the pre-euro period. However, in the post-euro period there are some significant negative coefficients from 0.70 to 0.80 quantiles. The least square show no significant exposure in post-euro period, therefore quantile regression presents greater information about the results. The values of Swedish information technology excess return coefficients $\hat{d}$ are positive and highly significant at both pre-and post-euro for all quantiles. The world market index coefficient $\hat{g}$ is mixed of both positive and negative sign in pre-euro, though it is mostly positive and highly significant in the post-euro period only. It indicates the more integration of Finnish information technology sector with the global technology sector in the post-euro period. Furthermore, in the information technology sector, the estimated interactive term's coefficient $\hat{f}$ is significant for quantile 0.10 at 1% level; however, no such significant impact is seen in the least square results. In the post-euro period, the estimated interactive term's coefficients $\hat{e}$ and $\hat{f}$ are highly significant above median quantile that is from quantile 0.60 to 0.90. It indicates there is strong interactive term's impact in the post-euro period.

Moreover, detailed graph of quantile regression process for the information technology sector with various quantiles (tau values) are presented in Appendix G (for equation 3) and Appendix M (for equation 4).In Appendix G and M, the Swedish Information technology estimates, in both pre-and post-euro period, are significantly above zero for all the quantiles.

6. Conclusion

The overall result indicates significant negative exchange rate exposure for all quantiles on the Finnish equity market (OMXH CAP). Also, the world market index is positively significant for the aggregate Finnish market. In the Finnish materials sector there is significant exchange rate exposure (except for equation 2) in the pre-euro period only, which may indicate the markets have better assimilated the exchange rates in the materials sector post-euro period. Furthermore, global market index seems to show positive (negative) and significant results in all (some) the equations for the post-euro (pre-euro) period. However, Swedish and Finnish material sector portfolios are positively and significantly correlated in both periods. Moreover, the estimated interactive term coefficient $\hat{e}$ is significant for some quantiles as well. In the industrial sector, there is no significant exchange rate exposure in the pre-euro period, whereas in the post-euro period the exposure is significantly evident in lower quantiles (0.10 to 0.60 percentile). The Swedish industry coefficients are not significant in the pre euro period, whereas, it become significant in post-euro period from Quantiles 0.10 to 0.50. Furthermore, the control variable of global markets seems insignificant in the pre-euro period and in the post-euro period it has become highly significant for all the Quantiles. Also, the estimated interactive terms coefficients have little or no significance effect.

The results from consumer discretionary sector quantile regression, the exchange rate exposure coefficient $\hat{b}$ is significant in lower quantiles from 0.10 to the median quantile in pre-euro period. Similarly, the quantile regression estimates for Swedish sector portfolio coefficient $\hat{d}$ exhibit mixed results where only for some quantile the values are significant for both pre-and post-euro. However, the world market index coefficient $\hat{g}$ shows negative sign for all the Quantiles with highly significant at 1% level in the post euro period. It could be interpreted as consumer discretionary sector as not completely integrated with the world stock markets. Furthermore, the interactive term's coefficients show mixed results in pre-euro period; however, in the post-euro period, the estimated coefficient of interactive term $\hat{e}$ is significant for five out of nine quantiles, that is, at quantile 0.40 to 0.80. It seems to provide some kind of exposure in relation to exchange rates. The Finnish consumer staples sector, in the post-euro period exchange rate coefficient is significant for 0.10, 0.30 and 0.80 quantile. Also, the global index coefficient $\hat{g}$ is significant at about two quantile values in the pre-euro whereas in the post-euro it is significant for all quantiles with a negative sign. However, the Swedish consumer discretionary sector excess return coefficient $\hat{d}$ is positive and significant for all the quantiles both in pre- and post- euro periods. Moreover, the estimated interactive term coefficient $\hat{e}$ is significant at median quantile in the pre-euro period and not significant for any quantiles in the post-euro period. However, in the post-euro period, another estimated interactive term coefficient $\hat{f}$ is also significant at median quantile.

Finnish financials sector results indicate that in the pre-euro period the exchange rate exposure coefficient $\hat{b}$ is negative and statistically significant for lower quantiles (0.10 to 0.40) while in the post-euro it has positive coefficients and significant at upper quantiles (0.60 to 0.90). Additionally, Swedish financial sector portfolio excess returns has positive coefficient and significant from some quantiles in the pre-euro period, whereas, it is positive and significant at all quantile at 1% level in the post-euro period. Similarly, world market index coefficient $\hat{g}$ is positive and not much significant in pre-euro period, while in the post-euro period the coefficient has negative sign with highly significant for upper quantiles (0.60 to 0.90). Also the estimated interactive term coefficient$\hat{f}$ is significant for all the quantiles except for the median quantile, in the pre-euro period (and not much significant in post-euro period).In the information technology, the exchange rate shocks coefficient $\hat{b}$ shows some significant negative coefficients from 0.70 to 0.80 quantiles in the post-euro period. The Swedish information technology excess return coefficients $\hat{d}$ are positive and highly significant at both pre-and post-euro at all quantiles. The world market index coefficient $\hat{g}$ is mixed of both positive and negative sign in pre-euro, though it is mostly positive and highly significant in the post-euro period. It indicates the more integration of Finnish information technology sector with the global technology sector in the post-euro period. Furthermore, in the information technology sector, the estimated interactive term's coefficients $\hat{e}$ and $\hat{f}$ are highly significant above median quantile (from 0.60 to 0.90). It indicates there is strong interactive term's impact in the post-euro period for the information technology sector.

In summary, there exists some exchange rate exposure in almost all the sectors; in the pre-euro period, significant exposure is from materials sector (all quantiles except τ =0.10 and 0.90), consumer discretionary (lower quantiles), and financials (lower quantiles) sectors. In the post-euro period, industrials (lower quantiles), consumer staples (very less exposure with only two quantiles), financials sectors (upper quantiles), information technology (upper quantiles). Moreover, 3-out-of-6 sectors (industrials, consumer discretionary and financials) have significantly positive coefficients, while 2-out-of-6 (materials and information technology sectors) have negative coefficients. Intuitively, significant positive (negative) coefficient would suggest that an increase in exchange rate is more (less) beneficial for that sector in comparison to the stock market. Therefore, for Finnish industrials, consumer discretionary and financials sectors the increase in bilateral exchange rate return r_t^{FX}, is beneficial as it increases the overall return on these sectors. However, Finnish materials and information technology sectors have negative coefficient indicating the decrease in overall value of return (in terms of r_t^{FX}), which is not beneficial for these two sector based portfolios' return.

Furthermore, the Swedish sector's excess return coefficient, in the pre-euro period, is significant for materials (all quantiles), consumer discretionary (some quantiles), financial sector (some quantiles), information technology (all quantiles). On the contrary in the post-euro period, Swedish sector's excess return coefficient is significant for materials (all quantiles), industrials (upper quantiles), consumer discretionary (some quantiles), consumer staples (all quantiles), financials (all quantiles), and information technology (all quantiles). In short, when looking at all significant tau values, 4-out-of-6 sectors show significant positive impact of Swedish sector's excess return on the Finnish sectors. The sectors are material, consumer staples, financials (only post-euro), and information technology. All in all, there is significant Swedish sector impact as coefficients are positive, which indicate common market movement or integration. Additionally, regarding the global market index, for almost all the sectors in pre-euro period (except for few quantiles) indicating less level of market integration in the pre-euro period. However, in the post-euro period, the global market integration proxy coefficient is significant for materials (all quantiles), industrials (all quantiles), consumer discretionary (all quantiles), consumer staples (all quantiles), financials (upper quantiles), and information technology (all quantiles). In short, for the post-euro period, looking at all values of tau to be significant, we find that 4-out-of-6 sectors show significant global equity market exposure with 3-out-of-4 have negative coefficient and 1-out-of-4 i.e. materials sector have positive coefficient. In fact, materials sector have some negative significant coefficient in pre-euro period, however, in the post euro period it switched the signs. It can be interpreted as Finnish stock market is not fully integrated with the world market.

In fact, in post-euro period almost 2-out-of-6, i.e. materials sector (with all significant tau values) and information technology sector (with all significant except one tau value), have both Swedish excess return and global equity market return exposure that is positively and significantly related to the Finnish equity market excess return. In other words, it can be interpreted as most of the Finnish sectors of materials and information technology are integrated with the world equity market, and with the Swedish market as well; as 4-out-of-6 sectors, at all quantile levels show significant positively correlated excess over the market exposure. However, with Swedish market the Finnish market co-move in same direction, indicated by positive coefficient, whereas with world market Finnish market does not co-move in same direction as indicated by negative coefficients. Moreover, 4-out-of-6 sectors show some exposure of interactive terms. In fact, consumer discretionary (majority of quantiles in both pre-and post-euro period) and information technology (upper quantiles show significant impact in the post-euro period only) and materials sectors (few quantiles in both pre-and post-euro period). However, in the pre-euro period we do find the financial sector (almost all quantiles) showing significant interaction effect between exchange rates and Swedish sector's excess return. This interactive exposure impact disappears in the post-euro period for financial sector. In addition, comparing the summary of estimated quantile results in comparison to least squares, we found the quantiles results are more robust as expected.

In summary, we find significant exchange rate exposure across different quantiles. However, the exposure is sector dependent and differs from pre – and post-euro periods. Furthermore, there is an explicit evidence of co-movements in almost all the sectors, which is consistent with previous research. However, there are negative coefficients as well, especially with interactive non-linear terms. It indicates some evidence for FCC of the Finnish firms. Moreover, the asymmetry with regards to distribution is also sector dependent, indicated for some (other) sectors upper (lower) quantiles are more significant.

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Table 1. Descriptive Statistics, Weekly Data

Panel A: Pre-Euro (January 1994 – December 1998) Stock Markets' Returns	Mean	Median	Maximum	Minimum	Quantile*	Sum	Std. Deviation	Skewness	Kurtosis	Observations
OMXHCAP Finnish Market Index	0.003040	0.004603	0.131990	-0.098650	0.004603	0.790301	0.027809	-0.062411	4.976049	260
OMXS Swedish Market Index	0.003896	0.006002	0.200768	-0.086736	0.006002	1.013000	0.028802	0.892608	10.96601	260
Panel B: Post-Euro (January 1999 – June 2009) Stock Markets' Returns										
OMXHCAP Finnish Market Index	0.000989	0.004308	0.102729	-0.190496	0.004308	0.538094	0.031003	-0.829736	6.522069	544
OMXS Swedish Market Index	0.000941	0.004138	0.118656	-0.228591	0.004138	0.512044	0.034665	-0.779201	6.897926	544
Panel C: Pre-Euro (January 1994 – December 1998) Bilateral Currency Returns (Rfx and Absolute Rfx)										
Rfx (FIM/SEK)	0.000355	-0.000655	0.031002	-0.027893	-0.000655	0.092188	0.009497	0.418954	3.617325	260
Absolute Rfx (FIM/SEK)	0.019625	0.016705	0.063828	0.003792	0.016705	5.102435	0.010946	1.315207	4.806710	260
Panel D: Post-Euro (January 1999 – June 2009) Bilateral Currency Returns (Rfx and Absolute Rfx)										
Rfx (FIM/SEK)	0.000254	0.000446	0.053798	-0.046175	0.000446	0.138041	0.009076	0.318744	8.444343	544
Absolute Rfx (FIM/SEK)										

*Quantiles are computed for p=0.5, using the Rankit (Cleveland) definition.

Table 2. Quantile Regression of OMXH CAP Finnish Market Index Returns Regressed on Exchange Rate Shocks and World Market Index, Weekly Data

	$\hat{a}$	t-stats	$\hat{b}$	t-stats	$\hat{g}$	t-stats	Adjusted R^2
Panel A: Pre-Euro (January 1994 – December 1998)							
$\theta = 0.10$	-0.0286***	(-9.86)	-0.7381***	(-2.84)	0.4477***	(3.60)	0.0672
$\theta = 0.20$	-0.0180***	(-8.23)	-0.8188***	(-4.12)	0.2870***	(2.76)	0.8595
$\theta = 0.30$	-0.0125***	(-5.66)	-0.7827***	(-3.60)	0.2930**	(2.28)	0.0706
$\theta = 0.40$	-0.0033	(-1.63)	-0.8391***	(-3.54)	0.1990**	(2.53)	0.0647
$\theta = 0.50$	0.0035	(1.61)	-0.7944***	(-2.73)	0.3376**	(2.43)	0.0524
$\theta = 0.60$	0.0100***	(4.90)	-0.6338***	(-2.56)	0.3031***	(3.31)	0.0484
$\theta = 0.70$	0.0166***	(8.28)	-0.4520*	(-1.96)	0.3244***	(4.10)	0.0531
$\theta = 0.80$	0.0221***	(11.80)	-0.4030*	(-1.93)	0.3590***	(5.60)	0.0528
$\theta = 0.90$	0.0325***	(14.34)	-0.3820	(-1.45)	0.3542***	(4.80)	0.0594
LS	0.0024	(1.45)	-0.6717***	(-3.92)	0.3465***	(4.32)	0.1184
OLS (EGARCH)	0.0023	(1.60)	-0.4758***	(-3.34)	0.3677***	(6.22)	0.0997
Panel B: Post-Euro (January 1999 – June 2009)							
$\theta = 0.10$	-0.0230***	(-9.32)	-0.5208**	(-2.40)	0.8218***	(7.91)	0.3094
$\theta = 0.20$	-0.0118***	(-9.46)	-0.4751***	(-3.34)	0.8814***	(15.90)	0.3382
$\theta = 0.30$	-0.0058***	(-6.10)	-0.5121***	(-3.22)	0.8632***	(31.80)	0.3464
$\theta = 0.40$	-0.0014*	(-1.66)	-0.4133***	(-2.96)	0.8803***	(30.43)	0.3511
$\theta = 0.50$	0.0021**	(2.60)	-0.4134***	(-3.23)	0.8967***	(28.33)	0.3451
$\theta = 0.60$	0.0061***	(7.12)	-0.3973***	(-3.30)	0.8770***	(18.60)	0.3362
$\theta = 0.70$	0.0101***	(10.80)	-0.4630***	(3.92)	0.8345***	(14.50)	0.3265
$\theta = 0.80$	0.1532***	(13.40)	-0.6090***	(-4.06)	0.8160***	(13.46)	0.3154
$\theta = 0.90$	0.0245***	(14.04)	-0.8366***	(-8.10)	0.6244***	(7.01)	0.3030
LS	0.0011	(1.20)	-0.5530***	(-5.21)	0.8002***	(21.25)	0.5280
OLS (EGARCH)	0.0017**	(2.33)	-0.3120***	(-3.57)	0.9110***	(30.80)	0.5147

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (*z*-statistics in parenthesis). The total number observations in the pre- and post-euro periods are $N = 260$ and $N = 544$, respectively. The regression equation:

$$r_{m,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (1)$$

LAD regression that minimizes the sum of absolute residuals is

$$\sum \left| r_{m,t}^{FI} - \hat{a} - \hat{b} r_t^{FX} - \hat{g} r_{i,t}^{WI} \right| = \sum \left| \varepsilon_t \right|$$

Quantile regression

$$\min \left[\sum_{\tau : r_{m,t}^{FI} \geq \hat{a} + \hat{b} r_t^{FX} + \hat{g} r_{i,t}^{WI}} \tau \left| r_{m,t}^{FI} - \hat{a} - \hat{b} r_t^{FX} - \hat{g} r_{i,t}^{WI} \right| + \sum_{\tau : r_{m,t}^{FI} < \hat{a} + \hat{b} r_t^{FX} + \hat{g} r_{i,t}^{WII}} (1 - \tau) \left| r_{m,t}^{FI} - \hat{a} - \hat{b} r_t^{FX} - \hat{g} r_{i,t}^{WI} \right| \right]$$

Table 3: Quantile Regression of Finnish *Materials Sector* Excess Returns Regressed on Exchange Rate Shocks, Weekly Data

