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

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Abstract

This study empirically analyzes the impact of exchange rates on cross-country sectors portfolios using the quantile regression approach. The parts of the return distribution in which the investor and risk managers are interested, such as extreme outcomes in the tails, which go beyond the mean values, quantile regression approach is quite useful. There is greater impact of exchange rate, Swedish excess return portfolios, and global market index return in the post euro for the Finnish sector portfolios. The summary of quantiles results with respect to least squares estimation, we find that the quantiles results are more robust.

JEL: F15, F31, F36

Keywords: Quantile Regression, Least Absolute Deviation, Currency Shocks, Sector Portfolios, Pre-and Post-Euro

1. Introduction

This study focuses on the connection between exposure to exchange rate risk shocks and cross-border sector portfolios of Finland and Sweden stock markets using quantile regression approach. Finland and Sweden are two closely located countries both with open economies, similar industry structures, a good bulk of cross-country trade and with an increasing number of cross-country company mergers. However, the two countries use different reference currencies. There are only a few studies investigating how the exposure is associated with cross-country industry competitiveness and the empirical results reported 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 determined whether the returns on similar industries across borders can be economically affected by corresponding bilateral exchange rates shocks. Traded industries were identified as those producing internationally traded goods whereas non-traded industries are domestically oriented.

The main analysis in the Griffin and Stulz (2001) study is based on a regression of Japanese industry excess returns on the changes in exchange rate, U.S. industry excess returns, and non-linear interaction variables. They conclude that common shocks across industries are more important than competitive shocks in exchange rates. Both industry and exchange rate shocks are more important for industries that produce internationally traded goods. However, the importance of these shocks is economically small for all the industries. They found that weekly exchange rate shocks explain almost nothing of the relative performance of the industries. Likewise, based on forex exposure analyses of German investors within European countries, De Santis, Gerard, and Hillion (2003) inferred that currency risks within Europe would have little economic impact (see also 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. By contrast, 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. Their empirical evidence confirmed that, as substitutability increased, keeping market share fixed, pass-through declined and exchanger rate exposure increased. Additionally, 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 over time 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.

A recent study by Gulati, Knif and Kolari (2010) about exchange rate shocks and firms competitiveness in small open economies tested the competitive hypothesis of a cross-country industry analysis on Finland and Sweden stock markets. Their result showed a statistically significant exchange rate exposure in the post-euro period for almost all the Finnish sector and industry portfolios. On the other hand, in the pre-euro period there is some empirical evidence of excess exchange rate risk exposure associated with Finnish Markka/Swedish Krona exchange rate shocks. This indicates that the Finnish equity market was to some degree homogeneous with respect to exchange rate shocks in the pre-euro period. For the post-euro period the exposure is more sector and industry dependent. The results clearly indicate a positive correlation between excess industry returns across border, and even more so in the post-euro period. Their study follows Griffin and Stulz (2001), whereby modeling with ordinary least square and accounting for the variances of the regression residuals in equations. And for this purpose, an EGARCH (1, 1) process is used, which takes into account autocorrelation, heteroscedasticity, and asymmetry in volatility.

However, with regards to risk assessment, the parts of the return distribution in which the investor and risk managers are interested, such as extreme outcomes in the tails, which go beyond the mean values. In this regard, as we know the majority of regression models are concerned with analyzing the conditional mean of a dependent variable, there are methods of modeling other aspects of the conditional distribution. In other words, this return distribution may not be well estimated with least square methods. Hence, Quantile regression seems to be more effective analysis than least square, when it comes to analyzing the extremes of a distribution. The behavior of tails of a distribution is more efficiently described by quantile regression.

Originally anticipated by Koenker and Bassett (1978) quantile regression provides estimates of the linear relationship between repressors and a specified quantile of the dependent variable. In this regard, least absolute deviation (LAD) is a special case of quantile regression, which corresponds to fitting the conditional median of the response variable. The main benefit is that quantile regression permits a more complete description of the conditional distribution than conditional mean analysis. It allows us to describe how the median or any other percentile of the response variable is affected by regressor variable. Moreover, quantile regression approach does not require strong distributional assumptions, if offers a robust method of modeling these relationships. In this paper, we analyze the expected excess return distribution of six sector portfolios, which are formed by the weighted log-returns of 71 Finnish and 87 Swedish firm's stocks, using quantile regression.

This paper is organized as follows: section 2 provides the literature review regarding exchange rate exposure. Section 3 reviews literature on quantile regressions and its implementation in previous studies. Section 4 presents and discusses the quantile regression methods used in this study. Section 5 is a data section. In section 6, we report the results of our empirical analysis. Finally, Section 7 concludes the study.

2. Literature Review

Jorion (1990) investigated the exchange rate exposure of U.S. multinationals to foreign currency risk and discovered 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 it to be of significance. Their result is robust indicating 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, with respect to movements in the foreign value of the yen, using unconditional and conditional testing procedures. Their results identify a reliable 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 is the application of a portfolio approach to investigate the economic importance of exposure. In contrast to previous literature, their empirical evidence shows that exchange rate movements can have an economically significant impact on firm value. Dominguez and Tesar (2006), in their study regarding the relationship between exchange rate movements and firm value, acknowledge that firms dynamically adjust their behavior in response to exchange rate risk. They found that the exposure is 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 presage 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.

Likewise, Entorf, Moebert and Sonderhof (2007) examined the foreign exchange rate exposure of nations following 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, indicating 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 to the exchange rate change of large firms in the UK, France and Germany. They uncovered that the exchange rate sensitivity is considerably stronger and firms typically gain value when their local currency depreciates against the US dollar. However, quite many UK companies lose value 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 argue that countries with a similar industrial structure will be affected in a similar way by sector-specific asymmetrical disturbances. The authors provide details about Finland and Sweden, displaying strong interdependence in regard to monetary policy and industrial structure. Overall, 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[1].

3. Quantile Regression Literature

Koenker and Bassett (1978) argued that the conventional least squares estimator may be seriously deficient in linear models with non-Gaussian errors. The authors showed the estimator which minimizes the sum of absolute residuals as a special case. They suggest 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 introduce a new class of statistics for the linear model which they have 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.

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 show that it can be adapted to a wide variety of inference problems involving the quantile regression process. In particular, the authors suggested new tests of the location shift and location-scale shift models as they are convenient abstractions for many statistical purposes. They suggest that there should be greater willingness to explore more flexible models for covariate effects in a wide variety of econometric models.

Quantile regression models have been applied in various areas. For instance, Buchinsky (1998) studied the dynamics of change in the female wage distribution in the USA using the quantile regression approach. The author examined the female wage structure focusing on changes at different

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[1] In a comprehensive survey, Baldwin (2006) found that the effect is likely to lie somewhere between 5 percent and 15 percent with 9 percent being the best estimate of increase in trading. With the same impetus, Badinger and Breuss (2007) further investigated trade gains to determine whether it is asymmetrically distributed among euro nations with respect to their size. Their results reveal strong evidence of gain in favor of small nations. Bris, Koskinen and Nilsson (2006) examined the effect of the adoption of the euro as the common currency on corporate investment rates. Using data from 16 European countries, including the euro members, one of their results exhibits that the euro has increased investments for firms from countries that previously had weak currencies.

points in the wage distribution. Using quantile regression the author showed that while the most significant changes for the less skilled women took place at the bottom of the wage distribution, for the more skilled groups changes occurred at both ends of the distribution. Also in another study Buchinsky (1998), provides a guideline for the practical use of the semi-parametric technique of quantile regression, concentrating on cross-section applications. It summarizes the most important issues in quantile regression applications. The study present several alternative estimators for the covariance matrix of the quantile regression estimates; reviews the results for a sequence of quantile regression estimates; and discusses testing procedures for homoskedasticity and symmetry of the error distribution. The various results in the literature are incorporated into the generalized methods of moments (GMM) framework. The paper concludes with an extension to the censored quantile regression model.