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel A: Pre-Euro (January 1994 – December 1998)																
$\theta = 0.10$	(2)	-0.0261***	(-11.30)	-0.0710	(-0.34)					0.0530	(0.50)					-0.0051
$\theta = 0.20$	(2)	-0.0170***	(-9.02)	-0.1302	(-0.80)					-0.0503	(-0.43)					-0.0022
$\theta = 0.30$	(2)	-0.0108***	(-6.82)	-0.1385	(-1.02)					-0.1168	(-1.23)					-0.0010
$\theta = 0.40$	(2)	-0.0061***	(-3.95)	-0.1808	(-1.30)					-0.0554	(-0.60)					0.0051
$\theta = 0.50$	(2)	-0.0030*	(-1.95)	-0.2101	(-1.42)					-0.0184	(-0.20)					0.0002
$\theta = 0.60$	(2)	0.0031**	(2.01)	-0.0968	(-0.60)					-0.0537	(-0.60)					-0.0036
$\theta = 0.70$	(2)	0.0088***	(4.70)	-0.3025	(-1.53)					-0.0835	(-0.84)					0.0061
$\theta = 0.80$	(2)	0.0145***	(8.00)	-0.3376*	(-1.71)					-0.1603***	(3.76)					0.0128
$\theta = 0.90$	(2)	0.0256***	(8.24)	-0.3160	(-0.80)					-0.2601*	(-1.90)					0.0151
LS	(2)	-0.0011	(-0.86)	-0.2288	(-1.64)					-0.0537	(-0.82)					0.0046
$\theta = 0.10$	(3)	-0.0241***	(-13.00)	-0.0643	(-0.45)			0.2433***	(5.74)	-0.0376	(-0.31)					0.1042
$\theta = 0.20$	(3)	-0.0157***	(-9.55)	-0.1476	(-1.00)			0.3123***	(5.23)	0.0471	(0.44)					0.0871
$\theta = 0.30$	(3)	-0.0091***	(-5.66)	-0.2608*	(-1.64)			0.2561***	(4.62)	0.0124	(0.20)					0.0821
$\theta = 0.40$	(3)	-0.0050***	(-3.41)	-0.3812**	(-2.70)			0.2603***	(5.44)	-0.0332	(-0.51)					0.0860
$\theta = 0.50$	(3)	-0.0008	(-0.60)	-0.3280**	(-2.26)			0.2456***	(5.23)	-0.0358	(-0.60)					0.0910
$\theta = 0.60$	(3)	0.0032**	(2.30)	-0.3717**	(-2.60)			0.2660***	(5.55)	-0.0842	(-1.51)					0.0943
$\theta = 0.70$	(3)	0.0072***	(5.20)	-0.2950**	(-2.15)			0.2440***	(4.90)	-0.1338***	(-3.50)					0.0958
$\theta = 0.80$	(3)	0.0121***	(8.21)	-0.2762*	(-1.91)			0.2564***	(4.85)	-0.0995**	(-2.22)					0.0923
$\theta = 0.90$	(3)	0.2714***	(3.05)	-0.4047	(-1.50)			0.2714***	(3.05)	-0.0337	(-0.54)					0.0735
LS	(3)	-0.0005	(-0.42)	-0.3127**	(-2.45)			0.2610***	(7.33)	-0.0412	(-0.70)					0.1741
$\theta = 0.10$	(4)	-0.0273***	(-4.84)	-0.3322	(-1.60)	0.1455	(0.60)	0.2206***	(4.61)	0.0251	(0.20)	13.0760	(1.61)	6.1570	(0.60)	0.1104
$\theta = 0.20$	(4)	-0.0174***	(-4.94)	-0.2837*	(-1.75)	0.1057	(0.70)	0.3311***	(3.43)	0.1104	(1.46)	12.5926	(1.24)	-17.6331	(-1.10)	0.0835
$\theta = 0.30$	(4)	-0.0142***	(-4.80)	-0.2750*	(-1.72)	0.2185*	(1.76)	0.3145***	(4.50)	0.0502	(0.62)	11.9306	(1.45)	-10.5127	(-0.94)	0.0850
$\theta = 0.40$	(4)	-0.0070**	(-2.34)	-0.3690***	(-2.96)	0.0895	(0.63)	0.2716***	(4.44)	-0.0028	(-0.04)	17.0823**	(2.04)	-9.4560	(-0.80)	0.0870
$\theta = 0.50$	(4)	-0.0044*	(-1.72)	-0.3052**	(-2.40)	0.1844*	(1.70)	0.2947***	(5.30)	-0.0538	(-0.90)	12.3472**	(2.00)	-9.4990	(-1.11)	0.1035
$\theta = 0.60$	(4)	-0.0005	(-0.20)	-0.2915**	(-2.16)	0.1545	(1.31)	0.3120***	(5.54)	-0.0571	(-1.02)	10.7048*	(1.71)	-8.8933	(-1.00)	0.0995
$\theta = 0.70$	(4)	0.0050	(1.55)	-0.3092**	(-2.00)	0.1316	(0.90)	0.3633***	(4.21)	-0.1350***	(-3.42)	4.6500	(0.53)	-16.1413	(-0.90)	0.0962
$\theta = 0.80$	(4)	0.0082**	(2.15)	-0.1452	(-0.64)	0.2371***	(3.62)	0.2920***	(3.62)	-0.1010*	(-1.80)	-3.5313	(-0.35)	-11.1817	(-0.90)	0.0934
$\theta = 0.90$	(4)	0.0191***	(2.80)	-0.2132	(-0.40)	0.2027	(0.63)	0.2413*	(1.92)	-0.0733	(-0.60)	-2.0634	(-0.10)	-17.8105	(-0.60)	0.0731
LS	(4)	-0.0035	(-1.40)	-0.3456***	(-2.70)	0.1537	(1.40)	0.3013***	(5.83)	-0.0453	(-0.75)	5.8410	(0.90)	-9.9840	(-1.10)	0.1764

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \quad (4)$$

Table 3 Cont… Quantile Regression of Finnish *Materials Sector* Excess Return

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel B: Post-Euro (January 1999 – June 2009)																
$\theta = 0.10$	(2)	-0.0354***	(-11.70)	0.1645	(0.61)					0.3681**	(2.61)					0.0332
$\theta = 0.20$	(2)	-0.0216***	(-15.21)	0.0707	(0.53)					0.2093***	(5.40)					0.0268
$\theta = 0.30$	(2)	-0.0158***	(-11.40)	0.1487	(1.13)					0.2335***	(5.40)					0.0172
$\theta = 0.40$	(2)	-0.0087***	(-6.51)	0.1414	(0.91)					0.1990***	(2.80)					0.0085
$\theta = 0.50$	(2)	-0.0025*	(-1.80)	0.0392	(0.20)					0.1672*	(1.80)					0.0063
$\theta = 0.60$	(2)	0.0024	(1.63)	0.0086	(0.04)					0.1965*	(1.91)					0.0060
$\theta = 0.70$	(2)	0.0121***	(7.25)	0.1495	(0.60)					0.1751*	(1.80)					0.0050
$\theta = 0.80$	(2)	0.0206***	(11.60)	0.2371	(0.91)					0.2150**	(2.22)					0.0093
$\theta = 0.90$	(2)	0.0390***	(10.16)	0.1521	(0.26)					0.2450**	(2.50)					0.0114
LS	(2)	-0.0008	(-0.60)	0.0793	(0.50)					0.2334***	(4.06)					0.0271
$\theta = 0.10$	(3)	-0.0347***	(-19.62)	0.1710	(1.10)			0.511***	(11.51)	0.4036***	(5.70)					0.2100
$\theta = 0.20$	(3)	-0.0241***	(-13.92)	0.0580	(0.30)			0.4778***	(7.95)	0.3838***	(4.53)					0.1410
$\theta = 0.30$	(3)	-0.0147***	(-9.84)	0.0008	(0.01)			0.4453***	(6.06)	0.3120***	(5.66)					0.1127
$\theta = 0.40$	(3)	-0.0080***	(-5.80)	-0.0040	(-0.03)			0.4476***	(7.40)	0.3082***	(6.30)					0.1084
$\theta = 0.50$	(3)	-0.0023*	(1.72)	0.0502	(0.34)			0.4394***	(8.72)	0.3313***	(6.30)					0.3016
$\theta = 0.60$	(3)	0.0040***	(2.80)	0.0452	(0.25)			0.4140***	(8.90)	0.2967***	(3.26)					0.1186
$\theta = 0.70$	(3)	0.0107***	(6.70)	0.0737	(0.41)			0.4597***	(8.40)	0.2900**	(2.40)					0.1280
$\theta = 0.80$	(3)	0.0213***	(10.03)	-0.2743	(-0.85)			0.5564***	(9.40)	0.3460**	(2.50)					0.1407
$\theta = 0.90$	(3)	0.0327***	(16.70)	-0.2728	(-0.95)			0.5992***	(12.10)	0.4015***	(5.33)					0.2070
LS	(3)	-0.0013	(-1.13)	-0.0431	(-0.31)			0.4950***	(14.62)	0.3393***	(6.90)					0.3016
$\theta = 0.10$	(4)	-0.0251***	(-8.26)	0.0842	(0.60)	-0.4632***	(-2.75)	0.4926***	(8.83)	0.3316***	(4.20)	-25.6471**	(-2.63)	-6.7356	(-0.60)	0.2525
$\theta = 0.20$	(4)	-0.0152***	(-5.64)	0.0230	(0.12)	-0.6035***	(-3.60)	0.4432***	(6.50)	0.3307***	(3.50)	-26.9168***	(-3.00)	-4.4010	(-0.40)	0.1665
$\theta = 0.30$	(4)	-0.0095***	(-4.60)	0.0268	(0.12)	-0.3698***	(-2.90)	0.4362***	(4.96)	0.2848***	(5.02)	-5.9531	(-0.95)	-3.0161	(-0.27)	0.1182
$\theta = 0.40$	(4)	-0.0042*	(-1.76)	0.0051	(0.03)	-0.2600	(-1.57)	0.4718***	(5.62)	0.3032***	(5.50)	-1.3695	(-0.10)	-4.8867	(-0.40)	0.1082
$\theta = 0.50$	(4)	-1.25E-05	(-0.00)	0.0263	(0.16)	-0.1841	(-0.82)	0.4386***	(5.23)	0.2950***	(4.74)	-3.8631	(-0.24)	-1.7351	(-0.10)	0.1071
$\theta = 0.60$	(4)	0.0041	(0.90)	0.1147	(0.54)	-0.0117	(-0.03)	0.4444***	(3.85)	0.3290***	(4.97)	1.8118	(0.11)	-6.6960	(-0.21)	0.1141
$\theta = 0.70$	(4)	0.0091*	(1.90)	0.1647	(0.76)	0.1736	(0.45)	0.5176***	(5.10)	0.2973**	(2.00)	-0.1462	(-0.01)	-12.5271	(-0.50)	0.1270
$\theta = 0.80$	(4)	0.0091**	(2.25)	-0.4260*	(-1.90)	0.9142***	(3.10)	0.5661***	(6.83)	0.2658***	(2.81)	-3.0542	(-0.30)	-5.2896	(-0.30)	0.1580
$\theta = 0.90$	(4)	0.0213***	(5.20)	-0.1747	(-0.60)	0.8660***	(3.36)	0.6227***	(7.40)	0.3116***	(4.20)	-2.6967	(-0.23)	-12.8231	(-0.63)	0.2378
LS	(4)	-0.0002	(-0.10)	-0.0122	(-0.10)	-0.0633	(-0.50)	0.5470***	(11.75)	0.3504***	(7.05)	-6.8801	(-1.10)	-15.2394*	(-1.66)	0.3025

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \qquad (4)$$

Table 4: Quantile Regression of Finnish *Industrials Sector* Excess Returns Regressed on Exchange Rate Shocks, Weekly Data

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel A: Pre-Euro (January 1994 – December 1998)																
$\theta = 0.10$	(2)	-0.01918***	(-10.50)	0.1638	(1.24)					-0.0850	(-0.90)					0.0047
$\theta = 0.20$	(2)	-0.0114	(0.00)	0.1766	(1.56)					-0.1131	(-1.50)					0.0102
$\theta = 0.30$	(2)	-0.0080***	(-5.86)	0.1081	(0.84)					-0.1698***	(-4.31)					0.0074
$\theta = 0.40$	(2)	-0.0033**	(-2.50)	0.1951	(1.22)					-0.1188**	(-2.25)					0.0054
$\theta = 0.50$	(2)	0.0017	(1.30)	0.2261	(1.21)					-0.1154**	(-2.20)					0.0030
$\theta = 0.60$	(2)	0.0053***	(4.10)	0.2215	(1.16)					-0.0518	(-0.80)					-0.0016
$\theta = 0.70$	(2)	0.0093***	(7.10)	0.2304	(1.27)					-0.0678	(-1.24)					0.0051
$\theta = 0.80$	(2)	0.0140***	(9.34)	0.3903**	(2.42)					-0.0386	(-0.71)					0.0081
$\theta = 0.90$	(2)	0.0216***	(10.16)	0.3947*	(1.96)					0.0093	(0.24)					0.0050
LS	(2)	0.0017	(1.25)	0.2290	(1.64)					-0.0588	(-0.90)					0.0067
$\theta = 0.10$	(3)	-0.0192***	(-10.45)	0.1637	(1.15)			-0.0003	(-0.00)	-0.0850	(-0.84)					0.0010
$\theta = 0.20$	(3)	-0.0117***	(-8.12)	0.1830	(1.60)			0.0286	(0.82)	-0.1076	(-1.36)					0.0087
$\theta = 0.30$	(3)	-0.0080***	(-5.90)	0.0878	(0.70)			0.0081	(0.22)	-0.1583***	(-3.90)					0.0040
$\theta = 0.40$	(3)	-0.0032**	(-2.40)	0.1935	(1.20)			0.01504	(0.34)	-0.1128**	(-2.10)					0.0020
$\theta = 0.50$	(3)	0.0016	(1.21)	0.2028	(1.11)			0.0688	(1.30)	-0.1086**	(-2.04)					0.0050
$\theta = 0.60$	(3)	0.0053***	(4.10)	0.2010	(1.10)			0.0693	(1.50)	-0.0650	(-1.14)					0.0040
$\theta = 0.70$	(3)	0.0084***	(6.70)	0.3020*	(1.81)			0.0771*	(1.85)	-0.0646	(-1.22)					0.0112
$\theta = 0.80$	(3)	0.0140***	(9.30)	0.3794**	(2.32)			0.0696	(1.54)	-0.0315	(-0.60)					0.0121
$\theta = 0.90$	(3)	0.0245***	(9.36)	0.2705	(1.14)			0.2460***	(2.82)	0.0438	(1.08)					0.0403
LS	(3)	0.0015	(1.11)	0.2340*	(1.70)			0.0884**	(2.11)	-0.0420	(-0.64)					0.0208
$\theta = 0.10$	(4)	-0.0148***	(-2.92)	0.0450	(0.20)	-0.3490	(-1.50)	-0.0440	(-0.40)	-0.0035	(-0.04)	-12.7965*	(-1.64)	9.1200	(0.90)	0.0081
$\theta = 0.20$	(4)	-0.0076**	(-2.31)	0.2190	(1.53)	-0.2482	(-1.45)	0.0180	(0.34)	-0.0845	(-1.06)	-0.0778	(-0.01)	2.2462	(0.11)	0.0046
$\theta = 0.30$	(4)	-0.0033	(-1.15)	0.1440	(1.20)	-0.2024	(1.40)	-0.0206	(-0.40)	-0.1234**	(-2.30)	-3.5947	(-0.51)	7.8872	(0.40)	0.0020
$\theta = 0.40$	(4)	-0.0010	(-0.33)	0.2280*	(1.70)	-0.1080	(-0.80)	-0.0478	(-0.90)	-0.1103**	(-2.21)	5.9520	(0.90)	18.2700	(1.43)	0.0005
$\theta = 0.50$	(4)	0.0017	(0.72)	0.2460	(1.60)	-0.0290	(-0.25)	0.0350	(0.43)	-0.1063*	(-1.94)	7.0825	(0.94)	6.2320	(0.52)	-0.0011
$\theta = 0.60$	(4)	0.0063**	(2.60)	0.1790	(1.04)	-0.0818	(-0.70)	0.0622	(0.80)	-0.0865	(-1.50)	5.7680	(0.65)	2.7280	(0.22)	-0.0033
$\theta = 0.70$	(4)	0.0103***	(4.10)	0.3153*	(1.86)	-0.0810	(-0.71)	0.0802	(1.14)	-0.0636	(-1.10)	4.3267	(0.60)	-0.1868	(-0.02)	0.0021
$\theta = 0.80$	(4)	0.0121***	(3.05)	0.3381	(1.50)	0.0966	(0.50)	0.0910	(0.70)	-0.0314	(-0.50)	-1.4710	(-0.14)	0.3410	(0.02)	0.0024
$\theta = 0.90$	(4)	0.0256***	(3.80)	0.2860	(1.00)	-0.0676	(-0.25)	0.2807**	(2.10)	0.0401	(0.92)	-1.3485	(-0.12)	-10.3382	(-0.61)	0.0296
LS	(4)	0.0040	(1.50)	0.2381*	(1.71)	-0.1342	(-1.10)	0.0314	(0.53)	-0.0407	(-0.62)	1.8620	(0.30)	12.3762	(1.40)	0.0202

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \qquad (4)$$

Table 4 Cont… Quantile Regression of Finnish *Industrials Sector* Excess Returns

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel B: Post-Euro (January 1999 – June 2009)																
$\theta = 0.10$	(2)	-0.0263***	(-11.00)	0.7223***	(3.50)					-0.3634***	(-4.61)					0.1152
$\theta = 0.20$	(2)	-0.0161***	(-12.01)	0.5448***	(3.31)					-0.3032***	(-7.50)					0.0940
$\theta = 0.30$	(2)	-0.0088***	(-7.65)	0.3320**	(2.42)					-0.3213***	(-6.01)					0.0831
$\theta = 0.40$	(2)	-0.0040***	(-4.21)	0.2265*	(1.90)					-0.3530***	(-10.12)					0.0805
$\theta = 0.50$	(2)	0.0006	(0.70)	0.2483**	(2.05)					-0.3322***	(-8.26)					0.0850
$\theta = 0.60$	(2)	0.0040***	(4.40)	0.3450***	(2.93)					-0.3356***	(-7.90)					0.0901
$\theta = 0.70$	(2)	0.0094***	(8.83)	0.1476	(0.90)					-0.4076***	(-5.02)					0.0960
$\theta = 0.80$	(2)	0.0148***	(11.31)	0.1150	(0.65)					-0.3503***	(-3.84)					0.1110
$\theta = 0.90$	(2)	0.0263***	(14.11)	0.2205	(1.01)					-0.3452***	(-4.55)					0.1010
LS	(2)	-0.0001	(-0.13)	0.4142***	(3.80)					-0.3262***	(-8.36)					0.1730
$\theta = 0.10$	(3)	-0.0275***	(-13.76)	0.6697***	(6.14)			0.1532***	(5.04)	-0.3270***	(-9.41)					0.1322
$\theta = 0.20$	(3)	-0.0161***	(-11.61)	0.5511***	(3.25)			0.0603	(1.46)	-0.2770***	(-4.90)					0.0960
$\theta = 0.30$	(3)	-0.0084***	(-8.12)	0.3497***	(3.16)			0.0838**	(2.51)	-0.3041***	(-9.00)					0.0901
$\theta = 0.40$	(3)	-0.0041***	(-4.40)	0.2693**	(2.60)			0.0903**	(2.60)	-0.3060***	(-7.40)					0.0881
$\theta = 0.50$	(3)	-0.0005	(-0.54)	0.2501**	(2.20)			0.0830**	(2.20)	-0.2860***	(-6.20)					0.0872
$\theta = 0.60$	(3)	0.0040***	(4.12)	0.3307**	(2.40)			0.0351	(0.72)	-0.3471***	(-4.14)					0.0883
$\theta = 0.70$	(3)	0.0091***	(8.50)	0.1178	(0.76)			0.0182	(0.41)	-0.4040***	(-5.21)					0.0947
$\theta = 0.80$	(3)	0.0148***	(11.20)	0.1062	(0.55)			0.0093	(0.20)	-0.3476***	(-3.80)					0.0982
$\theta = 0.90$	(3)	0.0257***	(13.84)	0.1768	(0.85)			0.0548	(0.83)	-0.3278***	(-4.60)					0.1040
LS	(3)	-0.0001	(-0.15)	0.3975***	(3.62)			0.0688**	(2.22)	-0.3097***	(-7.83)					0.1790
$\theta = 0.10$	(4)	-0.0132***	(-3.84)	1.0335***	(4.60)	-0.9095***	(-2.85)	0.1840***	(3.92)	-0.2963***	(-9.52)	10.6288	(1.51)	-5.3510	(-0.70)	0.1694
$\theta = 0.20$	(4)	-0.0084***	(-3.60)	0.6168***	(4.06)	-0.5166**	(-2.41)	0.1641**	(2.55)	-0.3020***	(-7.72)	-1.6893	(-0.20)	-5.9521	(-0.40)	0.1131
$\theta = 0.30$	(4)	-0.0044	(-1.42)	0.3445	(1.64)	-0.2662	(-0.90)	0.0987	(1.32)	-0.3297***	(-7.14)	-9.5252	(-0.80)	-1.7021	(-0.10)	0.0951
$\theta = 0.40$	(4)	-0.0020	(-1.40)	0.2322**	(2.25)	-0.0852	(-0.95)	0.0917*	(1.90)	-0.3080***	(-7.82)	-10.3233	(-1.14)	-1.7578	(-0.20)	0.0910
$\theta = 0.50$	(4)	0.0015	(0.90)	0.2045	(1.32)	-0.1067	(-0.70)	0.0255	(0.42)	-0.2976***	(-6.73)	-2.6118	(-0.40)	11.2131	(0.90)	0.0862
$\theta = 0.60$	(4)	0.0046***	(2.72)	0.2592	(1.60)	0.0286	(0.21)	-0.0250	(-0.35)	-0.3760***	(-5.04)	-6.8625	(-1.20)	12.8123	(1.20)	0.0886
$\theta = 0.70$	(4)	0.0085***	(4.63)	0.1440	(0.80)	0.0702	(0.50)	-0.0568	(-0.83)	-0.3706***	(-5.05)	-7.3087	(-1.20)	19.8334*	(1.90)	0.0970
$\theta = 0.80$	(4)	0.0097***	(3.36)	0.0785	(0.40)	0.4213	(1.60)	-0.0512	(-0.64)	-0.3785***	(-4.32)	-15.1071	(-1.10)	25.9141	(1.13)	0.1046
$\theta = 0.90$	(4)	0.0207***	(5.54)	0.2280	(1.03)	0.3027	(1.03)	-0.0245	(-0.26)	-0.3340***	(-4.45)	-2.3207	(-0.10)	35.2351	(1.51)	0.1116
LS	(4)	0.0016	(0.92)	0.3837***	(3.42)	-0.1111	(-0.94)	0.0434	(1.06)	-0.3133***	(-7.91)	-3.5060	(-0.72)	7.8090	(1.15)	0.1806

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \qquad (4)$$

Table 5: Quantile Regression of Finnish *Consumer Discretionary Sector* Excess Returns Regressed on Exchange Rate Shocks, Weekly Data

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel A: Pre-Euro (January 1994 – December 1998)																
$\theta = 0.10$	(2)	-0.0367***	(-8.30)	0.5327**	(2.02)					0.0637	(0.16)					0.0183
$\theta = 0.20$	(2)	-0.0194***	(-8.01)	0.5554**	(2.14)					-0.0846	(-1.02)					0.0080
$\theta = 0.30$	(2)	-0.0124***	(-5.75)	0.4780**	(2.30)					-0.0415	(-0.52)					0.0113
$\theta = 0.40$	(2)	-0.0054***	(-2.65)	0.4740**	(2.44)					-0.0022	(-0.03)					0.0010
$\theta = 0.50$	(2)	0.0015	(0.70)	0.3935*	(1.91)					-0.0461	(-0.45)					0.0032
$\theta = 0.60$	(2)	0.0067***	(2.70)	0.2998	(1.31)					-0.0518	(-0.35)					-0.0022
$\theta = 0.70$	(2)	0.0147***	(5.60)	-0.0526	(-0.21)					-0.1091	(-0.75)					-0.0054
$\theta = 0.80$	(2)	0.0290***	(7.75)	0.4170	(1.01)					-0.3620**	(-2.53)					0.0150
$\theta = 0.90$	(2)	0.0446***	(10.30)	-0.0991	(-0.20)					-0.4672***	(-2.90)					0.0152
LS	(2)	0.0034	(1.45)	0.5225**	(2.13)					-0.1332	(-1.16)					0.0164
$\theta = 0.10$	(3)	-0.0354***	(-8.52)	0.7112**	(2.50)			-0.1374	(-1.13)	0.0584	(0.23)					0.0212
$\theta = 0.20$	(3)	-0.0190***	(-7.83)	0.5356**	(2.06)			-0.0496	(-0.81)	-0.0845	(-1.02)					0.0050
$\theta = 0.30$	(3)	-0.0123***	(-5.72)	0.4851**	(2.20)			-0.0343	(-0.51)	-0.0420	(-0.51)					0.0110
$\theta = 0.40$	(3)	-0.0054***	(-2.66)	0.4740**	(2.32)			0.0008	(0.10)	-0.0013	(-0.02)					0.0060
$\theta = 0.50$	(3)	0.0012	(0.60)	0.4280**	(2.06)			0.0599	(0.63)	-0.0482	(-0.46)					0.0012
$\theta = 0.60$	(3)	0.0066***	(2.66)	0.2940	(1.30)			0.1176	(1.20)	-0.0585	(-0.42)					-0.0031
$\theta = 0.70$	(3)	0.0137***	(5.40)	0.1561	(0.62)			0.1051	(1.01)	-0.1463	(-1.13)					-0.0050
$\theta = 0.80$	(3)	0.0283***	(7.45)	0.3513	(0.76)			0.0291	(0.30)	-0.3684**	(-2.60)					0.0123
$\theta = 0.90$	(3)	0.4622***	(10.35)	0.4580	(0.72)			0.1272*	(1.66)	-0.4897***	(-3.60)					0.0164
LS	(3)	0.0033	(1.40)	0.5228**	(2.13)			0.0197	(0.30)	-0.1311	(-1.14)					0.0128
$\theta = 0.10$	(4)	-0.0330***	(-3.42)	1.1270***	(2.70)	-0.1906	(-0.41)	-0.1864	(-0.90)	0.1308	(0.50)	-31.2162	(-0.85)	9.6761	(0.23)	0.0173
$\theta = 0.20$	(4)	-0.0143**	(-2.42)	0.7934**	(2.43)	-0.2881	(-0.85)	-0.0450	(-0.35)	-0.0831	(-0.93)	-15.3212	(-0.64)	0.7510	(0.02)	0.0030
$\theta = 0.30$	(4)	-0.0131***	(-3.10)	0.4126*	(1.93)	0.0460	(0.25)	-0.0472	(-0.41)	-0.0433	(-0.52)	-14.2730	(-0.96)	-1.4548	(-0.10)	0.0010
$\theta = 0.40$	(4)	-0.0042	(-1.00)	0.4455**	(2.02)	-0.0726	(-0.40)	-0.0309	(-0.23)	-0.0265	(-0.32)	-10.1533	(-0.65)	1.0814	(0.04)	-0.0018
$\theta = 0.50$	(4)	0.0020	(0.43)	0.2652	(1.20)	-0.0108	(-0.05)	0.2043	(1.60)	-0.0093	(-0.11)	8.5044	(0.60)	-29.7226	(-1.51)	-0.0022
$\theta = 0.60$	(4)	0.0080	(1.61)	0.2036	(0.91)	-0.0508	(-0.23)	0.2663**	(2.20)	-0.0977	(-0.75)	19.0336	(1.32)	-38.6247**	(-2.10)	0.0013
$\theta = 0.70$	(4)	0.0117**	(2.10)	-0.0020	(-0.01)	0.1496	(0.51)	0.3535***	(3.01)	-0.1960*	(-1.90)	33.0756**	(2.43)	-60.8101***	(-3.30)	0.0086
$\theta = 0.80$	(4)	0.0248***	(3.10)	0.4718	(1.00)	0.0504	(0.14)	0.2596	(1.35)	-0.3108***	(-2.93)	0.1675	(0.01)	-59.7874**	(-2.07)	0.0173
$\theta = 0.90$	(4)	0.0360***	(4.02)	0.3414	(0.74)	0.5945	(1.51)	0.2604**	(2.10)	-0.4781***	(-3.05)	30.8841*	(1.70)	-50.8454	(-1.34)	0.0516
LS	(4)	0.0048	(1.01)	0.5380**	(2.15)	-0.0851	(-0.40)	0.0844	(0.75)	-0.1394	(-1.20)	0.3042	(0.02)	-17.9501	(-0.80)	0.0040

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \quad (4)$$

Table 5 Cont… Quantile Regression of Finnish *Consumer Discretionary Sector* Excess Returns

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel B: Post-Euro (January 1999 – June 2009)																
$\theta = 0.10$	(2)	-0.0325****	(-16.60)	0.7067***	(3.50)					-0.2732***	(-3.51)					0.0490
$\theta = 0.20$	(2)	-0.0218***	(-12.60)	0.3968*	(1.82)					-0.3397***	(-8.23)					0.0340
$\theta = 0.30$	(2)	-0.0128***	(-8.16)	0.2747	(1.32)					0.0626	(0.80)					0.0011
$\theta = 0.40$	(2)	-0.0053***	(-3.01)	0.0878	(0.50)					-0.2544***	(-5.86)					0.0213
$\theta = 0.50$	(2)	0.0002	(0.20)	-0.0468	(-0.32)					-0.2284***	(-5.60)					0.0268
$\theta = 0.60$	(2)	0.0054***	(4.40)	-0.0657	(-0.45)					-0.2341***	(-5.51)					0.0286
$\theta = 0.70$	(2)	0.0102***	(7.95)	-0.0270	(-0.20)					-0.1945***	(-5.34)					0.0270
$\theta = 0.80$	(2)	0.0195***	(10.80)	0.0234	(0.10)					-0.2448*	(-1.90)					0.0233
$\theta = 0.90$	(2)	0.0331***	(14.46)	-0.0566	(-0.26)					-0.3490***	(-3.10)					0.0340
LS	(2)	2.24E-05	(0.02)	0.1120	(0.80)					-0.2491***	(-5.02)					0.0515
$\theta = 0.10$	(3)	-0.0323***	(-18.20)	0.6192***	(3.71)			0.0567***	(2.81)	-0.2960***	(-4.54)					0.0570
$\theta = 0.20$	(3)	-0.0222***	(-12.20)	0.4210**	(2.05)			0.0262	(0.55)	-0.3243***	(-6.72)					0.0330
$\theta = 0.30$	(3)	-0.0128***	(-8.04)	0.1310	(0.55)			0.0135	(0.20)	-0.2808***	(-4.60)					0.0238
$\theta = 0.40$	(3)	-0.0052***	(-3.90)	0.0853	(0.50)			0.0142	(0.20)	-0.2441***	(-4.73)					0.0197
$\theta = 0.50$	(3)	0.0004	(0.30)	-0.0441	(0.31)			0.0375	(0.53)	-0.2153***	(-4.53)					0.0263
$\theta = 0.60$	(3)	0.0054***	(4.40)	-0.0844	(-0.60)			0.0346	(0.50)	-0.2243***	(-4.66)					0.0280
$\theta = 0.70$	(3)	0.0108***	(8.16)	0.0342	(0.21)			0.0566	(1.03)	-0.1731***	(-3.65)					0.0280
$\theta = 0.80$	(3)	0.0196***	(11.24)	-0.0508	(-0.20)			0.0616	(1.40)	-0.2167	(-1.63)					0.0246
$\theta = 0.90$	(3)	0.0331***	(13.81)	-0.0044	(-0.02)			0.0502	(0.80)	-0.2926*	(-1.90)					0.0327
LS	(3)	-6.79E-06	(-0.01)	0.0987	(0.71)			0.0650**	(2.01)	-0.2376***	(-4.80)					0.0568
$\theta = 0.10$	(4)	-0.0227***	(-6.80)	0.6136***	(2.85)	-0.6364***	(-2.90)	0.0703**	(2.10)	-0.1980**	(-2.50)	-6.1817	(-0.76)	1.0577	(0.10)	0.0750
$\theta = 0.20$	(4)	-0.0151***	(-4.51)	0.5283**	(2.03)	-0.4925**	(-2.14)	0.1132**	(2.54)	-0.3055***	(-7.30)	-1.0956	(-0.11)	-14.2603	(-1.01)	0.0487
$\theta = 0.30$	(4)	-0.0093***	(-3.23)	0.2552	(1.41)	-0.2724	(-1.46)	0.1353**	(2.62)	-0.2918***	(-6.53)	15.1603	(1.60)	-31.1287***	(-2.84)	0.0336
$\theta = 0.40$	(4)	-0.0030	(-1.23)	0.2240	(1.32)	-0.2494	(-1.60)	0.1112	(1.31)	-0.2753***	(-5.90)	26.3640**	(2.46)	-28.4677*	(-1.85)	0.0296
$\theta = 0.50$	(4)	0.0014	(0.62)	0.1833	(1.15)	-0.2036	(-1.40)	0.0970	(1.16)	-0.2520***	(-5.87)	33.3380***	(3.80)	-23.7187	(-1.40)	0.0330
$\theta = 0.60$	(4)	0.0062**	(2.44)	-0.0555	(-0.30)	-0.1218	(-0.62)	0.0771	(0.83)	-0.2184***	(-4.70)	31.8726***	(2.70)	-13.0473	(-0.55)	0.0363
$\theta = 0.70$	(4)	0.0090***	(3.10)	-0.0262	(-0.11)	0.0907	(0.40)	0.0611	(0.80)	-0.2340***	(-2.90)	29.2508**	(2.44)	-10.9705	(-0.61)	0.0399
$\theta = 0.80$	(4)	0.0153***	(5.20)	-0.0785	(-0.30)	0.1928	(0.91)	0.0953	(1.36)	-0.1856*	(-1.72)	26.1445**	(2.51)	-17.7970	(-1.24)	0.0361
$\theta = 0.90$	(4)	0.0291***	(5.32)	-0.2060	(-0.50)	0.3633	(0.91)	0.1420	(1.16)	-0.2394	(-1.60)	16.5050	(1.06)	-13.1436	(-0.51)	0.0426
LS	(4)	-0.0021	(-0.70)	0.2126	(1.11)	0.1546	(0.73)	0.1845***	(3.10)	-0.2428***	(-3.32)	-4.3278	(-0.50)	2.6327	(0.30)	0.1022

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \qquad (4)$$

Table 6: Quantile Regression of Finnish *Consumer Staples Sector* Excess Returns Regressed on Exchange Rate Shocks, Weekly Data