Barnes and Hughes (2002) in their study of quantile regression analysis of the cross section of stock market returns modeled returns and tested whether the conditional CAPM holds at other points of the distribution by utilizing the technique of quantile regression. This method allows modeling the performance of firms or portfolios that underperform or over perform in the sense that the conditional mean under- or over predicts the firm's return. In their study, they discover that size is significant and positive for firms in the bottom 50% of conditional returns (that is, for firms who receive negative idiosyncratic shocks or bad news of varying magnitude), and significant and negative for the top 25% of over performing (or good news) firms. This provides new empirical support for Merton's (1987) prediction that size and returns are positively related and is in contrast to many of the empirical findings reported in the literature. In their paper, they establish that the quantile regression method is a statistically viable and appropriate way of analyzing the cross section of returns. A more profound implication is that further theoretical exploration of why such risk factors should be priced differently, depending on firm size and whether the firm received good, bad or indifferent news during the sample period.

Moreover, a study by Allen, Singh, and Powell (2009) used quantile regression to explore the relationship between set of returns of the 30 Dow Jones Index stocks and the three factor model (featuring inference about conditional quantile functions). Their study empirically examined the behavior of the three risk factors from Fama-French. In other words, they tested three factor models of stock returns, beyond the mean of the distribution, by using quantile regressions and a US data. They show that the factor models do not necessarily follow a linear relationship. Furthermore, they find that the traditional method of OLS becomes less effective when it comes to analyzing the extremes within a distribution, which is often of key interest to investors and risk managers. Their results reveal large and sometimes significant differences between returns and these three factors both across quantiles and through time.

4. Empirical Methodology

The quantile regression methodology has been applied in order to analyze the sector portfolios in small-open economies. The usage of quantile regression analysis offer much richer, more focused view of the applications than could be achieved by conditional mean models. In particular, it provides a way to explore sources of heterogeneity in the response that are associated 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, in Quantile regressions analyses study by Barnes and Hughes (2002), the authors 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. As 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, other conditional quantile functions are estimated by minimizing an asymmetrically weighted sum of absolute errors, where the weights are functions of the quantile of interest.

In Quantile regression results is 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

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

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

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

Shocks to exchange rates are measured as log-returns of one currency relative to the other currency. If X_t is the exchange rate at time *t* in terms of the number of Swedish krona per Finnish markka, then the log-return on the currency, r_t^{FX}, is computed as:

$$r_t^{FX} = ln(X_t \ /X_{t-1})$$

Hence, 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:

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

In our case, the quantile equation is:

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

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

Excess returns over the market has been used in the following equations[2]

Equation: 2

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

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

The robust LAD regression minimizes the sum of absolute residuals

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

Quantile Regression for equation 2 with LAD.

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

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

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:

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

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

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

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

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

5. Data

The data consists of four different sets of weekly returns: (1) stock market total return indexes (TRI[3]) for individual firms in Finland and Sweden, (2) aggregate stock market total index returns in both Finland and Sweden (i.e., the OMX Helsinki Cap index denoted OMXH CAP[4] and OMX Stockholm index denoted OMXS[5], 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 series, which is taken as a control variable proxy of global market integration.

The exchange rate series is converted to bilateral FIM/SEK exchange rates. Global Industrial Classification Standard (GICS) codes are employed to classify various stocks into sectors.[6] All in all, six sector portfolios are formed with regards to GICS. Data was available for the following six sectors: materials, industrials, consumer discretionary, consumer staples, financials, and information technology. Firms' market capitalizations are used to compute weighted log-returns for different sector portfolios for both Finnish and Swedish stock markets. The selected sector portfolios consist of 71 Finnish and 87 Swedish companies. 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.

6. Empirical Analysis

The empirical results are presented for four main quantile regression equations, which have been previously discussed in the methodology. The quantile equation 1 takes into consideration the overall impact of exchange rate (bilateral FIN/SEK) and global markets on the Finnish stock market (OMXH

[3] The total return index (TRI) data 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, due to the unavailability of TRI series, the company closing price index was used.

[4] The Finnish OMXH CAP index is based on al 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 better reflects the general performance of the Finnish stock market than the OMXH. Furthermore, the Finnish and Swedish stock market, which is known as NASDAQ OMX Group as on May 25, 2007 NASDAQ agreed to buy the Swedish-Finnish financial company OMX. The final deal was completed on February 27, 2008. However, in our study, Finnish stock market has been referred as OMXH and OMXH CAP and Swedish market is referred as OMXS.

[5] 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. No other market portfolio series are available for the selected time period.

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

CAP index). In equation 2, we provide quantile regression of the exchange rates and the global market index with regards to Finnish sector over the market excess return. 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, though with exchange rate and the absolute value of Swedish sector's excess return. Details of all these quantile regression equations have been discussed previously in the methodology section.

[Insert Table 1]

In Table 1, Quantile regression of OMXH CAP Finnish market index returns has been regressed on exchange rate shocks and world market index. In the pre- and post-euro period, the exchange rate and the global market index exhibit a negative and statistically significant exposure, at all levels of tau in the quantile regression, on the Finnish stock market. In other words, the stock market of Finland is clearly being affected by the exchange rate shocks and global market integration. Moreover, detailed graph of quantile regression process with various quantiles (tau values) are presented in Appendix A.

[Insert Table 2]

In Table 2, the Quantile regression of Finnish materials sector excess returns has been regressed on exchange rate shocks for both pre- and post-euro period. The Quantile results, 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 happened in the post-euro period.

Moreover, equation 3 and 4, which takes into account the Swedish market index, exhibit Swedish and Finnish stock market to be positively and highly correlated for the materials sector. In fact, they are statistically and positively integrated in 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 were only statistically significant in the pre-euro period, which is similar to equation 1 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)

[Insert Table 3]

In Table 3, 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).

[Insert Table 4]

In Table 4, 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).

[Insert Table 5]

In Table 5, 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 sector excess return coefficient $\hat{d}$ is positive and significant for all the quantiles both in pre- and post- euro 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).

[Insert Table 6]

In Table 6, 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).

[Insert Table 7]

In Table 7, 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, hence, quantile regression presents better estimates. The values of 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 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).

7. Conclusion

Our results indicate the overall negative and significant exchange rate exposure, at all levels quantiles, on the Finnish stock market index (OMXH CAP). Additionally, the world market index variable is also highly significant and positively affecting the overall 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.

In the results of 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, the exchange rate coefficient, in the pre-euro period, is significant for three out of six sectors, i.e. materials (almost all quantiles), consumer discretionary (lower quantiles), and financials (lower quantiles) sectors. On the other hand, in the post-euro period, industrials (lower quantiles), consumer staples (three quantiles), financials sectors (upper quantiles). 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). All in all, there is significant Finnish and Swedish sector integration in the post-euro period.

Moreover, for almost all the sectors in pre-euro period, the global market index is not significant (except for few quantiles) indicating lower 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).
With regards to interactive terms only consumer discretionary (majority of quantiles) and information technology sectors (upper quantiles) show significant impact, in the 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. Also comparing to the summary of quantiles results with respect to least squares estimation, it has been found that quantiles results are more robust.