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats	$\hat{b}$ Coeff.	t-stats	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel A: Pre-Euro (January 1994 – December 1998)																
$\theta = 0.10$	(2)	-0.0404***	(-10.85)	0.1891	(0.60)					0.1531	(1.30)					0.0023
$\theta = 0.20$	(2)	-0.0248***	(-7.80)	0.0241	(0.10)					-0.0176	(-0.14)					-0.0074
$\theta = 0.30$	(2)	-0.0144***	(-5.16)	0.0780	(0.30)					-0.1652	(-1.30)					-0.0013
$\theta = 0.40$	(2)	-0.0056**	(-2.20)	0.0535	(0.20)					-0.2510*	(-1.85)					0.0026
$\theta = 0.50$	(2)	0.0020	(0.72)	0.0435	(0.15)					-0.0821	(-0.50)					-0.0042
$\theta = 0.60$	(2)	0.0065**	(2.60)	0.1608	(0.53)					-0.0518	(-0.30)					-0.0060
$\theta = 0.70$	(2)	0.0171***	(6.23)	0.2431	(0.73)					-0.1940	(-1.02)					0.0026
$\theta = 0.80$	(2)	0.0281***	(8.05)	0.3770	(1.05)					-0.3333	(-1.60)					0.0012
$\theta = 0.90$	(2)	0.0453***	(8.36)	0.8005*	(1.81)					-0.3873	(-0.72)					0.0060
LS	(2)	0.0014	(0.53)	0.2851	(1.01)					-0.0120	(-0.10)					-0.0037
$\theta = 0.10$	(3)	-0.0396***	(-11.03)	0.2592	(1.01)			0.1701	(1.43)	0.2187*	(1.76)					0.0201
$\theta = 0.20$	(3)	-0.0254***	(-8.07)	0.0435	(0.20)			0.1747***	(15.32)	0.0065	(0.05)					0.0211
$\theta = 0.30$	(3)	-0.0151***	(-5.24)	-0.0185	(-0.10)			0.1691***	(12.52)	-0.1368	(-1.00)					0.0233
$\theta = 0.40$	(3)	-0.0057**	(-2.23)	0.0994	(0.34)			0.1624***	(10.27)	-0.2498*	(-1.93)					0.0301
$\theta = 0.50$	(3)	0.0015	(0.60)	0.0591	(0.20)			0.1550***	(9.20)	-0.1826	(-1.33)					0.0231
$\theta = 0.60$	(3)	0.0074***	(2.96)	0.0663	(0.22)			0.1490***	(9.43)	-0.0976	(-0.60)					0.0305
$\theta = 0.70$	(3)	0.0163***	(6.33)	0.0540	(0.20)			0.1412***	(9.90)	-0.1683	(-0.95)					0.0394
$\theta = 0.80$	(3)	0.0262***	(8.32)	0.0755	(0.21)			0.1328***	(11.35)	-0.2621	(-1.24)					0.0486
$\theta = 0.90$	(3)	0.0420***	(8.50)	0.8944**	(2.56)			0.1280***	(13.75)	-0.4408	(-1.32)					0.0815
LS	(3)	0.0011	(0.42)	0.2893	(1.10)			0.1600***	(4.70)	-0.0073	(-0.06)					0.0723
$\theta = 0.10$	(4)	-0.0497***	(-7.30)	0.0478	(0.16)	0.3771	(1.50)	0.2004***	(17.00)	0.2655***	(3.01)	-0.6384	(-0.05)	-9.1198	(-1.50)	0.0160
$\theta = 0.20$	(4)	-0.0240***	(-3.26)	0.1734	(0.60)	-0.1663	(-0.60)	0.1886***	(12.95)	0.0072	(0.05)	-1.5580	(-0.14)	-7.3895	(-1.03)	0.0113
$\theta = 0.30$	(4)	-0.0153**	(-2.23)	0.1292	(0.40)	0.0188	(0.10)	0.1550***	(8.17)	-0.1314	(-0.82)	12.9436	(1.13)	11.9670	(1.00)	0.0180
$\theta = 0.40$	(4)	-0.0053	(-1.10)	-0.0560	(-0.22)	-0.0097	(-0.05)	0.1474***	(7.12)	-0.2837**	(-2.30)	13.6210	(1.11)	9.0041	(0.60)	0.0265
$\theta = 0.50$	(4)	0.0002	(0.05)	-0.0850	(-0.32)	0.0067	(0.04)	0.1426***	(5.95)	-0.2387*	(-1.86)	20.6042*	(1.73)	4.6596	(0.21)	0.0211
$\theta = 0.60$	(4)	0.0091*	(1.90)	0.0280	(0.10)	-0.0740	(-0.40)	0.1434***	(5.20)	-0.1123	(-0.70)	15.9708	(1.20)	-1.2216	(-0.05)	0.0247
$\theta = 0.70$	(4)	0.0180***	(3.46)	0.1180	(0.35)	-0.0950	(-0.40)	0.1295***	(4.02)	-0.1625	(-1.10)	16.6710	(1.10)	6.7594	(0.23)	0.0360
$\theta = 0.80$	(4)	0.0281***	(3.80)	0.1545	(0.32)	0.0093	(0.02)	0.0918**	(2.23)	-0.2732	(-1.12)	20.7945	(1.10)	36.4300	(0.90)	0.0420
$\theta = 0.90$	(4)	0.0307***	(2.67)	0.9032*	(1.92)	0.7306	(1.06)	0.0893**	(2.32)	-0.2776	(-0.40)	4.4443	(0.20)	37.3908	(1.15)	0.0966
LS	(4)	-0.0024	(-0.45)	0.2460	(0.90)	0.1703	(0.70)	0.1402***	(3.35)	-0.0008	(-0.01)	9.4703	(0.80)	10.4465	(0.72)	0.0684

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \qquad (4)$$

Table 6 Cont… Quantile Regression of Finnish *Consumer Staples Sector*

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel B: Post-Euro (January 1999 – June 2009)																
$\theta = 0.10$	(2)	-0.0421***	(-13.50)	0.5747**	(2.05)					-0.3880***	(-4.76)					0.0437
$\theta = 0.20$	(2)	-0.0236***	(-12.08)	0.2891	(1.24)					-0.2753**	(-2.65)					0.0193
$\theta = 0.30$	(2)	-0.0137***	(-7.91)	0.5054**	(2.20)					-0.4186***	(-5.83)					0.0307
$\theta = 0.40$	(2)	-0.0054***	(-3.40)	0.2534	(1.07)					-0.4176***	(-7.80)					0.0456
$\theta = 0.50$	(2)	0.0005	(0.32)	0.1008	(0.50)					-0.3862***	(-7.80)					0.0510
$\theta = 0.60$	(2)	0.0072***	(5.20)	0.0080	(0.04)					-0.4192***	(-5.60)					0.0537
$\theta = 0.70$	(2)	0.0135***	(8.90)	0.1176	(0.56)					-0.4094***	(-4.53)					0.0588
$\theta = 0.80$	(2)	0.0231***	(11.12)	0.2450	(0.96)					-0.4366***	(-3.71)					0.0527
$\theta = 0.90$	(2)	0.0446***	(11.45)	0.2703	(0.64)					-0.3984***	(-2.90)					0.0412
LS	(2)	-4.36E-05	(-0.03)	0.3526*	(1.92)					-0.3830***	(-5.90)					0.0817
$\theta = 0.10$	(3)	-0.0408***	(-12.98)	0.5004	(1.50)			0.1380*	(1.85)	-0.2526**	(-2.40)					0.0503
$\theta = 0.20$	(3)	-0.0233***	(-11.21)	0.2487	(0.96)			0.1657***	(2.66)	-0.2243*	(-1.80)					0.0294
$\theta = 0.30$	(3)	-0.0128***	(-7.73)	0.3761	(1.61)			0.1710***	(2.74)	-0.2141*	(-1.70)					0.0448
$\theta = 0.40$	(3)	-0.0054***	(-3.70)	0.0757	(0.36)			0.2443***	(4.20)	-0.1480	(-1.51)					0.0620
$\theta = 0.50$	(3)	0.0006	(0.42)	-0.0914	(-0.51)			0.1090***	(3.30)	-0.2636***	(-3.46)					0.0684
$\theta = 0.60$	(3)	0.0063***	(4.67)	0.0110	(0.10)			0.1991***	(3.30)	-0.2770***	(-4.26)					0.0686
$\theta = 0.70$	(3)	0.0141***	(8.51)	0.0240	(0.13)			0.2194***	(2.77)	-0.3200***	(-3.20)					0.0730
$\theta = 0.80$	(3)	0.0220***	(12.42)	0.3716*	(1.73)			0.2887***	(4.40)	-0.2320***	(-3.33)					0.0732
$\theta = 0.90$	(3)	0.0420***	(10.50)	-0.0100	(-0.02)			0.1784**	(2.04)	-0.2305	(-1.50)					0.0480
LS	(3)	-0.0003	(-0.20)	0.2326	(1.30)			0.1944***	(3.98)	-0.2461***	(-3.37)					0.1062
$\theta = 0.10$	(4)	-0.0363***	(-4.15)	0.6047	(1.03)	-0.3533	(-0.54)	0.1050	(1.26)	-0.2648**	(-2.00)	0.0884	(0.01)	-2.6180	(-0.31)	0.0526
$\theta = 0.20$	(4)	-0.0216***	(-4.71)	0.1508	(0.54)	-0.0033	(-0.01)	0.1548**	(2.03)	-0.2382**	(-2.03)	-14.2032	(-1.20)	-2.2121	(-0.30)	0.0327
$\theta = 0.30$	(4)	-0.0104***	(-2.71)	0.2450	(1.00)	-0.1156	(-0.40)	0.1596**	(2.30)	-0.2015*	(-1.78)	-11.0828	(-0.86)	2.2098	(0.22)	0.0470
$\theta = 0.40$	(4)	-0.0024	(-0.70)	0.0416	(0.20)	-0.1730	(-0.60)	0.1484**	(2.04)	-0.2376**	(-2.11)	-5.9673	(-0.60)	8.1941	(0.73)	0.0623
$\theta = 0.50$	(4)	-0.0004	(-0.13)	-0.0927	(-0.51)	0.1251	(0.53)	0.1645**	(2.52)	-0.2421***	(-3.40)	-9.6990	(-1.04)	13.2054*	(1.72)	0.0684
$\theta = 0.60$	(4)	0.0054*	(1.86)	-0.0738	(-0.41)	0.0505	(0.22)	0.1534**	(2.40)	-0.2653***	(-4.25)	-10.3353	(-1.10)	11.6388	(1.52)	0.0666
$\theta = 0.70$	(4)	0.0114***	(4.26)	0.0101	(0.05)	0.1922	(0.97)	0.1910*	(1.95)	-0.3070***	(-3.07)	0.2763	(0.02)	4.9544	(0.31)	0.0697
$\theta = 0.80$	(4)	0.0146***	(3.82)	0.4466	(1.50)	0.5443	(1.60)	0.2910***	(3.40)	-0.2357***	(-3.44)	10.4640	(0.55)	-9.8973	(-0.70)	0.0778
$\theta = 0.90$	(4)	0.0268***	(4.60)	0.1134	(0.20)	0.8782**	(2.43)	0.1555	(1.00)	-0.2308	(-1.44)	24.8040	(1.25)	-9.9604	(-0.30)	0.0782
LS	(4)	-0.0021	(-0.70)	0.2126	(1.11)	0.1546	(0.73)	0.1845***	(3.01)	-0.2428***	(-3.31)	-4.3278	(-0.50)	2.6327	(0.30)	0.1022

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \quad (4)$$

Table 7: Quantile Regression of Finnish *Financials Sector* Excess Returns Regressed on Exchange Rate Shocks, Weekly Data

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel A: Pre-Euro (January 1994 – December 1998)																
$\theta = 0.10$	(2)	-0.0364***	(-11.11)	-0.3650	(-1.54)					-0.1066	(-0.43)					0.0053
$\theta = 0.20$	(2)	-0.0256***	(-9.51)	-0.4617*	(-1.74)					-0.1206	(-0.54)					0.0105
$\theta = 0.30$	(2)	-0.0154***	(-6.45)	-0.5921**	(-2.20)					-0.0268	(-0.16)					0.0093
$\theta = 0.40$	(2)	-0.0070***	(-2.83)	-0.5648*	(-1.81)					-0.0040	(-0.02)					0.0066
$\theta = 0.50$	(2)	-0.0011	(-0.45)	-0.4902	(-1.40)					0.1022	(0.60)					0.0037
$\theta = 0.60$	(2)	0.0074***	(2.90)	-0.3286	(-0.91)					0.2040	(1.27)					0.0078
$\theta = 0.70$	(2)	0.0167***	(6.26)	-0.3157	(-1.00)					0.1681	(1.06)					0.0076
$\theta = 0.80$	(2)	0.0250***	(9.30)	-0.1053	(-0.42)					0.3570**	(2.03)					0.0105
$\theta = 0.90$	(2)	0.0408***	(10.90)	0.2385	(0.60)					0.2835	(1.35)					0.0045
LS	(2)	0.0006	(0.30)	-0.3875*	(-1.91)					0.1146	(1.21)					0.0133
$\theta = 0.10$	(3)	-0.0374***	(-10.70)	-0.2705	(-1.07)			0.2113*	(1.70)	0.0040	(0.02)					0.0185
$\theta = 0.20$	(3)	-0.0253***	(-9.20)	-0.3315	(-1.12)			0.1474	(1.33)	-0.0190	(-0.10)					0.0145
$\theta = 0.30$	(3)	-0.0150***	(-6.10)	-0.5050*	(-1.73)			0.1191	(1.24)	-0.0324	(-0.20)					0.0096
$\theta = 0.40$	(3)	-0.0077***	(-3.02)	-0.5587*	(-1.80)			0.0613	(0.61)	0.0985	(0.52)					0.0040
$\theta = 0.50$	(3)	-0.0014	(-0.60)	-0.5094	(-1.50)			0.0542	(0.53)	0.1070	(0.62)					0.0007
$\theta = 0.60$	(3)	0.0078***	(3.10)	-0.4413	(-1.27)			-0.0470	(-0.50)	0.2220	(1.36)					0.0043
$\theta = 0.70$	(3)	0.0167***	(6.20)	-0.2708	(-0.85)			0.0195	(0.20)	0.1701	(1.03)					0.0044
$\theta = 0.80$	(3)	0.0270***	(8.60)	0.0922	(0.32)			0.1760	(1.20)	0.2975	(1.50)					0.0152
$\theta = 0.90$	(3)	0.0386***	(13.35)	0.2551	(0.80)			0.3350***	(3.21)	0.5184**	(2.40)					0.0388
LS	(3)	0.0004	(0.22)	-0.2923	(-1.40)			0.1291*	(1.80)	0.1262	(1.33)					0.0214
$\theta = 0.10$	(4)	-0.0383***	(-6.52)	-0.6825**	(-2.01)	-0.0597	(-0.20)	0.5217***	(3.72)	0.1582**	(2.30)	-11.5888	(-0.30)	-100.7964**	(-2.51)	0.0421
$\theta = 0.20$	(4)	-0.0257***	(-4.40)	-0.4223	(-1.20)	-0.0384	(-0.20)	0.3253**	(2.20)	0.1512	(0.60)	7.0543	(0.43)	-41.4613	(-1.20)	0.1267
$\theta = 0.30$	(4)	-0.0122**	(-2.40)	-0.5073*	(-1.71)	-0.1902	(-0.90)	0.3216**	(2.22)	0.0126	(0.10)	11.0515	(0.92)	-50.1967*	(-1.80)	0.0108
$\theta = 0.40$	(4)	-0.0057	(-1.00)	-0.3818	(-1.11)	-0.0780	(-0.30)	0.2321	(1.45)	0.0781	(0.40)	1.2530	(0.10)	-54.5806*	(-1.83)	0.0060
$\theta = 0.50$	(4)	-0.0025	(-0.43)	-0.3910	(-1.03)	0.0112	(0.04)	0.2754	(1.55)	0.0801	(0.43)	-3.4438	(-0.26)	-47.4357	(-1.44)	0.0033
$\theta = 0.60$	(4)	0.0083	(1.40)	-35.14	(-1.10)	-0.0927	(-0.34)	0.2548	(1.40)	0.2442	(1.50)	-6.7620	(-0.53)	-64.1912*	(-1.95)	0.0053
$\theta = 0.70$	(4)	0.0143**	(2.30)	-0.4476	(-1.52)	0.0573	(0.21)	0.2875	(1.41)	0.2068	(1.10)	-18.1720	(-1.60)	-64.7985**	(-2.10)	0.0070
$\theta = 0.80$	(4)	0.0281***	(4.34)	-0.0872	(-0.30)	-0.1390	(0.52)	0.4662**	(2.24)	0.1870	(0.82)	-14.7106	(-1.24)	-77.6702**	(-2.10)	0.0222
$\theta = 0.90$	(4)	0.0432***	(7.64)	0.2865	(0.80)	-0.2925	(-1.14)	0.4888***	(3.73)	0.4710*	(1.90)	-7.8040	(-0.70)	-66.3717**	(-2.10)	0.0474
LS	(4)	0.0008	(0.21)	-0.3712*	(-1.80)	-0.0586	(-0.33)	0.3622***	(3.20)	0.1201	(1.30)	-7.0012	(-0.60)	-61.9103***	(-2.66)	0.0375

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \quad (4)$$

Table7 Cont… Quantile Regression of Finnish *Financials Sector*

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel B: Post-Euro (January 1999 – June 2009)																
$\theta = 0.10$	(2)	-0.0312***	(-16.10)	0.2956*	(1.92)					0.1351***	(2.03)					0.0043
$\theta = 0.20$	(2)	-0.0198***	(-11.94)	0.2356	(1.50)					-0.0137	(-0.20)					0.0005
$\theta = 0.30$	(2)	-0.0127***	(-9.55)	0.3180*	(1.73)					-0.0777	(-1.12)					0.0070
$\theta = 0.40$	(2)	-0.0057***	(-4.32)	0.3283	(1.60)					-0.0243	(-0.30)					0.0032
$\theta = 0.50$	(2)	-0.0002	(-0.12)	0.3167	(1.44)					-0.1140	(-1.30)					0.0022
$\theta = 0.60$	(2)	0.0067***	(4.70)	0.3820**	(2.04)					-0.1072	(-1.50)					0.0067
$\theta = 0.70$	(2)	0.0130***	(8.63)	0.3844**	(2.30)					-0.1316***	(-3.04)					0.0105
$\theta = 0.80$	(2)	0.0225***	(12.36)	0.1554	(0.84)					-0.1330**	(-2.20)					0.0064
$\theta = 0.90$	(2)	0.0348***	(15.03)	0.1106	(0.55)					-0.0581	(-1.31)					0.0020
LS	(2)	0.0018	(1.34)	0.1536	(1.01)					-0.0490	(-0.91)					0.0013
$\theta = 0.10$	(3)	-0.0304***	(-13.42)	0.0440	(0.20)			0.2653***	(3.07)	0.1120	(1.10)					0.0186
$\theta = 0.20$	(3)	-0.0184***	(-12.33)	0.2330	(1.51)			0.2376***	(2.92)	0.0222	(0.26)					0.0267
$\theta = 0.30$	(3)	-0.0111***	(-8.16)	0.1483	(0.85)			0.2810***	(3.70)	-0.0247	(-0.34)					0.0344
$\theta = 0.40$	(3)	-0.0057***	(-4.37)	0.0570	(0.33)			0.3217***	(4.64)	-0.0544	(-0.75)					0.0352
$\theta = 0.50$	(3)	0.0006	(0.42)	0.2152	(1.10)			0.3296***	(4.66)	-0.0963	(-1.34)					0.0442
$\theta = 0.60$	(3)	0.0071***	(5.22)	0.3426	(1.60)			0.3753***	(5.50)	-0.0360	(-0.50)					0.0520
$\theta = 0.70$	(3)	0.0132***	(9.10)	0.4636**	(2.40)			0.3748***	(5.60)	-0.0696	(-0.80)					0.0620
$\theta = 0.80$	(3)	0.0210***	(12.60)	0.4048**	(2.03)			0.4350***	(5.65)	-0.1565***	(-3.40)					0.0678
$\theta = 0.90$	(3)	0.0355***	(14.67)	0.3795***	(3.12)			0.5350***	(13.20)	-0.1321***	(-4.13)					0.0888
LS	(3)	0.0017	(1.40)	0.1376	(0.96)			0.3784***	(8.05)	-0.0534	(-1.05)					0.1066
$\theta = 0.10$	(4)	-0.0247***	(-4.80)	0.2680	(0.82)	-0.4368	(-1.30)	0.3697***	(2.72)	0.0843	(0.74)	17.9313**	(2.20)	-34.7870	(-1.40)	0.0517
$\theta = 0.20$	(4)	-0.0148***	(-4.23)	0.1981	(0.90)	-0.3190	(-0.96)	0.3652***	(3.14)	-0.0016	(-0.01)	11.9594	(0.35)	-36.3377*	(-1.80)	0.0336
$\theta = 0.30$	(4)	-0.0074***	(-3.00)	0.1137	(0.50)	-0.3126	(-1.63)	0.3393***	(3.14)	-0.0341	(-0.50)	-5.8527	(-0.22)	-29.8320	(-1.32)	0.0335
$\theta = 0.40$	(4)	-0.0045*	(-1.71)	0.0518	(0.30)	-0.0503	(-0.30)	0.3750***	(3.30)	-0.0678	(-0.91)	-8.5170	(-0.70)	-10.2904	(-0.40)	0.0330
$\theta = 0.50$	(4)	-0.0005	(-0.21)	0.1415	(0.71)	0.0791	(0.51)	0.3901***	(4.40)	-0.0743	(-1.10)	-11.9033	(-1.03)	-8.4713	(-0.61)	0.0419
$\theta = 0.60$	(4)	0.0056**	(2.20)	0.3384**	(2.10)	0.1138	(0.64)	0.4385***	(4.80)	-0.0603	(-0.90)	-15.4963	(-1.52)	-17.4225	(-1.13)	0.0522
$\theta = 0.70$	(4)	0.0104***	(3.62)	0.2606	(1.21)	0.1932	(0.93)	0.4878***	(4.71)	-0.0886	(-1.20)	-12.1978	(-0.72)	-19.8962	(-0.94)	0.0650
$\theta = 0.80$	(4)	0.0162***	(4.30)	0.2197	(1.00)	0.4384	(1.42)	0.4752***	(3.80)	-0.1442***	(-3.20)	-1.6923	(-0.11)	-5.3154	(-0.27)	0.0777
$\theta = 0.90$	(4)	0.0213***	(3.04)	0.1196	(0.40)	1.0687*	(1.90)	0.4810***	(3.87)	-0.1116***	(-2.92)	38.1918	(1.34)	0.4210	(0.02)	0.1116
LS	(4)	-0.0002	(-0.10)	0.0631	(0.43)	0.1443	(1.00)	0.4881***	(7.10)	-0.0410	(-0.80)	8.8913	(1.26)	-25.5696**	(-2.21)	0.1121

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \qquad (4)$$

Table 8: Quantile Regression of Finnish *Information Technology Sector* Excess Returns Regressed on Exchange Rate Shocks, Weekly Data

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel A: Pre-Euro (January 1994 – December 1998)																
$\theta = 0.10$	(2)	-0.0368***	(-9.45)	0.1541	(0.44)					0.0605	(0.31)					-0.0071
$\theta = 0.20$	(2)	-0.0227***	(-7.34)	0.3034	(0.93)					-0.0415	(-0.30)					-0.0058
$\theta = 0.30$	(2)	-0.0110***	(-3.60)	0.1184	(0.40)					-0.0111	(-0.10)					-0.0074
$\theta = 0.40$	(2)	-0.0015	(-0.53)	-0.2527	(-0.82)					0.0877	(0.60)					-0.0041
$\theta = 0.50$	(2)	0.0077***	(2.70)	-0.4444	(-1.52)					0.0806	(0.70)					-0.0012
$\theta = 0.60$	(2)	0.0143***	(4.90)	-0.3463	(-1.20)					0.0596	(0.53)					0.0017
$\theta = 0.70$	(2)	0.0255***	(7.91)	-0.2184	(-0.71)					0.1295	(1.23)					-0.0017
$\theta = 0.80$	(2)	0.0392***	(9.60)	-0.0892	(-0.22)					0.2155**	(2.35)					-0.0030
$\theta = 0.90$	(2)	0.0648	(11.30)	0.2320	(0.32)					-0.0667	(-0.30)					-0.0036
LS	(2)	0.0080***	(2.85)	0.0126	(0.04)					0.0821	(0.60)					-0.0064
$\theta = 0.10$	(3)	-0.0362***	(-7.70)	0.3410	(1.10)			0.6560***	(5.10)	-0.0612	(-0.34)					0.0883
$\theta = 0.20$	(3)	-0.0182***	(-6.60)	0.0262	(0.10)			0.5345***	(5.30)	-0.1565*	(-1.85)					0.0772
$\theta = 0.30$	(3)	-0.0103***	(-3.81)	-0.0785	(-0.30)			0.4748***	(5.07)	-0.0478	(-0.44)					0.0830
$\theta = 0.40$	(3)	-0.0044	(-1.60)	-0.1420	(-0.50)			0.5237***	(5.04)	0.0417	(0.30)					0.0728
$\theta = 0.50$	(3)	0.0057**	(2.10)	-0.3065	(-1.02)			0.4284***	(4.53)	-0.0002	(-0.00)					0.0610
$\theta = 0.60$	(3)	0.0140***	(4.85)	-0.2542	(-0.90)			0.3776***	(3.90)	0.0482	(0.45)					0.0611
$\theta = 0.70$	(3)	0.0246***	(7.83)	-0.3417	(-1.10)			0.4850***	(4.04)	0.1115	(1.14)					0.0680
$\theta = 0.80$	(3)	0.0348***	(10.52)	-0.2663	(-0.73)			0.5340**	(5.61)	0.1558**	(2.00)					0.0596
$\theta = 0.90$	(3)	0.0587***	(9.70)	0.0030	(0.01)			0.5454***	(5.06)	-0.0364	(-0.20)					0.0462
LS	(3)	0.0070***	(2.70)	-0.0024	(-0.01)			0.5723***	(7.10)	0.0300	(0.24)					0.1517
$\theta = 0.10$	(4)	-0.0102*	(-1.74)	0.6795	(1.32)	-1.4947***	(-4.06)	0.3193**	(2.37)	-0.1175	(-0.60)	-14.2608	(-1.15)	93.6237***	(5.75)	0.1333
$\theta = 0.20$	(4)	-0.0077	(-1.24)	0.3960	(1.10)	-0.7440*	(-1.66)	0.5468***	(3.43)	-0.1926*	(-1.70)	5.5577	(0.14)	20.0810	(0.40)	0.0888
$\theta = 0.30$	(4)	-0.0040	(-0.92)	-0.0550	(-0.21)	-0.3657*	(-1.70)	0.4810***	(3.61)	0.0091	(0.10)	1.1202	(0.04)	2.3091	(0.10)	0.0856
$\theta = 0.40$	(4)	0.0031	(0.66)	-0.2320	(-0.80)	-0.4098*	(-1.70)	0.4546***	(3.33)	-0.0064	(-0.05)	-10.6285	(-0.50)	10.6761	(0.32)	0.0728
$\theta = 0.50$	(4)	0.0109*	(1.90)	-0.3821	(-1.24)	-0.2550	(-0.95)	0.4321***	(3.11)	0.0945	(0.75)	-13.6128	(-0.60)	-4.1410	(-0.14)	0.0571
$\theta = 0.60$	(4)	0.0150**	(2.30)	-0.4046	(-1.30)	-0.0374	(-0.11)	0.3904***	(2.65)	0.0332	(0.31)	-21.9016	(-1.33)	10.6441	(0.50)	0.0532
$\theta = 0.70$	(4)	0.0242***	(3.26)	-0.3970	(-1.21)	0.0498	(0.13)	0.4257**	(2.40)	0.1094	(1.05)	-3.7071	(-0.20)	15.1587	(0.55)	0.0616
$\theta = 0.80$	(4)	0.0294***	(3.10)	-0.2091	(-0.51)	0.2594	(0.52)	0.4171**	(2.51)	0.1634*	(1.95)	-1.1227	(-0.10)	8.7275	(0.32)	0.0550
$\theta = 0.90$	(4)	0.0672***	(5.25)	0.2723	(0.42)	-0.5480	(-1.10)	0.4868**	(2.55)	-0.0711	(-0.40)	-13.1610	(-0.80)	27.5810	(0.85)	0.0384
LS	(4)	0.0146***	(2.73)	0.0617	(0.23)	-0.3983*	(-1.65)	0.5505***	(4.60)	0.0240	(0.20)	-10.6001	(-0.85)	7.2364	(0.40)	0.1525

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \qquad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \qquad (4)$$

Table 8 Cont… Quantile Regression of Finnish *Information Technology Sector*

Quantiles	Equation	$\hat{a}$ Coeff.	t-stats.	$\hat{b}$ Coeff.	t-stats.	$\hat{c}$ Coeff	t-stats	$\hat{d}$ Coeff	t-stats	$\hat{g}$ Coeff	t-stats	$\hat{e}$ Coeff.	t-stats	$\hat{f}$ Coeff.	t-stats	Adjusted R^2
Panel B: Post-Euro (January 1999 – June 2009)																
$\theta = 0.10$	(2)	-0.0545***	(-10.33)	0.6150	(1.30)					0.6545***	(3.31)					0.0331
$\theta = 0.20$	(2)	-0.0313***	(-13.10)	-0.0230	(-0.10)					0.5655***	(3.42)					0.0368
$\theta = 0.30$	(2)	-0.0194***	(-9.52)	0.0022	(0.01)					0.5217***	(3.73)					0.0344
$\theta = 0.40$	(2)	-0.0097***	(-4.95)	0.0252	(0.10)					0.5485***	(4.11)					0.0357
$\theta = 0.50$	(2)	-0.0020	(-0.90)	-0.2108	(-0.60)					0.5480***	(3.91)					0.0344
$\theta = 0.60$	(2)	0.0074***	(3.30)	-0.4846	(-1.30)					0.4110***	(2.80)					0.0206
$\theta = 0.70$	(2)	0.0190***	(7.60)	-0.5480	(-1.55)					0.3432**	(2.40)					0.0170
$\theta = 0.80$	(2)	0.0324***	(11.35)	-0.3090	(-1.21)					0.2091*	(1.90)					0.0091
$\theta = 0.90$	(2)	0.0558***	(12.46)	-0.6084**	(-2.03)					0.0615	(0.30)					0.0085
LS	(2)	-0.0008	(-0.40)	-0.1554	(-0.63)					0.3076***	(3.52)					0.0248
$\theta = 0.10$	(3)	-0.0515***	(-11.22)	0.3422	(0.54)			0.3570***	(4.90)	0.5738**	(2.02)					0.0806
$\theta = 0.20$	(3)	-0.0310***	(-12.30)	0.1532	(0.40)			0.2807***	(4.10)	0.4691***	(2.80)					0.0671
$\theta = 0.30$	(3)	-0.0182***	(-8.80)	0.1883	(0.64)			0.2477***	(3.90)	0.4680***	(3.50)					0.0637
$\theta = 0.40$	(3)	-0.0102***	(-5.03)	0.0643	(0.21)			0.2290***	(3.50)	0.4152***	(3.14)					0.0604
$\theta = 0.50$	(3)	-0.0010	(-0.45)	-0.2106	(-0.40)			0.2065***	(3.70)	0.3550***	(2.90)					0.0550
$\theta = 0.60$	(3)	0.0073***	(3.35)	-0.3007	(-0.92)			0.1996***	(3.90)	0.3365**	(2.62)					0.0453
$\theta = 0.70$	(3)	0.0186***	(7.80)	-0.7645**	(-2.20)			0.1941***	(3.90)	0.1644	(1.25)					0.0366
$\theta = 0.80$	(3)	0.0330***	(11.56)	-0.6254***	(-2.71)			0.2371***	(4.04)	0.1995*	(1.71)					0.0328
$\theta = 0.90$	(3)	0.0555***	(16.96)	-0.6137**	(-2.20)			0.2070***	(3.82)	-0.0981	(-1.50)					0.0307
LS	(3)	-0.0002	(-0.12)	-0.1780	(-0.74)			0.2230***	(5.40)	0.2253**	(2.61)					0.0726
$\theta = 0.10$	(4)	-0.0418***	(-4.60)	0.6493	(1.30)	-0.7625	(-1.20)	0.4432***	(6.13)	0.5426*	(1.90)	7.9861	(0.45)	-18.4087	(-1.25)	0.0906
$\theta = 0.20$	(4)	-0.0273***	(-6.60)	-0.0481	(-0.14)	-0.3577	(-1.33)	0.3132***	(3.52)	0.4810***	(3.10)	-0.9827	(-0.10)	-15.6556	(-1.10)	0.0667
$\theta = 0.30$	(4)	-0.0175***	(-3.90)	0.1691	(0.55)	-0.1353	(-0.40)	0.2653***	(3.10)	0.4983***	(3.50)	-12.8851	(-0.97)	-9.2426	(-0.60)	0.0611
$\theta = 0.40$	(4)	-0.0113**	(-2.43)	0.0402	(0.11)	0.0894	(0.23)	0.2651***	(3.10)	0.4234***	(3.01)	-16.7772	(-1.10)	-10.6917	(-0.60)	0.0574
$\theta = 0.50$	(4)	-0.0055	(-1.50)	-0.2965	(-0.83)	0.3286	(1.20)	0.2484***	(2.95)	0.4344***	(3.20)	-10.9473	(-1.15)	-24.1295	(-1.55)	0.0573
$\theta = 0.60$	(4)	0.0010	(0.23)	-0.3886	(-1.03)	0.5403*	(1.81)	0.2677***	(3.91)	0.3664***	(3.03)	-17.3142*	(-1.80)	-28.2991*	(-1.92)	0.0551
$\theta = 0.70$	(4)	0.0091**	(2.50)	-0.8176***	(-3.10)	0.7394***	(3.45)	0.2888***	(3.33)	0.2476*	(1.84)	-30.3037***	(-2.96)	-39.4501**	(-2.31)	0.0621
$\theta = 0.80$	(4)	0.0192***	(3.10)	-0.7377**	(-2.13)	0.9371*	(1.94)	0.4403***	(5.21)	0.1358	(0.70)	-36.8862***	(-6.20)	-61.9630***	(-4.25)	0.0712
$\theta = 0.90$	(4)	0.0405***	(4.30)	-0.5165	(-1.32)	0.8761	(1.30)	0.5147***	(5.50)	-0.0616	(-1.10)	-42.7550***	(-3.23)	-78.3257***	(-4.54)	0.1044
LS	(4)	-0.0061	(-1.63)	-0.2124	(-0.90)	0.3510	(1.60)	0.3430***	(5.32)	0.2241**	(2.60)	-17.7920**	(-2.40)	-33.5055**	(-2.60)	0.0913