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Table 1. 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:

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

LAD regression that minimizes the sum of absolute residuals is

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

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

Quantiles	Selected Equations	$\hat{a}$ 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
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
	(3)	-0.0241***	(-13.00)	-0.0643	(-0.45)			0.2433***	(5.74)	-0.0376	(-0.31)					0.1042
	(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
$\theta = 0.20$	(2)	-0.0170***	(-9.02)	-0.1302	(-0.80)					-0.0503	(-0.43)					-0.0022
	(3)	-0.0157***	(-9.55)	-0.1476	(-1.00)			0.3123***	(5.23)	0.0471	(0.44)					0.0871
	(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
$\theta = 0.30$	(2)	-0.0108***	(-6.82)	-0.1385	(-1.02)					-0.1168	(-1.23)					-0.0010
	(3)	-0.0091***	(-5.66)	-0.2608*	(-1.64)			0.2561***	(4.62)	0.0124	(0.20)					0.0821
	(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
$\theta = 0.40$	(2)	-0.0061***	(-3.95)	-0.1808	(-1.30)					-0.0554	(-0.60)					0.0051
	(3)	-0.0050***	(-3.41)	-0.3812**	(-2.70)			0.2603***	(5.44)	-0.0332	(-0.51)					0.0860
	(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
$\theta = 0.50$	(2)	-0.0030*	(-1.95)	-0.2101	(-1.42)					-0.0184	(-0.20)					0.0002
	(3)	-0.0008	(-0.60)	-0.3280**	(-2.26)			0.2456***	(5.23)	-0.0358	(-0.60)					0.0910
	(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
$\theta = 0.60$	(2)	0.0031**	(2.01)	-0.0968	(-0.60)					-0.0537	(-0.60)					-0.0036
	(3)	0.0032**	(2.30)	-0.3717**	(-2.60)			0.2660***	(5.55)	-0.0842	(-1.51)					0.0943
	(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
$\theta = 0.70$	(2)	0.0088***	(4.70)	-0.3025	(-1.53)					-0.0835	(-0.84)					0.0061
	(3)	0.0072***	(5.20)	-0.2950**	(-2.15)			0.2440***	(4.90)	-0.1338***	(-3.50)					0.0958
	(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
$\theta = 0.80$	(2)	0.0145***	(8.00)	-0.3376*	(-1.71)					-0.1603***	(3.76)					0.0128
	(3)	0.0121***	(8.21)	-0.2762*	(-1.91)			0.2564***	(4.85)	-0.0995**	(-2.22)					0.0923
	(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
$\theta = 0.90$	(2)	0.0256***	(8.24)	-0.3160	(-0.80)					-0.2601*	(-1.90)					0.0151
	(3)	0.2714***	(3.05)	-0.4047	(-1.50)			0.2714***	(3.05)	-0.0337	(-0.54)					0.0735
	(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	(2)	-0.0011	(-0.86)	-0.2288	(-1.64)					-0.0537	(-0.82)					0.0046
	(3)	-0.0005	(-0.42)	-0.3127**	(-2.45)			0.2610***	(7.33)	-0.0412	(-0.70)					0.1741
	(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

Table 2 Cont… Quantile Regression of Finnish *Materials Sector* Excess Return

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0347***	(-19.62)	0.1710	(1.10)			0.511***	(11.51)	0.4036***	(5.70)					0.2100
	(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
$\theta = 0.20$	(2)	-0.0216***	(-15.21)	0.0707	(0.53)					0.2093***	(5.40)					0.0268
	(3)	-0.0241***	(-13.92)	0.0580	(0.30)			0.4778***	(7.95)	0.3838***	(4.53)					0.1410
	(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
$\theta = 0.30$	(2)	-0.0158***	(-11.40)	0.1487	(1.13)					0.2335***	(5.40)					0.0172
	(3)	-0.0147***	(-9.84)	0.0008	(0.01)			0.4453***	(6.06)	0.3120***	(5.66)					0.1127
	(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
$\theta = 0.40$	(2)	-0.0087***	(-6.51)	0.1414	(0.91)					0.1990***	(2.80)					0.0085
	(3)	-0.0080***	(-5.80)	-0.0040	(-0.03)			0.4476***	(7.40)	0.3082***	(6.30)					0.1084
	(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
$\theta = 0.50$	(2)	-0.0025*	(-1.80)	0.0392	(0.20)					0.1672*	(1.80)					0.0063
	(3)	-0.0023*	(1.72)	0.0502	(0.34)			0.4394***	(8.72)	0.3313***	(6.30)					0.3016
	(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
$\theta = 0.60$	(2)	0.0024	(1.63)	0.0086	(0.04)					0.1965*	(1.91)					0.0060
	(3)	0.0040***	(2.80)	0.0452	(0.25)			0.4140***	(8.90)	0.2967***	(3.26)					0.1186
	(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
$\theta = 0.70$	(2)	0.0121***	(7.25)	0.1495	(0.60)					0.1751*	(1.80)					0.0050
	(3)	0.0107***	(6.70)	0.0737	(0.41)			0.4597***	(8.40)	0.2900**	(2.40)					0.1280
	(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
$\theta = 0.80$	(2)	0.0206***	(11.60)	0.2371	(0.91)					0.2150**	(2.22)					0.0093
	(3)	0.0213***	(10.03)	-0.2743	(-0.85)			0.5564***	(9.40)	0.3460**	(2.50)					0.1407
	(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
$\theta = 0.90$	(2)	0.0390***	(10.16)	0.1521	(0.26)					0.2450**	(2.50)					0.0114
	(3)	0.0327***	(16.70)	-0.2728	(-0.95)			0.5992***	(12.10)	0.4015***	(5.33)					0.2070
	(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	(2)	-0.0008	(-0.60)	0.0793	(0.50)					0.2334***	(4.06)					0.0271
	(3)	-0.0013	(-1.13)	-0.0431	(-0.31)			0.4950***	(14.62)	0.3393***	(6.90)					0.3016
	(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:

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

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

Quantile Regression for equation 2 with LAD.

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

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

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

Quantile Regression for equation 3 with LAD.

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

Equation: 4

Quantile Regression for equation 4 with LAD:

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

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

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

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

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

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0192***	(-10.45)	0.1637	(1.15)			-0.0003	(-0.00)	-0.0850	(-0.84)					0.0010
	(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
$\theta = 0.20$	(2)	-0.0114	(0.00)	0.1766	(1.56)					-0.1131	(-1.50)					0.0102
	(3)	-0.0117***	(-8.12)	0.1830	(1.60)			0.0286	(0.82)	-0.1076	(-1.36)					0.0087
	(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
$\theta = 0.30$	(2)	-0.0080***	(-5.86)	0.1081	(0.84)					-0.1698***	(-4.31)					0.0074
	(3)	-0.0080***	(-5.90)	0.0878	(0.70)			0.0081	(0.22)	-0.1583***	(-3.90)					0.0040
	(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
$\theta = 0.40$	(2)	-0.0033**	(-2.50)	0.1951	(1.22)					-0.1188**	(-2.25)					0.0054
	(3)	-0.0032**	(-2.40)	0.1935	(1.20)			0.01504	(0.34)	-0.1128**	(-2.10)					0.0020
	(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
$\theta = 0.50$	(2)	0.0017	(1.30)	0.2261	(1.21)					-0.1154**	(-2.20)					0.0030
	(3)	0.0016	(1.21)	0.2028	(1.11)			0.0688	(1.30)	-0.1086**	(-2.04)					0.0050
	(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
$\theta = 0.60$	(2)	0.0053***	(4.10)	0.2215	(1.16)					-0.0518	(-0.80)					-0.0016
	(3)	0.0053***	(4.10)	0.2010	(1.10)			0.0693	(1.50)	-0.0650	(-1.14)					0.0040
	(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
$\theta = 0.70$	(2)	0.0093***	(7.10)	0.2304	(1.27)					-0.0678	(-1.24)					0.0051
	(3)	0.0084***	(6.70)	0.3020*	(1.81)			0.0771*	(1.85)	-0.0646	(-1.22)					0.0112
	(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
$\theta = 0.80$	(2)	0.0140***	(9.34)	0.3903**	(2.42)					-0.0386	(-0.71)					0.0081
	(3)	0.0140***	(9.30)	0.3794**	(2.32)			0.0696	(1.54)	-0.0315	(-0.60)					0.0121
	(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
$\theta = 0.90$	(2)	0.0216***	(10.16)	0.3947*	(1.96)					0.0093	(0.24)					0.0050
	(3)	0.0245***	(9.36)	0.2705	(1.14)			0.2460***	(2.82)	0.0438	(1.08)					0.0403
	(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	(2)	0.0017	(1.25)	0.2290	(1.64)					-0.0588	(-0.90)					0.0067
	(3)	0.0015	(1.11)	0.2340*	(1.70)			0.0884**	(2.11)	-0.0420	(-0.64)					0.0208
	(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

Table 3 Cont… Quantile Regression of Finnish *Industrials Sector* Excess Returns

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0275***	(-13.76)	0.6697***	(6.14)			0.1532***	(5.04)	-0.3270***	(-9.41)					0.1322
	(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
$\theta = 0.20$	(2)	-0.0161***	(-12.01)	0.5448***	(3.31)					-0.3032***	(-7.50)					0.0940
	(3)	-0.0161***	(-11.61)	0.5511***	(3.25)			0.0603	(1.46)	-0.2770***	(-4.90)					0.0960
	(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
$\theta = 0.30$	(2)	-0.0088***	(-7.65)	0.3320**	(2.42)					-0.3213***	(-6.01)					0.0831
	(3)	-0.0084***	(-8.12)	0.3497***	(3.16)			0.0838**	(2.51)	-0.3041***	(-9.00)					0.0901
	(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
$\theta = 0.40$	(2)	-0.0040***	(-4.21)	0.2265*	(1.90)					-0.3530***	(-10.12)					0.0805
	(3)	-0.0041***	(-4.40)	0.2693**	(2.60)			0.0903**	(2.60)	-0.3060***	(-7.40)					0.0881
	(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
$\theta = 0.50$	(2)	0.0006	(0.70)	0.2483**	(2.05)					-0.3322***	(-8.26)					0.0850
	(3)	-0.0005	(-0.54)	0.2501**	(2.20)			0.0830**	(2.20)	-0.2860***	(-6.20)					0.0872
	(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
$\theta = 0.60$	(2)	0.0040***	(4.40)	0.3450***	(2.93)					-0.3356***	(-7.90)					0.0901
	(3)	0.0040***	(4.12)	0.3307**	(2.40)			0.0351	(0.72)	-0.3471***	(-4.14)					0.0883
	(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
$\theta = 0.70$	(2)	0.0094***	(8.83)	0.1476	(0.90)					-0.4076***	(-5.02)					0.0960
	(3)	0.0091***	(8.50)	0.1178	(0.76)			0.0182	(0.41)	-0.4040***	(-5.21)					0.0947
	(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
$\theta = 0.80$	(2)	0.0148***	(11.31)	0.1150	(0.65)					-0.3503***	(-3.84)					0.1110
	(3)	0.0148***	(11.20)	0.1062	(0.55)			0.0093	(0.20)	-0.3476***	(-3.80)					0.0982
	(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
$\theta = 0.90$	(2)	0.0263***	(14.11)	0.2205	(1.01)					-0.3452***	(-4.55)					0.1010
	(3)	0.0257***	(13.84)	0.1768	(0.85)			0.0548	(0.83)	-0.3278***	(-4.60)					0.1040
	(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	(2)	-0.0001	(-0.13)	0.4142***	(3.80)					-0.3262***	(-8.36)					0.1730
	(3)	-0.0001	(-0.15)	0.3975***	(3.62)			0.0688**	(2.22)	-0.3097***	(-7.83)					0.1790
	(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:

Equation: 2

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

The robust LAD regression minimizes the sum of absolute residuals

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

Quantile Regression for equation 2 with LAD.

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

Equation: 3

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

The robust LAD regression minimizes the sum of absolute residuals

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

Quantile Regression for equation 3 with LAD.

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

Equation: 4

Quantile Regression for equation 4 with LAD:

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

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

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

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

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

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0354***	(-8.52)	0.7112**	(2.50)			-0.1374	(-1.13)	0.0584	(0.23)					0.0212
	(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
$\theta = 0.20$	(2)	-0.0194***	(-8.01)	0.5554**	(2.14)					-0.0846	(-1.02)					0.0080
	(3)	-0.0190***	(-7.83)	0.5356**	(2.06)			-0.0496	(-0.81)	-0.0845	(-1.02)					0.0050
	(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
$\theta = 0.30$	(2)	-0.0124***	(-5.75)	0.4780**	(2.30)					-0.0415	(-0.52)					0.0113
	(3)	-0.0123***	(-5.72)	0.4851**	(2.20)			-0.0343	(-0.51)	-0.0420	(-0.51)					0.0110
	(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
$\theta = 0.40$	(2)	-0.0054***	(-2.65)	0.4740**	(2.44)					-0.0022	(-0.03)					0.0010
	(3)	-0.0054***	(-2.66)	0.4740**	(2.32)			0.0008	(0.10)	-0.0013	(-0.02)					0.0060
	(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
$\theta = 0.50$	(2)	0.0015	(0.70)	0.3935*	(1.91)					-0.0461	(-0.45)					0.0032
	(3)	0.0012	(0.60)	0.4280**	(2.06)			0.0599	(0.63)	-0.0482	(-0.46)					0.0012
	(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
$\theta = 0.60$	(2)	0.0067***	(2.70)	0.2998	(1.31)					-0.0518	(-0.35)					-0.0022
	(3)	0.0066***	(2.66)	0.2940	(1.30)			0.1176	(1.20)	-0.0585	(-0.42)					-0.0031
	(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
$\theta = 0.70$	(2)	0.0147***	(5.60)	-0.0526	(-0.21)					-0.1091	(-0.75)					-0.0054
	(3)	0.0137***	(5.40)	0.1561	(0.62)			0.1051	(1.01)	-0.1463	(-1.13)					-0.0050
	(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
$\theta = 0.80$	(2)	0.0290***	(7.75)	0.4170	(1.01)					-0.3620**	(-2.53)					0.0150
	(3)	0.0283***	(7.45)	0.3513	(0.76)			0.0291	(0.30)	-0.3684**	(-2.60)					0.0123
	(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
$\theta = 0.90$	(2)	0.0446***	(10.30)	-0.0991	(-0.20)					-0.4672***	(-2.90)					0.0152
	(3)	0.4622***	(10.35)	0.4580	(0.72)			0.1272*	(1.66)	-0.4897***	(-3.60)					0.0164
	(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	(2)	0.0034	(1.45)	0.5225**	(2.13)					-0.1332	(-1.16)					0.0164
	(3)	0.0033	(1.40)	0.5228**	(2.13)			0.0197	(0.30)	-0.1311	(-1.14)					0.0128
	(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