Note: Asterisks ***, **, and * denote 1%, 5%, and 10% significance levels, respectively (t-statistics in parenthesis). The total number observations in the pre- and post-euro periods are N = 260 and N = 544, respectively. The regression equation:

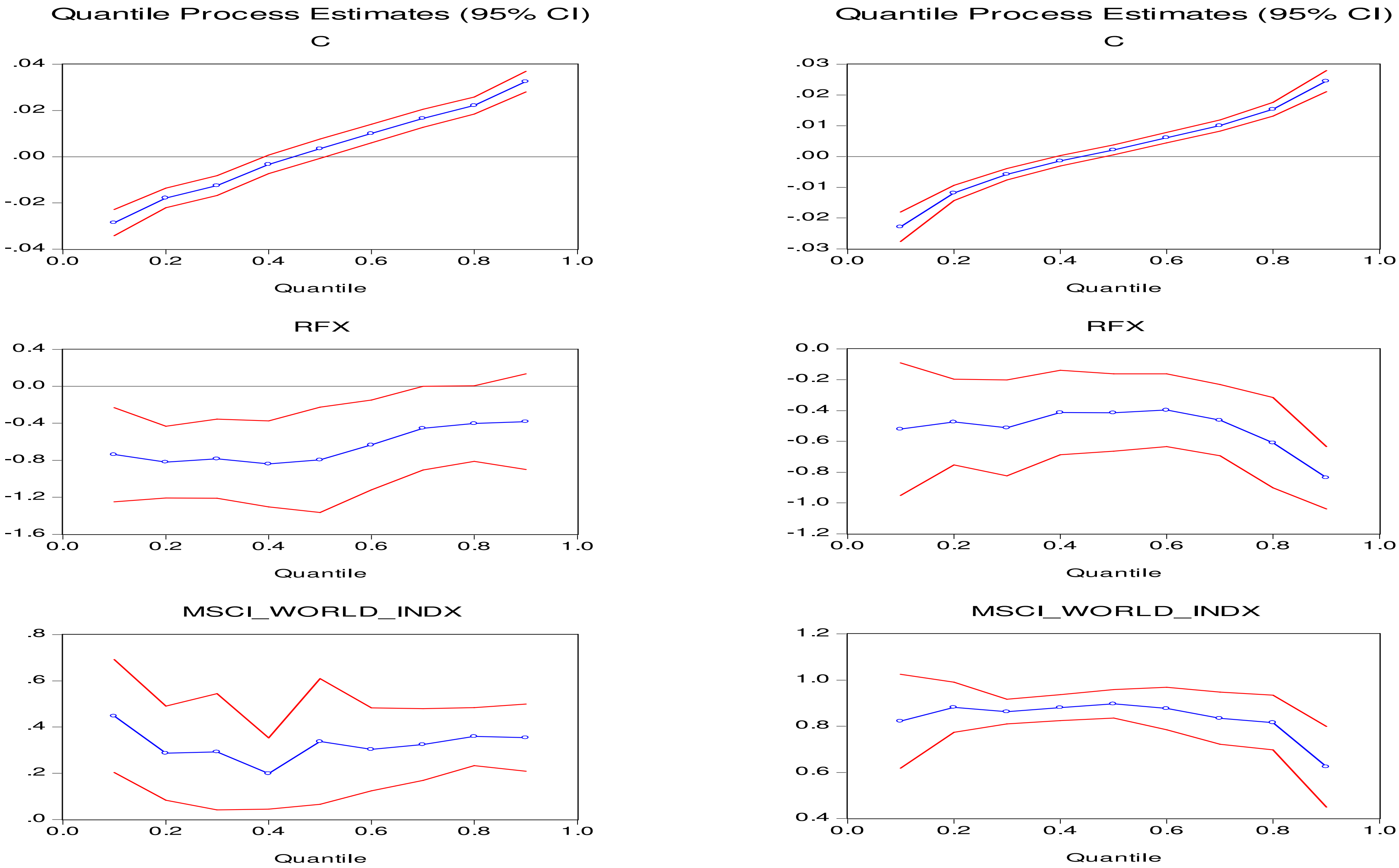
$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (2)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + \varepsilon_{i,t} \quad (3)$$

$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g_i r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \quad (4)$$

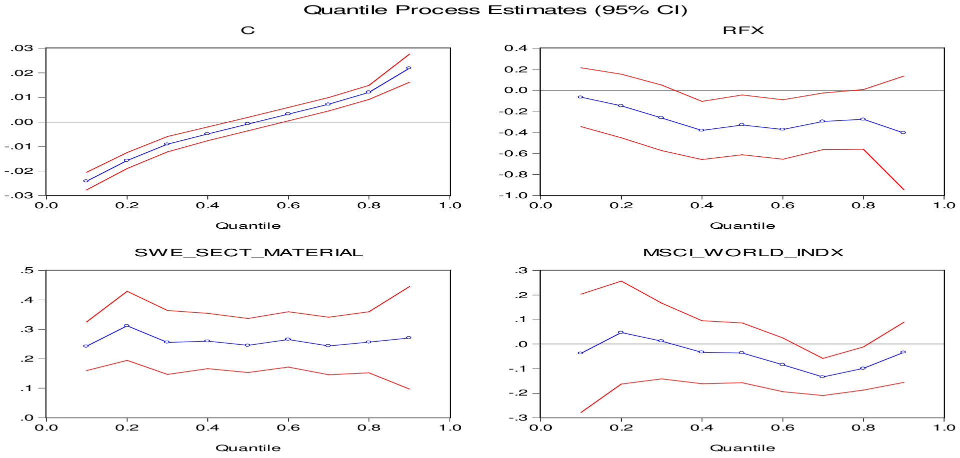
Appendix: A, Graph of Quantile Regression of OMXH CAP Finnish Market Index Returns

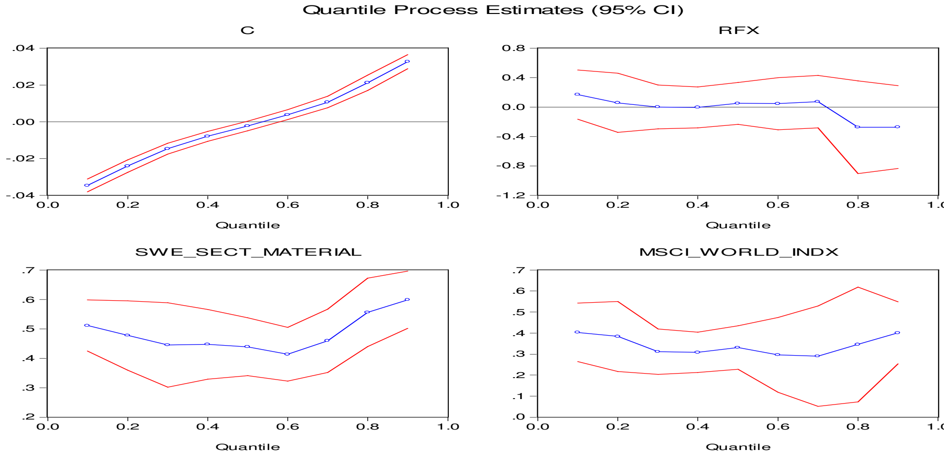
Pre-Euro (January 1994 – December 1998) | Post-Euro (January 1999 – June 2009)

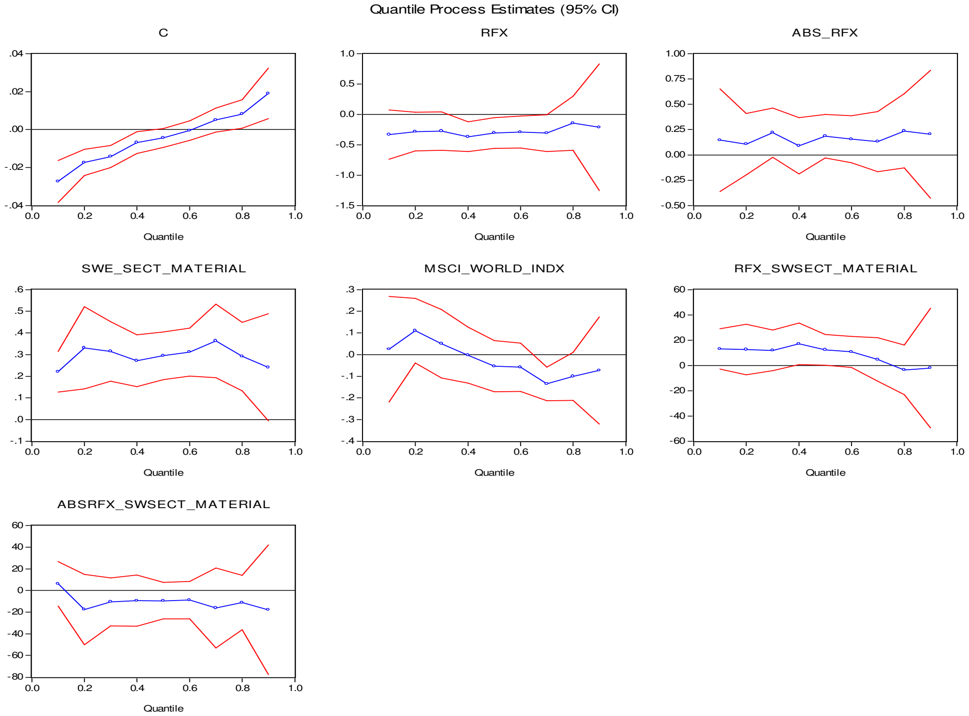


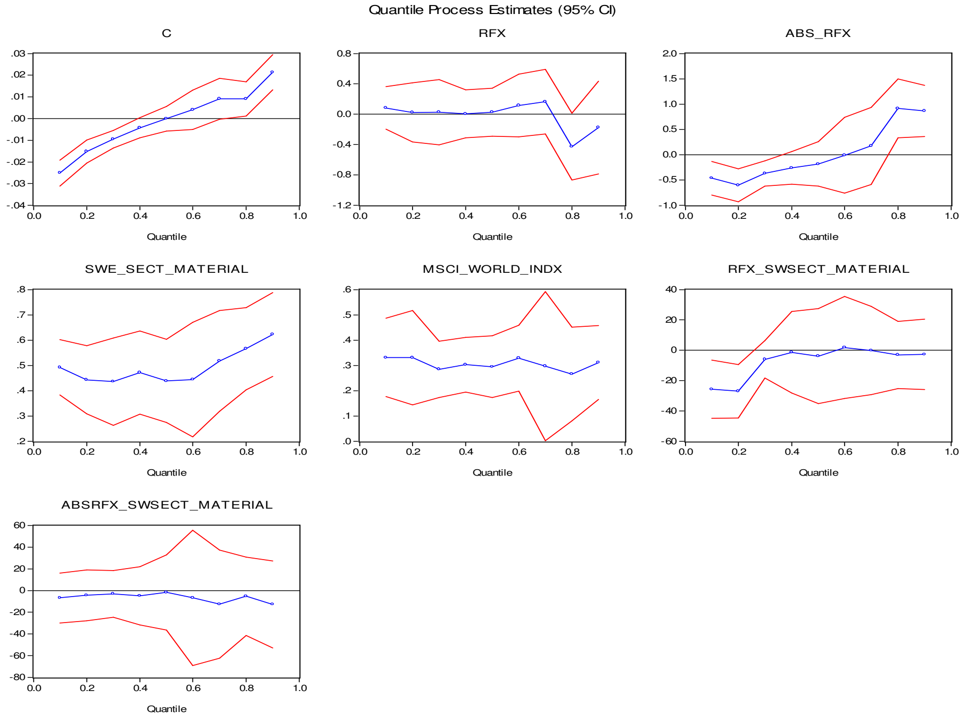
Appendix: B& H, Graph of Quantile Regression of Finnish *Materials Sector* Excess Returns, Equation 3 and 4

Pre-Euro (January 1994 – December 1998)	Post-Euro (January 1999 – June 2009)



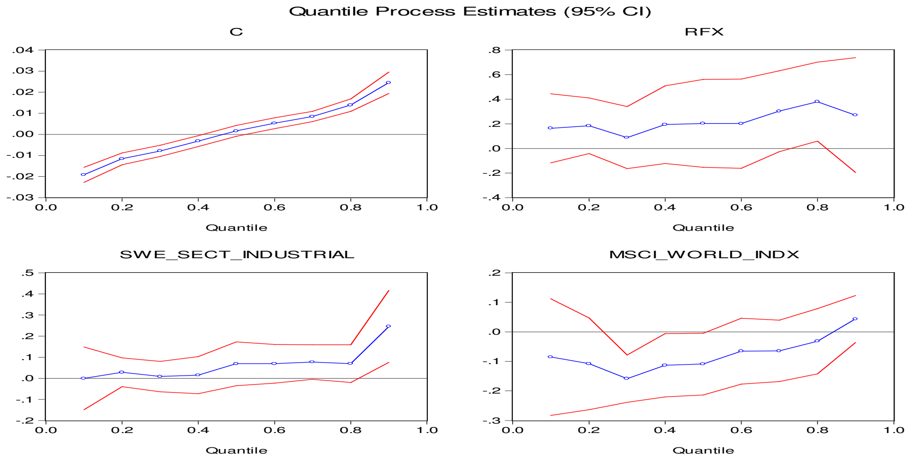


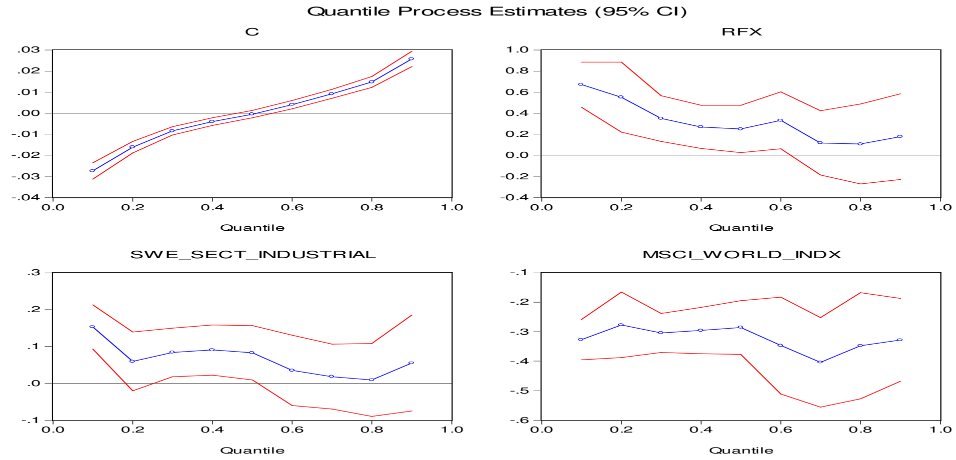


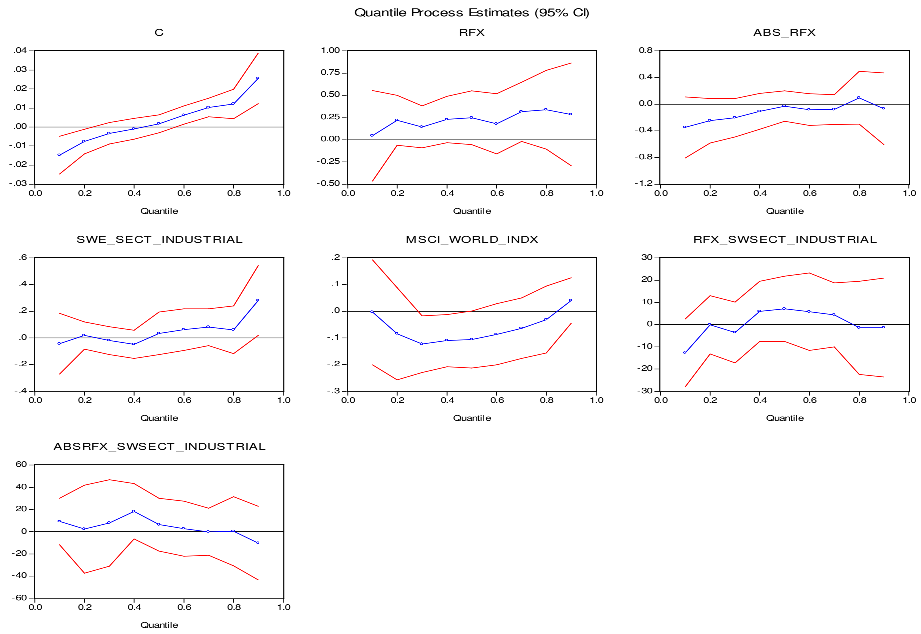


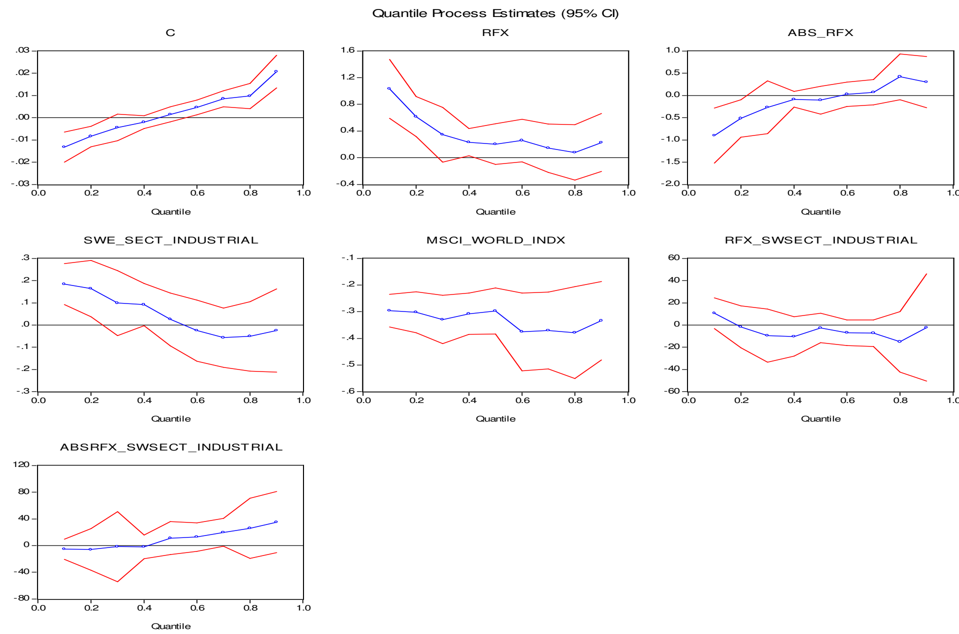
Appendix: C& I, Graph of Quantile Regression of *Industrial Sector* Finnish Excess Returns, Equation 3 & 4