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

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0323***	(-18.20)	0.6192***	(3.71)			0.0567***	(2.81)	-0.2960***	(-4.54)					0.0570
	(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
$\theta = 0.20$	(2)	-0.0218***	(-12.60)	0.3968*	(1.82)					-0.3397***	(-8.23)					0.0340
	(3)	-0.0222***	(-12.20)	0.4210**	(2.05)			0.0262	(0.55)	-0.3243***	(-6.72)					0.0330
	(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
$\theta = 0.30$	(2)	-0.0128***	(-8.16)	0.2747	(1.32)					0.0626	(0.80)					0.0011
	(3)	-0.0128***	(-8.04)	0.1310	(0.55)			0.0135	(0.20)	-0.2808***	(-4.60)					0.0238
	(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
$\theta = 0.40$	(2)	-0.0053***	(-3.01)	0.0878	(0.50)					-0.2544***	(-5.86)					0.0213
	(3)	-0.0052***	(-3.90)	0.0853	(0.50)			0.0142	(0.20)	-0.2441***	(-4.73)					0.0197
	(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
$\theta = 0.50$	(2)	0.0002	(0.20)	-0.0468	(-0.32)					-0.2284***	(-5.60)					0.0268
	(3)	0.0004	(0.30)	-0.0441	(0.31)			0.0375	(0.53)	-0.2153***	(-4.53)					0.0263
	(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
$\theta = 0.60$	(2)	0.0054***	(4.40)	-0.0657	(-0.45)					-0.2341***	(-5.51)					0.0286
	(3)	0.0054***	(4.40)	-0.0844	(-0.60)			0.0346	(0.50)	-0.2243***	(-4.66)					0.0280
	(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
$\theta = 0.70$	(2)	0.0102***	(7.95)	-0.0270	(-0.20)					-0.1945***	(-5.34)					0.0270
	(3)	0.0108***	(8.16)	0.0342	(0.21)			0.0566	(1.03)	-0.1731***	(-3.65)					0.0280
	(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
$\theta = 0.80$	(2)	0.0195***	(10.80)	0.0234	(0.10)					-0.2448*	(-1.90)					0.0233
	(3)	0.0196***	(11.24)	-0.0508	(-0.20)			0.0616	(1.40)	-0.2167	(-1.63)					0.0246
	(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
$\theta = 0.90$	(2)	0.0331***	(14.46)	-0.0566	(-0.26)					-0.3490***	(-3.10)					0.0340
	(3)	0.0331***	(13.81)	-0.0044	(-0.02)			0.0502	(0.80)	-0.2926*	(-1.90)					0.0327
	(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	(2)	2.24E-05	(0.02)	0.1120	(0.80)					-0.2491***	(-5.02)					0.0515
	(3)	-6.79E-06	(-0.01)	0.0987	(0.71)			0.0650**	(2.01)	-0.2376***	(-4.80)					0.0568
	(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:

Equation: 2

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

The robust LAD regression minimizes the sum of absolute residuals

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

Quantile Regression for equation 2

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

Equation: 3

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

The robust LAD regression minimizes the sum of absolute residuals

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

Quantile Regression for equation 3

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

Equation: 4

Quantile Regression for equation 4

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

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

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

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

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

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0396***	(-11.03)	0.2592	(1.01)			0.1701	(1.43)	0.2187*	(1.76)					0.0201
	(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
$\theta = 0.20$	(2)	-0.0248***	(-7.80)	0.0241	(0.10)					-0.0176	(-0.14)					-0.0074
	(3)	-0.0254***	(-8.07)	0.0435	(0.20)			0.1747***	(15.32)	0.0065	(0.05)					0.0211
	(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
$\theta = 0.30$	(2)	-0.0144***	(-5.16)	0.0780	(0.30)					-0.1652	(-1.30)					-0.0013
	(3)	-0.0151***	(-5.24)	-0.0185	(-0.10)			0.1691***	(12.52)	-0.1368	(-1.00)					0.0233
	(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
$\theta = 0.40$	(2)	-0.0056**	(-2.20)	0.0535	(0.20)					-0.2510*	(-1.85)					0.0026
	(3)	-0.0057**	(-2.23)	0.0994	(0.34)			0.1624***	(10.27)	-0.2498*	(-1.93)					0.0301
	(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
$\theta = 0.50$	(2)	0.0020	(0.72)	0.0435	(0.15)					-0.0821	(-0.50)					-0.0042
	(3)	0.0015	(0.60)	0.0591	(0.20)			0.1550***	(9.20)	-0.1826	(-1.33)					0.0231
	(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
$\theta = 0.60$	(2)	0.0065**	(2.60)	0.1608	(0.53)					-0.0518	(-0.30)					-0.0060
	(3)	0.0074***	(2.96)	0.0663	(0.22)			0.1490***	(9.43)	-0.0976	(-0.60)					0.0305
	(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
$\theta = 0.70$	(2)	0.0171***	(6.23)	0.2431	(0.73)					-0.1940	(-1.02)					0.0026
	(3)	0.0163***	(6.33)	0.0540	(0.20)			0.1412***	(9.90)	-0.1683	(-0.95)					0.0394
	(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
$\theta = 0.80$	(2)	0.0281***	(8.05)	0.3770	(1.05)					-0.3333	(-1.60)					0.0012
	(3)	0.0262***	(8.32)	0.0755	(0.21)			0.1328***	(11.35)	-0.2621	(-1.24)					0.0486
	(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
$\theta = 0.90$	(2)	0.0453***	(8.36)	0.8005*	(1.81)					-0.3873	(-0.72)					0.0060
	(3)	0.0420***	(8.50)	0.8944**	(2.56)			0.1280***	(13.75)	-0.4408	(-1.32)					0.0815
	(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	(2)	0.0014	(0.53)	0.2851	(1.01)					-0.0120	(-0.10)					-0.0037
	(3)	0.0011	(0.42)	0.2893	(1.10)			0.1600***	(4.70)	-0.0073	(-0.06)					0.0723
	(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

Table 5 Cont… Quantile Regression of Finnish *Consumer Staples Sector*

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0408***	(-12.98)	0.5004	(1.50)			0.1380*	(1.85)	-0.2526**	(-2.40)					0.0503
	(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
$\theta = 0.20$	(2)	-0.0236***	(-12.08)	0.2891	(1.24)					-0.2753**	(-2.65)					0.0193
	(3)	-0.0233***	(-11.21)	0.2487	(0.96)			0.1657***	(2.66)	-0.2243*	(-1.80)					0.0294
	(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
$\theta = 0.30$	(2)	-0.0137***	(-7.91)	0.5054**	(2.20)					-0.4186***	(-5.83)					0.0307
	(3)	-0.0128***	(-7.73)	0.3761	(1.61)			0.1710***	(2.74)	-0.2141*	(-1.70)					0.0448
	(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
$\theta = 0.40$	(2)	-0.0054***	(-3.40)	0.2534	(1.07)					-0.4176***	(-7.80)					0.0456
	(3)	-0.0054***	(-3.70)	0.0757	(0.36)			0.2443***	(4.20)	-0.1480	(-1.51)					0.0620
	(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
$\theta = 0.50$	(2)	0.0005	(0.32)	0.1008	(0.50)					-0.3862***	(-7.80)					0.0510
	(3)	0.0006	(0.42)	-0.0914	(-0.51)			0.1090***	(3.30)	-0.2636***	(-3.46)					0.0684
	(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
$\theta = 0.60$	(2)	0.0072***	(5.20)	0.0080	(0.04)					-0.4192***	(-5.60)					0.0537
	(3)	0.0063***	(4.67)	0.0110	(0.10)			0.1991***	(3.30)	-0.2770***	(-4.26)					0.0686
	(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
$\theta = 0.70$	(2)	0.0135***	(8.90)	0.1176	(0.56)					-0.4094***	(-4.53)					0.0588
	(3)	0.0141***	(8.51)	0.0240	(0.13)			0.2194***	(2.77)	-0.3200***	(-3.20)					0.0730
	(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
$\theta = 0.80$	(2)	0.0231***	(11.12)	0.2450	(0.96)					-0.4366***	(-3.71)					0.0527
	(3)	0.0220***	(12.42)	0.3716*	(1.73)			0.2887***	(4.40)	-0.2320***	(-3.33)					0.0732
	(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
$\theta = 0.90$	(2)	0.0446***	(11.45)	0.2703	(0.64)					-0.3984***	(-2.90)					0.0412
	(3)	0.0420***	(10.50)	-0.0100	(-0.02)			0.1784**	(2.04)	-0.2305	(-1.50)					0.0480
	(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	(2)	-4.36E-05	(-0.03)	0.3526*	(1.92)					-0.3830***	(-5.90)					0.0817
	(3)	-0.0003	(-0.20)	0.2326	(1.30)			0.1944***	(3.98)	-0.2461***	(-3.37)					0.1062
	(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:

Equation: 2

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

The robust LAD regression minimizes the sum of absolute residuals

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

Quantile Regression for equation 2

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

Equation: 3

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

The robust LAD regression minimizes the sum of absolute residuals

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

Quantile Regression for equation 3

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

Equation: 4

Quantile Regression for equation 4

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

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

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

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

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

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0374***	(-10.70)	-0.2705	(-1.07)			0.2113*	(1.70)	0.0040	(0.02)					0.0185
	(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
$\theta = 0.20$	(2)	-0.0256***	(-9.51)	-0.4617*	(-1.74)					-0.1206	(-0.54)					0.0105
	(3)	-0.0253***	(-9.20)	-0.3315	(-1.12)			0.1474	(1.33)	-0.0190	(-0.10)					0.0145
	(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
$\theta = 0.30$	(2)	-0.0154***	(-6.45)	-0.5921**	(-2.20)					-0.0268	(-0.16)					0.0093
	(3)	-0.0150***	(-6.10)	-0.5050*	(-1.73)			0.1191	(1.24)	-0.0324	(-0.20)					0.0096
	(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
$\theta = 0.40$	(2)	-0.0070***	(-2.83)	-0.5648*	(-1.81)					-0.0040	(-0.02)					0.0066
	(3)	-0.0077***	(-3.02)	-0.5587*	(-1.80)			0.0613	(0.61)	0.0985	(0.52)					0.0040
	(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
$\theta = 0.50$	(2)	-0.0011	(-0.45)	-0.4902	(-1.40)					0.1022	(0.60)					0.0037
	(3)	-0.0014	(-0.60)	-0.5094	(-1.50)			0.0542	(0.53)	0.1070	(0.62)					0.0007
	(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
$\theta = 0.60$	(2)	0.0074***	(2.90)	-0.3286	(-0.91)					0.2040	(1.27)					0.0078
	(3)	0.0078***	(3.10)	-0.4413	(-1.27)			-0.0470	(-0.50)	0.2220	(1.36)					0.0043
	(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
$\theta = 0.70$	(2)	0.0167***	(6.26)	-0.3157	(-1.00)					0.1681	(1.06)					0.0076
	(3)	0.0167***	(6.20)	-0.2708	(-0.85)			0.0195	(0.20)	0.1701	(1.03)					0.0044
	(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
$\theta = 0.80$	(2)	0.0250***	(9.30)	-0.1053	(-0.42)					0.3570**	(2.03)					0.0105
	(3)	0.0270***	(8.60)	0.0922	(0.32)			0.1760	(1.20)	0.2975	(1.50)					0.0152
	(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
$\theta = 0.90$	(2)	0.0408***	(10.90)	0.2385	(0.60)					0.2835	(1.35)					0.0045
	(3)	0.0386***	(13.35)	0.2551	(0.80)			0.3350***	(3.21)	0.5184**	(2.40)					0.0388
	(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	(2)	0.0006	(0.30)	-0.3875*	(-1.91)					0.1146	(1.21)					0.0133
	(3)	0.0004	(0.22)	-0.2923	(-1.40)			0.1291*	(1.80)	0.1262	(1.33)					0.0214
	(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

Table 6 Cont… Quantile Regression of Finnish *Financials Sector*

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0304***	(-13.42)	0.0440	(0.20)			0.2653***	(3.07)	0.1120	(1.10)					0.0186
	(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
$\theta = 0.20$	(2)	-0.0198***	(-11.94)	0.2356	(1.50)					-0.0137	(-0.20)					0.0005
	(3)	-0.0184***	(-12.33)	0.2330	(1.51)			0.2376***	(2.92)	0.0222	(0.26)					0.0267
	(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
$\theta = 0.30$	(2)	-0.0127***	(-9.55)	0.3180*	(1.73)					-0.0777	(-1.12)					0.0070
	(3)	-0.0111***	(-8.16)	0.1483	(0.85)			0.2810***	(3.70)	-0.0247	(-0.34)					0.0344
	(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
$\theta = 0.40$	(2)	-0.0057***	(-4.32)	0.3283	(1.60)					-0.0243	(-0.30)					0.0032
	(3)	-0.0057***	(-4.37)	0.0570	(0.33)			0.3217***	(4.64)	-0.0544	(-0.75)					0.0352
	(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
$\theta = 0.50$	(2)	-0.0002	(-0.12)	0.3167	(1.44)					-0.1140	(-1.30)					0.0022
	(3)	0.0006	(0.42)	0.2152	(1.10)			0.3296***	(4.66)	-0.0963	(-1.34)					0.0442
	(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
$\theta = 0.60$	(2)	0.0067***	(4.70)	0.3820**	(2.04)					-0.1072	(-1.50)					0.0067
	(3)	0.0071***	(5.22)	0.3426	(1.60)			0.3753***	(5.50)	-0.0360	(-0.50)					0.0520
	(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
$\theta = 0.70$	(2)	0.0130***	(8.63)	0.3844**	(2.30)					-0.1316***	(-3.04)					0.0105
	(3)	0.0132***	(9.10)	0.4636**	(2.40)			0.3748***	(5.60)	-0.0696	(-0.80)					0.0620
	(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
$\theta = 0.80$	(2)	0.0225***	(12.36)	0.1554	(0.84)					-0.1330**	(-2.20)					0.0064
	(3)	0.0210***	(12.60)	0.4048**	(2.03)			0.4350***	(5.65)	-0.1565***	(-3.40)					0.0678
	(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
$\theta = 0.90$	(2)	0.0348***	(15.03)	0.1106	(0.55)					-0.0581	(-1.31)					0.0020
	(3)	0.0355***	(14.67)	0.3795***	(3.12)			0.5350***	(13.20)	-0.1321***	(-4.13)					0.0888
	(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	(2)	0.0018	(1.34)	0.1536	(1.01)					-0.0490	(-0.91)					0.0013
	(3)	0.0017	(1.40)	0.1376	(0.96)			0.3784***	(8.05)	-0.0534	(-1.05)					0.1066
	(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:

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

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

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

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

Quantile Regression for equation 3

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

Equation: 4

Quantile Regression for equation 4

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

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

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

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

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

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0362***	(-7.70)	0.3410	(1.10)			0.6560***	(5.10)	-0.0612	(-0.34)					0.0883
	(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
$\theta = 0.20$	(2)	-0.0227***	(-7.34)	0.3034	(0.93)					-0.0415	(-0.30)					-0.0058
	(3)	-0.0182***	(-6.60)	0.0262	(0.10)			0.5345***	(5.30)	-0.1565*	(-1.85)					0.0772
	(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
$\theta = 0.30$	(2)	-0.0110***	(-3.60)	0.1184	(0.40)					-0.0111	(-0.10)					-0.0074
	(3)	-0.0103***	(-3.81)	-0.0785	(-0.30)			0.4748***	(5.07)	-0.0478	(-0.44)					0.0830
	(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
$\theta = 0.40$	(2)	-0.0015	(-0.53)	-0.2527	(-0.82)					0.0877	(0.60)					-0.0041
	(3)	-0.0044	(-1.60)	-0.1420	(-0.50)			0.5237***	(5.04)	0.0417	(0.30)					0.0728
	(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
$\theta = 0.50$	(2)	0.0077***	(2.70)	-0.4444	(-1.52)					0.0806	(0.70)					-0.0012
	(3)	0.0057**	(2.10)	-0.3065	(-1.02)			0.4284***	(4.53)	-0.0002	(-0.00)					0.0610
	(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
$\theta = 0.60$	(2)	0.0143***	(4.90)	-0.3463	(-1.20)					0.0596	(0.53)					0.0017
	(3)	0.0140***	(4.85)	-0.2542	(-0.90)			0.3776***	(3.90)	0.0482	(0.45)					0.0611
	(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
$\theta = 0.70$	(2)	0.0255***	(7.91)	-0.2184	(-0.71)					0.1295	(1.23)					-0.0017
	(3)	0.0246***	(7.83)	-0.3417	(-1.10)			0.4850***	(4.04)	0.1115	(1.14)					0.0680
	(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
$\theta = 0.80$	(2)	0.0392***	(9.60)	-0.0892	(-0.22)					0.2155**	(2.35)					-0.0030
	(3)	0.0348***	(10.52)	-0.2663	(-0.73)			0.5340**	(5.61)	0.1558**	(2.00)					0.0596
	(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
$\theta = 0.90$	(2)	0.0648	(11.30)	0.2320	(0.32)					-0.0667	(-0.30)					-0.0036
	(3)	0.0587***	(9.70)	0.0030	(0.01)			0.5454***	(5.06)	-0.0364	(-0.20)					0.0462
	(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	(2)	0.0080***	(2.85)	0.0126	(0.04)					0.0821	(0.60)					-0.0064
	(3)	0.0070***	(2.70)	-0.0024	(-0.01)			0.5723***	(7.10)	0.0300	(0.24)					0.1517
	(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

Table 7 Cont… Quantile Regression of Finnish *Information Technology Sector*

Quantiles	Selected Equations	$\hat{a}$ 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
	(3)	-0.0515***	(-11.22)	0.3422	(0.54)			0.3570***	(4.90)	0.5738**	(2.02)					0.0806
	(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
$\theta = 0.20$	(2)	-0.0313***	(-13.10)	-0.0230	(-0.10)					0.5655***	(3.42)					0.0368
	(3)	-0.0310***	(-12.30)	0.1532	(0.40)			0.2807***	(4.10)	0.4691***	(2.80)					0.0671
	(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
$\theta = 0.30$	(2)	-0.0194***	(-9.52)	0.0022	(0.01)					0.5217***	(3.73)					0.0344
	(3)	-0.0182***	(-8.80)	0.1883	(0.64)			0.2477***	(3.90)	0.4680***	(3.50)					0.0637
	(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
$\theta = 0.40$	(2)	-0.0097***	(-4.95)	0.0252	(0.10)					0.5485***	(4.11)					0.0357
	(3)	-0.0102***	(-5.03)	0.0643	(0.21)			0.2290***	(3.50)	0.4152***	(3.14)					0.0604
	(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
$\theta = 0.50$	(2)	-0.0020	(-0.90)	-0.2108	(-0.60)					0.5480***	(3.91)					0.0344
	(3)	-0.0010	(-0.45)	-0.2106	(-0.40)			0.2065***	(3.70)	0.3550***	(2.90)					0.0550
	(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
$\theta = 0.60$	(2)	0.0074***	(3.30)	-0.4846	(-1.30)					0.4110***	(2.80)					0.0206
	(3)	0.0073***	(3.35)	-0.3007	(-0.92)			0.1996***	(3.90)	0.3365**	(2.62)					0.0453
	(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
$\theta = 0.70$	(2)	0.0190***	(7.60)	-0.5480	(-1.55)					0.3432**	(2.40)					0.0170
	(3)	0.0186***	(7.80)	-0.7645**	(-2.20)			0.1941***	(3.90)	0.1644	(1.25)					0.0366
	(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
$\theta = 0.80$	(2)	0.0324***	(11.35)	-0.3090	(-1.21)					0.2091*	(1.90)					0.0091
	(3)	0.0330***	(11.56)	-0.6254***	(-2.71)			0.2371***	(4.04)	0.1995*	(1.71)					0.0328
	(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
$\theta = 0.90$	(2)	0.0558***	(12.46)	-0.6084**	(-2.03)					0.0615	(0.30)					0.0085
	(3)	0.0555***	(16.96)	-0.6137**	(-2.20)			0.2070***	(3.82)	-0.0981	(-1.50)					0.0307
	(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	(2)	-0.0008	(-0.40)	-0.1554	(-0.63)					0.3076***	(3.52)					0.0248
	(3)	-0.0002	(-0.12)	-0.1780	(-0.74)			0.2230***	(5.40)	0.2253**	(2.61)					0.0726
	(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:

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

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

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

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

Quantile Regression for equation 3

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

Equation: 4

Quantile Regression for equation 4

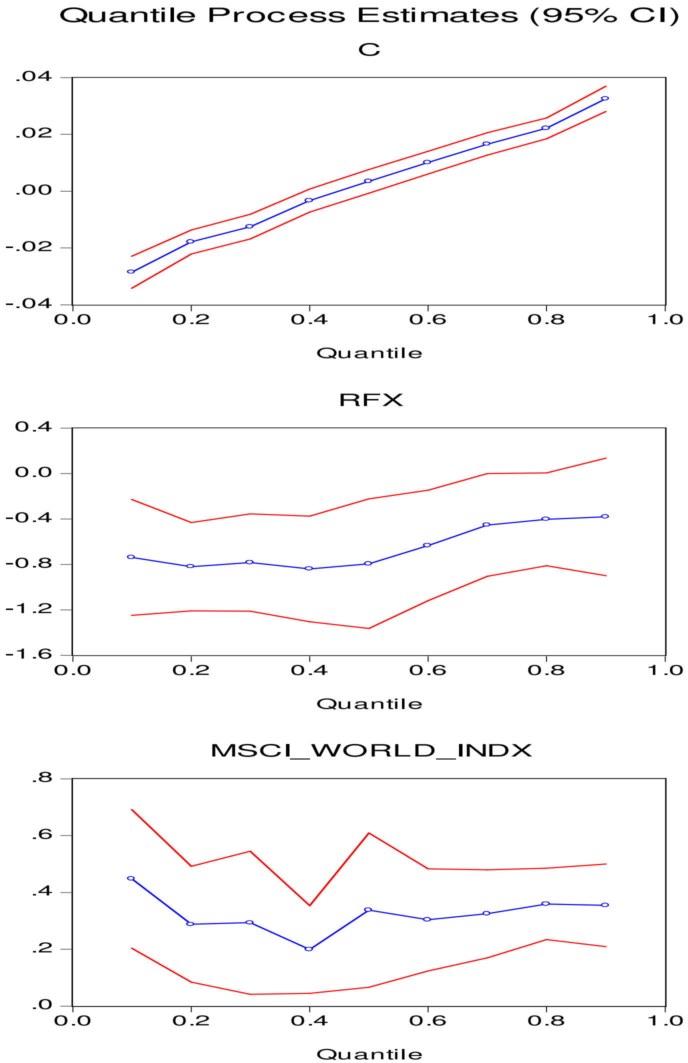
$$\tilde{r}_{i,t}^{FI} = a_i + b_i r_t^{FX} + c_i |r_t^{FX}| + d_i \tilde{r}_{i,t}^{SW} + g r_{i,t}^{WI} + e_i r_t^{FX} \tilde{r}_{i,t}^{SW} + f_i |r_t^{FX}| \tilde{r}_{i,t}^{SW} + \varepsilon_{i,t} \tag{4}$$