Pre-Euro (January 1994 – December 1998)	Post-Euro (January 1999 – June 2009)



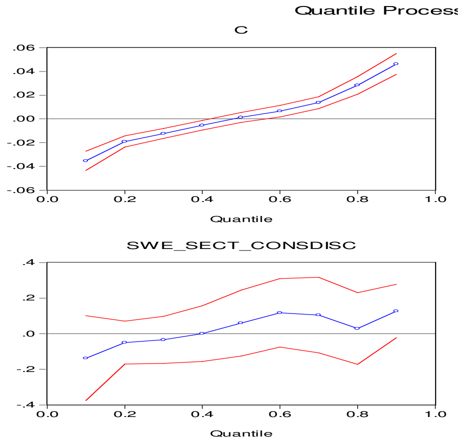


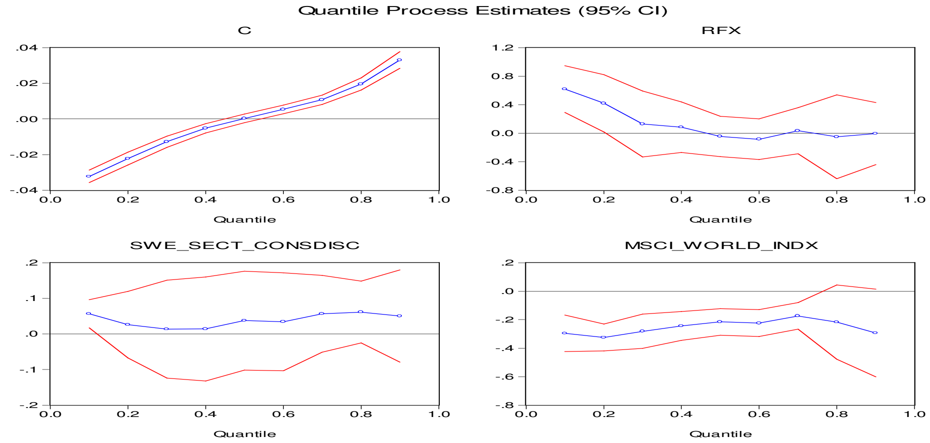


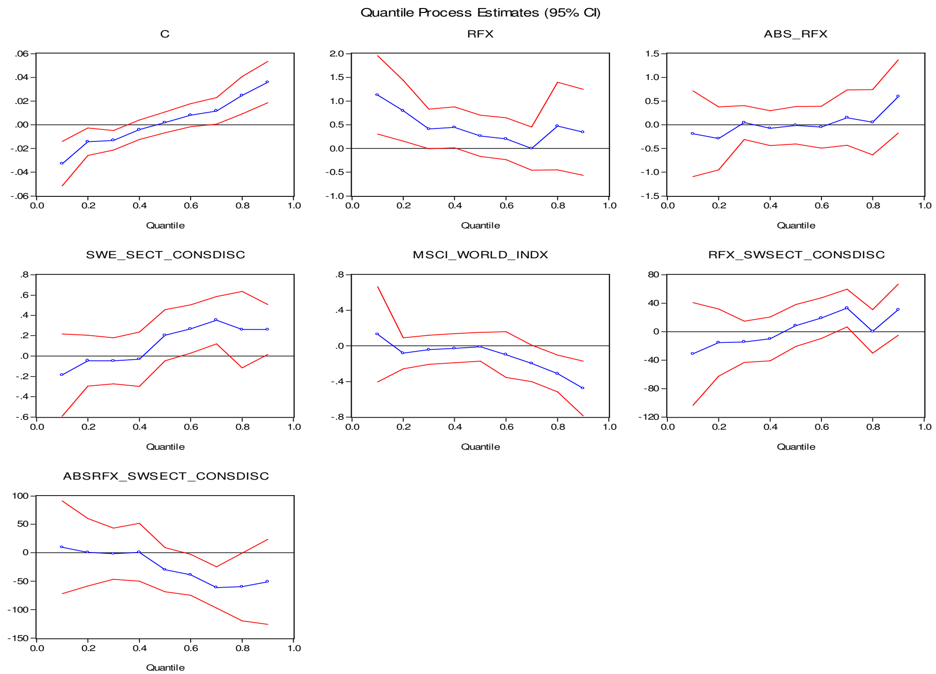


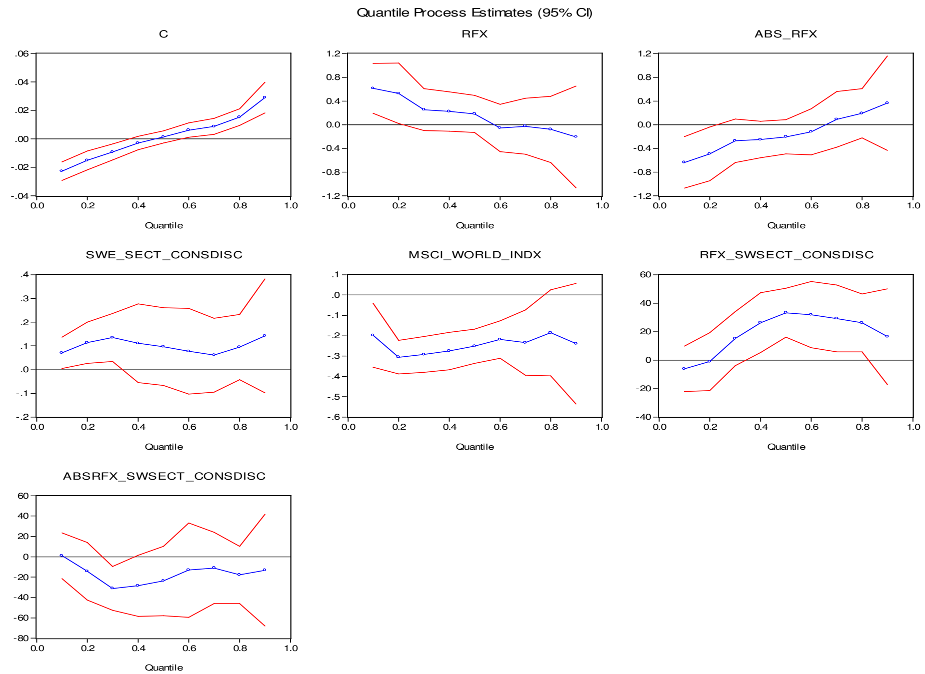
Appendix: D & J, Graph of Quantile Regression of *Consumer Discretionary Sector* Finnish Excess Returns, Equation 3 & 4

Pre-Euro (January 1994 – December 1998)	Post-Euro (January 1999 – June 2009)



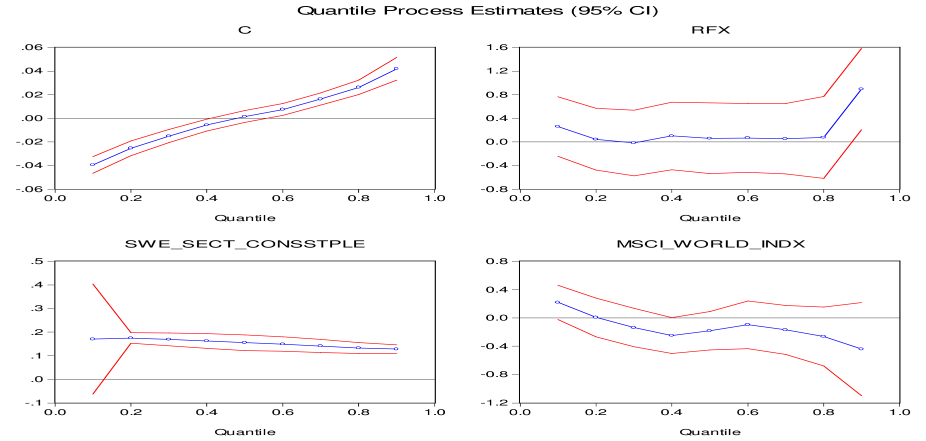


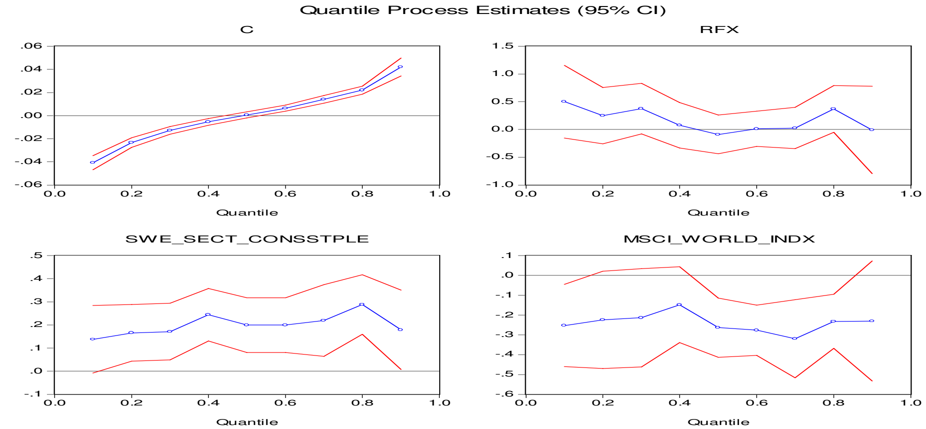


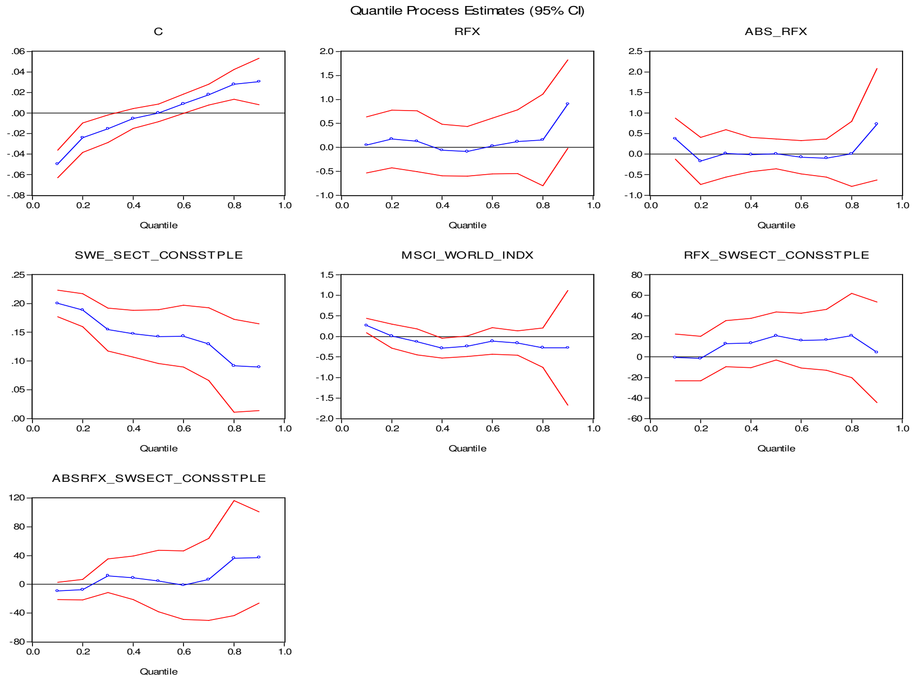


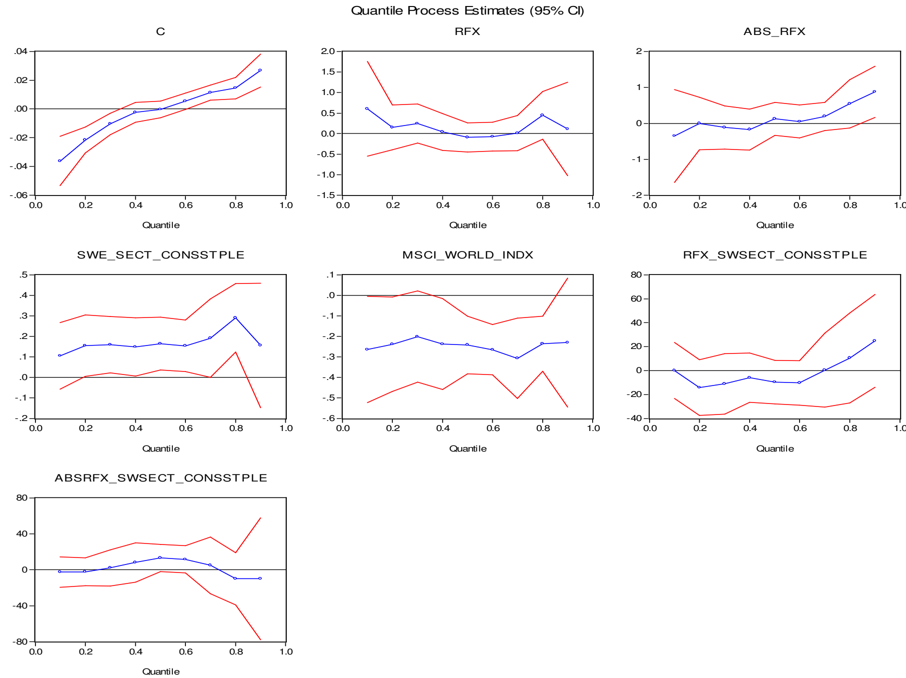
Appendix: E & K, Graph of Quantile Regression of *Consumer Staples Sector* Finnish Excess Returns, Equation 3 & 4

Pre-Euro (January 1994 – December 1998)	Post-Euro (January 1999 – June 2009)



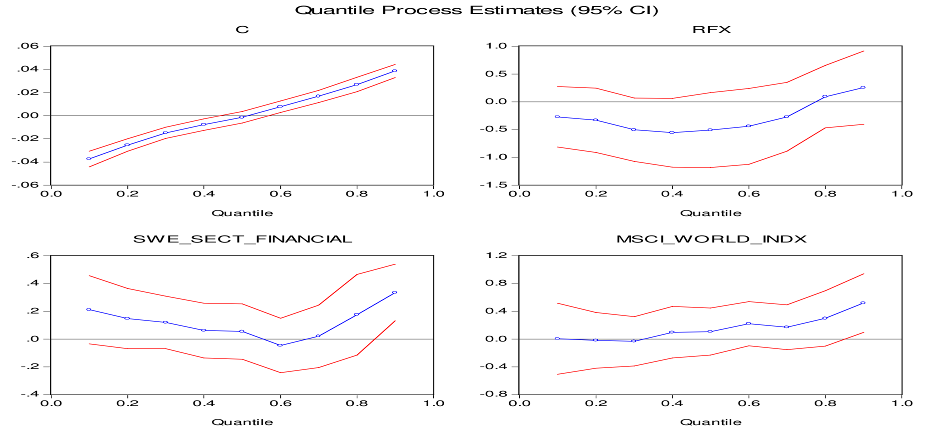


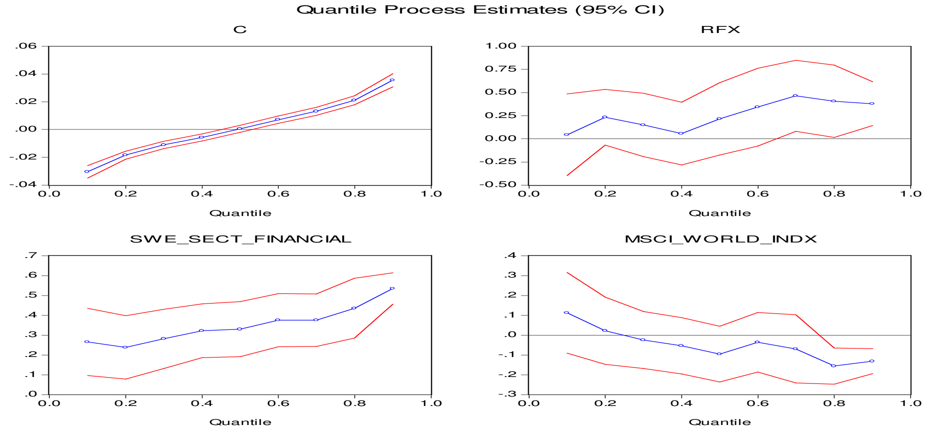


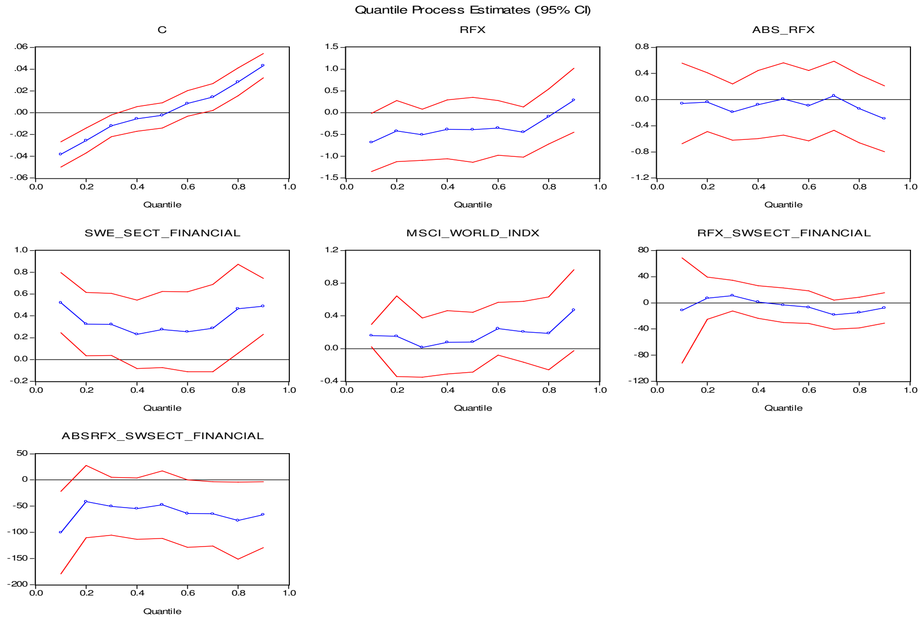


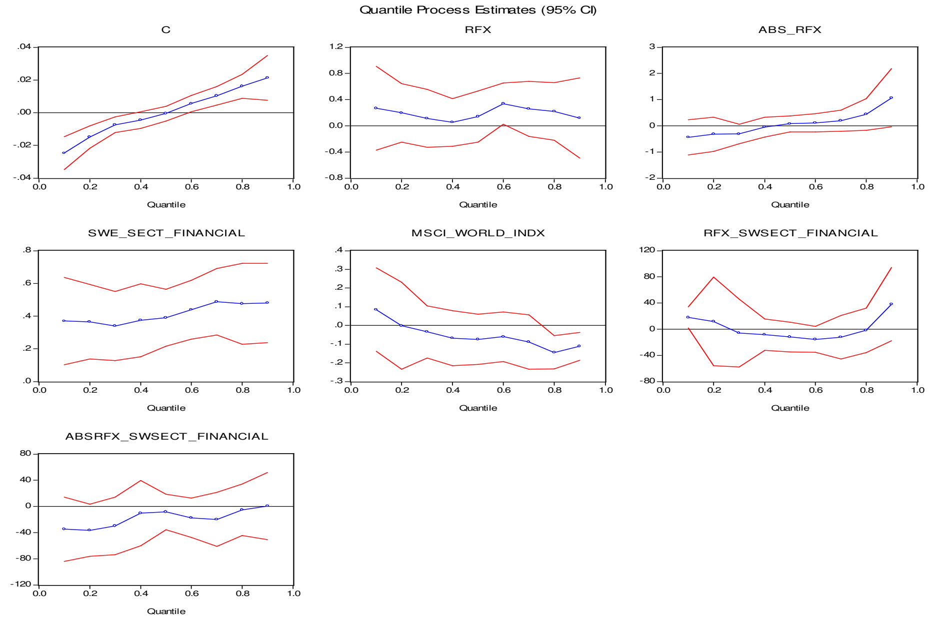
Appendix: F& L, Graph of Quantile Regression of *Financials Sector* Finnish Excess Returns, Equation 3 & 4

Pre-Euro (January 1994 – December 1998)	Post-Euro (January 1999 – June 2009)



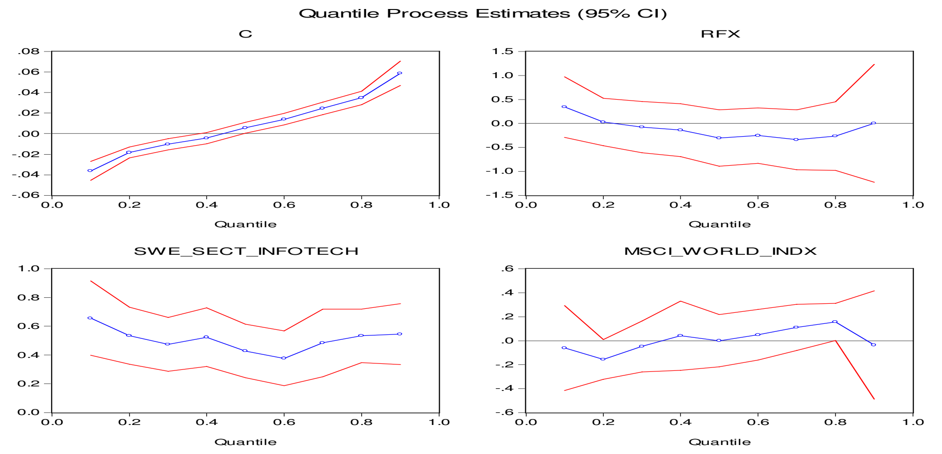


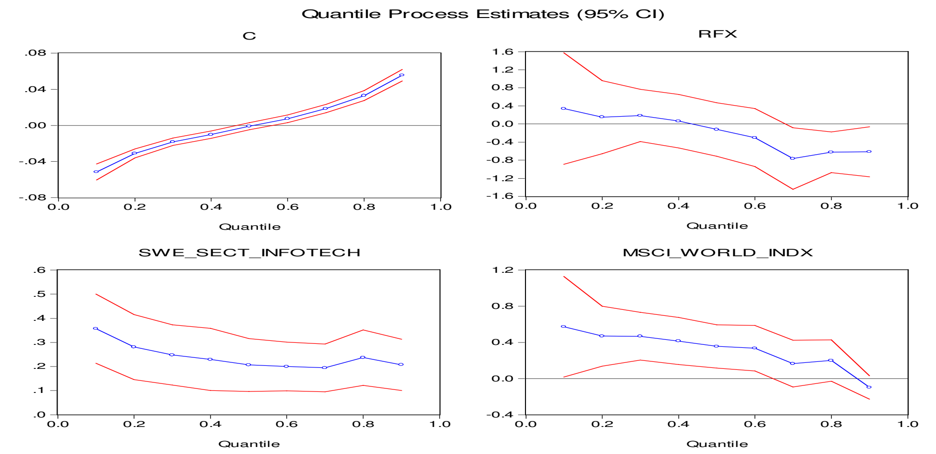


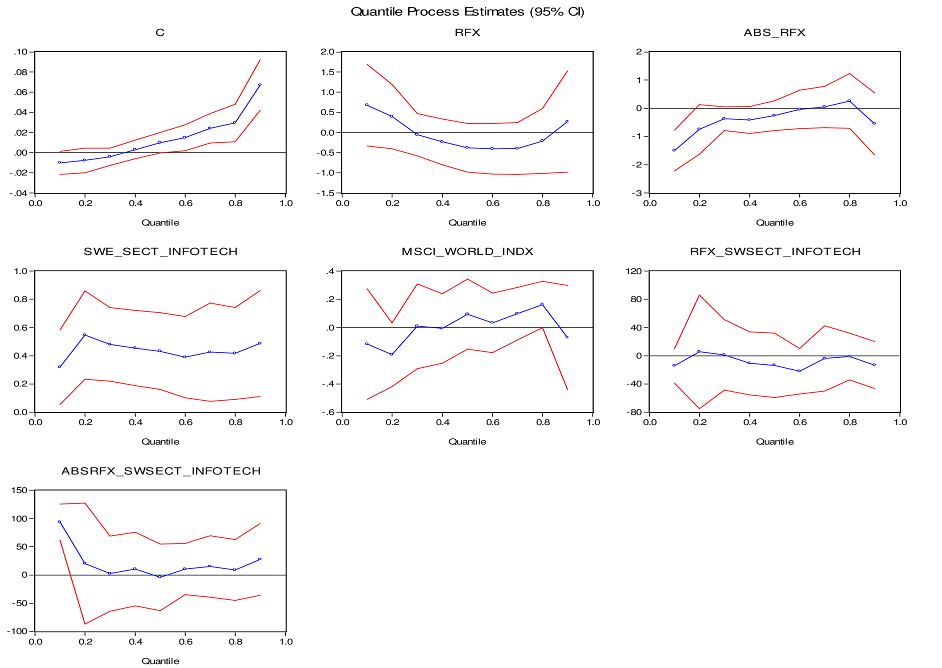


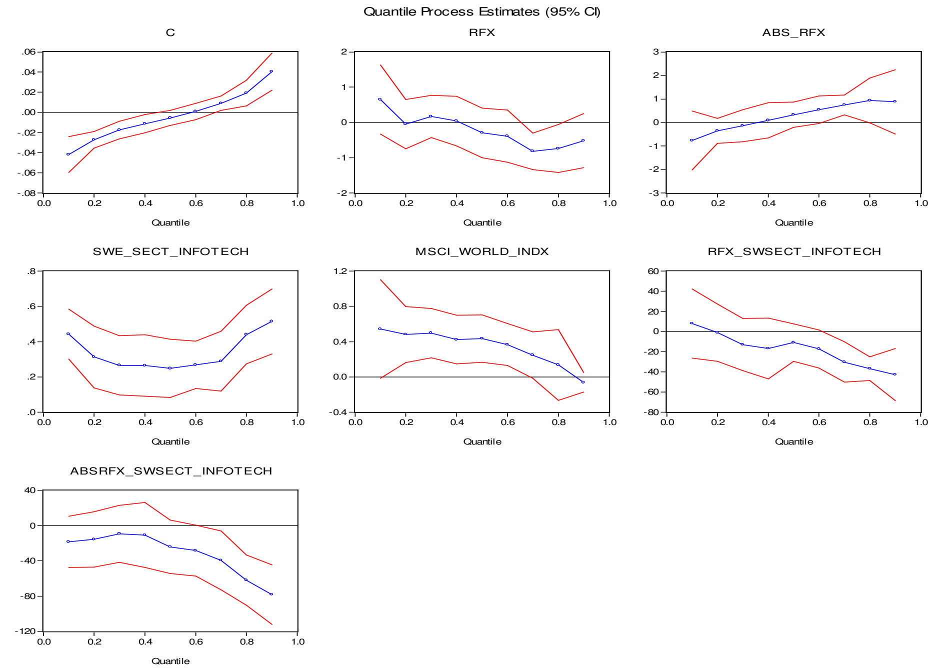
Appendix: M, Graph of Quantile Regression of *Information Technology Sector* Finnish Excess Returns

Pre-Euro (January 1994 – December 1998)	Post-Euro (January 1999 – June 2009)









Notes:

[1] Historically, from 13th Century to 1809, Finland belonged to the kingdom of Sweden and in this period the two areas had the same monetary system. However, after 1809 it was ceded to Russian empire until 1917 when Finland declared independence. In 1970 onward Finland and Sweden became modern welfare states. Furthermore, in May 1991 and June 1991, both Sweden and Finland respectively, pegged from their respective trade-weighted basket to European Currency Unit (ECU). However, Sweden discarded the peg to ECU in November 1992 and Finland followed the suit around the same time. Hence, both nations allowed their effective exchange rate to float freely with their central banks having intervention rights. However, both the nations joined European Union in 1995 along with Austria; however Finland joined the Exchange Rate Mechanism of ECU in 1996 and became euro member nation in 1999; however Sweden did not follow the suit.

[2] The Finnish stock exchange known as Helsinki stock exchange (HEX) merged with Swedish stock exchange called OM on September 2003 and joint company became to be known as OMX. In January 2005 OMX acquired the Copenhagen stock exchange (Denmark's stocks exchange) and in September 2006 acquired Iceland stock exchange. Moreover, in October 2006 OMX took 10% stake in Oslo stock exchange (Norway's stock exchange) and in November 2007 acquired Armenian stock exchange. However, in 2007-2008 NASDAQ bought the OMX group and know known as NASDAQ OMX Group.

[3] For Finland in pre-and post-euro, firms in sectors such as materials have on average about 66% of sales; industrials have 53% sales, and information technology have 50% of total sales in Europe. And in case of Sweden, materials sector have about 80% of sales, 44 % for industrial firms and 55% for information technology sales are in Europe. Source: Thomson Financials.

[4] On 1 January 1999, 11 European Union (EU) nations adopted the euro. Furthermore, additional EU members have joined euro since 1999; thus bringing the total to 17 eurozone members as of 2011.

[5] Baldwin (2006) found that the effect is likely to lie somewhere between 5 and 15 percent with 9 percent being the best estimate of increase in trading. With the same impetus, Badinger and Breuss (2007) revealed strong evidence of gain in trades in favor of small euro nations. Bris, Koskinen and Nilsson (2006) with one of their results showed exhibits the euro had lead to increased investments for firms from countries that previously had weak currencies.

[6] Koenker and Hallock (2001) provided a brief tutorial introduction to quantile regression methods, illustrating their application in several settings. Practical aspects of computation, inference, and interpretation are discussed. Furthermore, Koenker and Xiao (2002), considered an approach involving a martingale transformation of the parametric empirical process suggested by Khmaladze (1981) and showed that it can be adapted to a wide variety of inference problems involving the quantile regression process. They suggested exploring more flexible models for covariate effects in a wide variety of econometric models. Moreover, Quantile regression models have been widely applied in various studies such as Buchinsky (1998), Cade and Noon (2003), Barnes and Hughes (2002), Allen, Singh, and Powell (2009) Högholm, Knif, and Pynnönen (2011), etc

[7] The $\tilde{r}^{FI}_{i,t} = r^{FI}_{i,t} - r^{FI}_{m,t}$, is an excess returns for the *i*th sector of Finnish stock market, and $\tilde{r}^{SW}_{i,t} = r^{SW}_{i,t} - r^{SW}_{m,t}$, is an excess return for the *i*th sector o Swedish stock market. Also, $r^{K}_{m,t}$ is log-return on the corresponding market portfolio for country *K*. Finnish sector excess returns are expressed in the Finnish markka (FIM) and those for Swedish sectors are expressed in Swedish krona (SEK).

[8] The total return index (TRI) is used because it takes into account the time-varying adjustment of dividends for all available companies in both Finland and Sweden. However, in some cases, closing prices are used instead.

[9] The Finnish OMXH CAP index is based on all listed shares on the Helsinki Stock Exchange. Unlike the Finnish OMXH index, market values of constituent firms are capped at a maximum of 10% of the total market value of the index. If one company's share dominates due to large weights in the index (e.g., Nokia accounted for 70% of the total market value of HEX in the last quarter of 2000), it is likely to over-represent that particular sector or industry and skew the index performance. Hence, OMXH CAP reflects the general performance of the Finnish stock market more appropriately than the OMXH.

[10] For Sweden, the series Sweden–DS total return index is selected, which is calculated by DataStream to reflect the total value-weighted return of the Swedish stock market, as non-availability of a comparable alternative.

[11] MSCI World Index is Morgan Stanly World Index expressed in SDR – Special Drawing Rights, which is basket of currencies.

[12] GICS codes were developed by MSCI and Standard & Poor's in 1999 to provide reliable, complete, and standard industry classification system for global sectors and industries. It is used in the OMXH and OMXH CAP (Helsinki Stock Exchange) as well as the OMXS (Stockholm Stock Exchange).

[13] With regards to GICS specification, the selected firms in Materials sector are same as in material industry specification; Industrial sector consists of firms in Capital Goods, Commercial Services & Supplies, and Transportation industries; Information Technology sector includes firms in Software & Services and Technology Hardware & Equipment industries. Data source is Thomson Financials Database for the selected period.

[14] The selected firms in Consumer Discretionary sector consist of Automobile & Components, Consumer Durables & Apparels, Media, Retailing, etc. industries. Consumer Staples sector includes Food & Staples Retailing and Food Beverage & Tobacco industries. And Financials sector comprise of firms classified as Banks, Diversified Financials, Real Estate industries. These industries are grouped in sectors as per GICS classification.