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

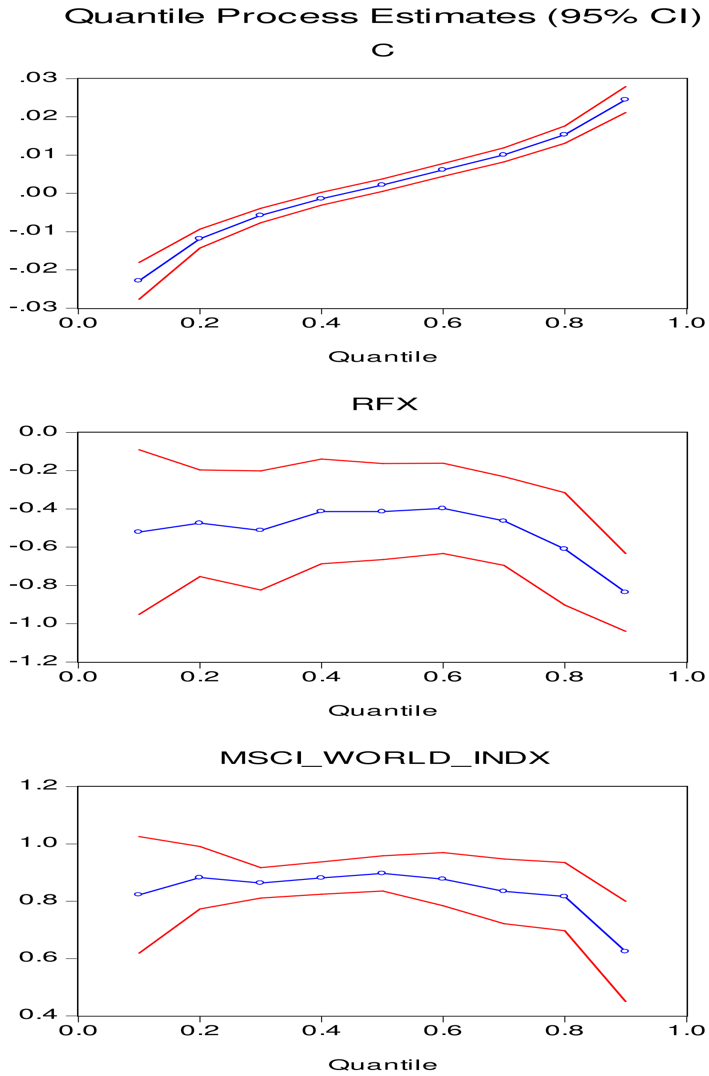
$$\min \left[\sum_{\tau : \tilde{r}_{i,t}^{FI} \geq \hat{a} + \hat{b} r_t^{FX} + \hat{c} \left| r_t^{FX} \right| + \hat{d} \tilde{r}_{i,t}^{SW} + \hat{g} r_{i,t}^{WI} + \hat{e} r_t^{FX} \tilde{r}_{i,t}^{SW} + \hat{f} r_t^{FX} \left| \tilde{r}_{i,t}^{SW} \right|} \tau \left| \tilde{r}_{i,t}^{FI} - \hat{a}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

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

Pre-Euro

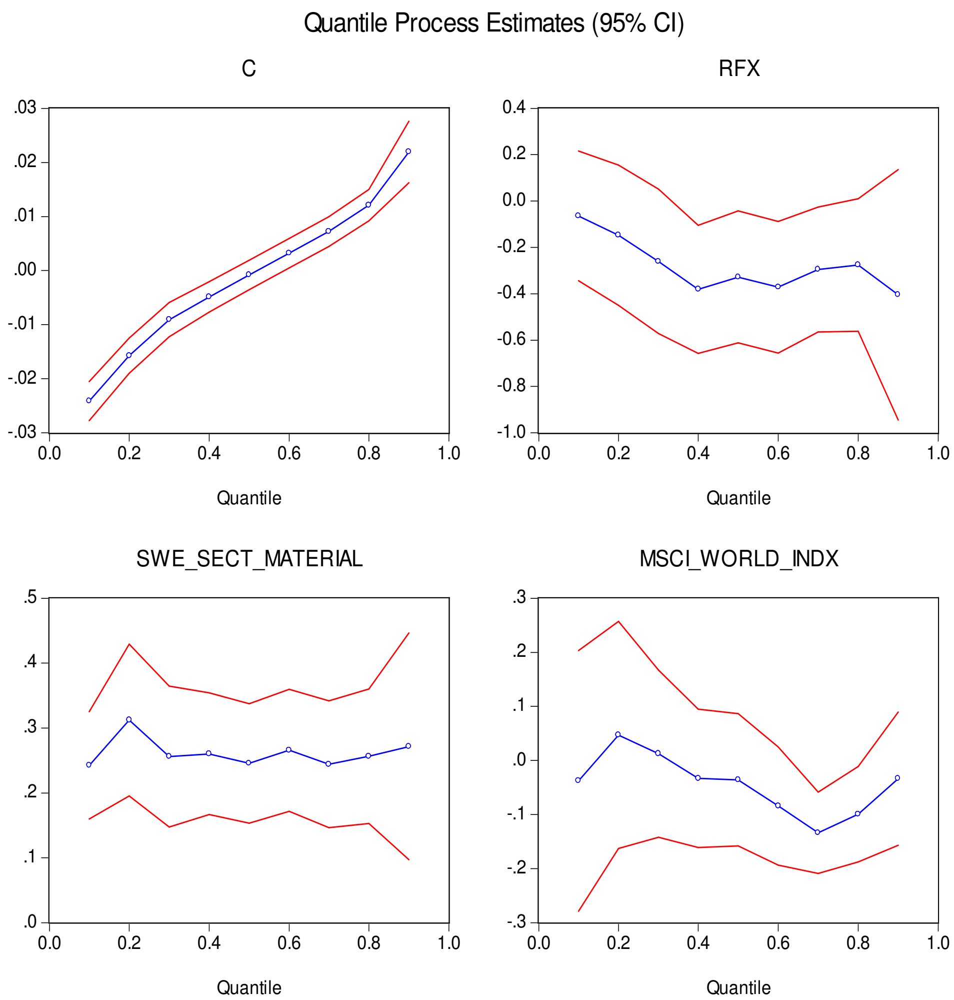


Post-Euro

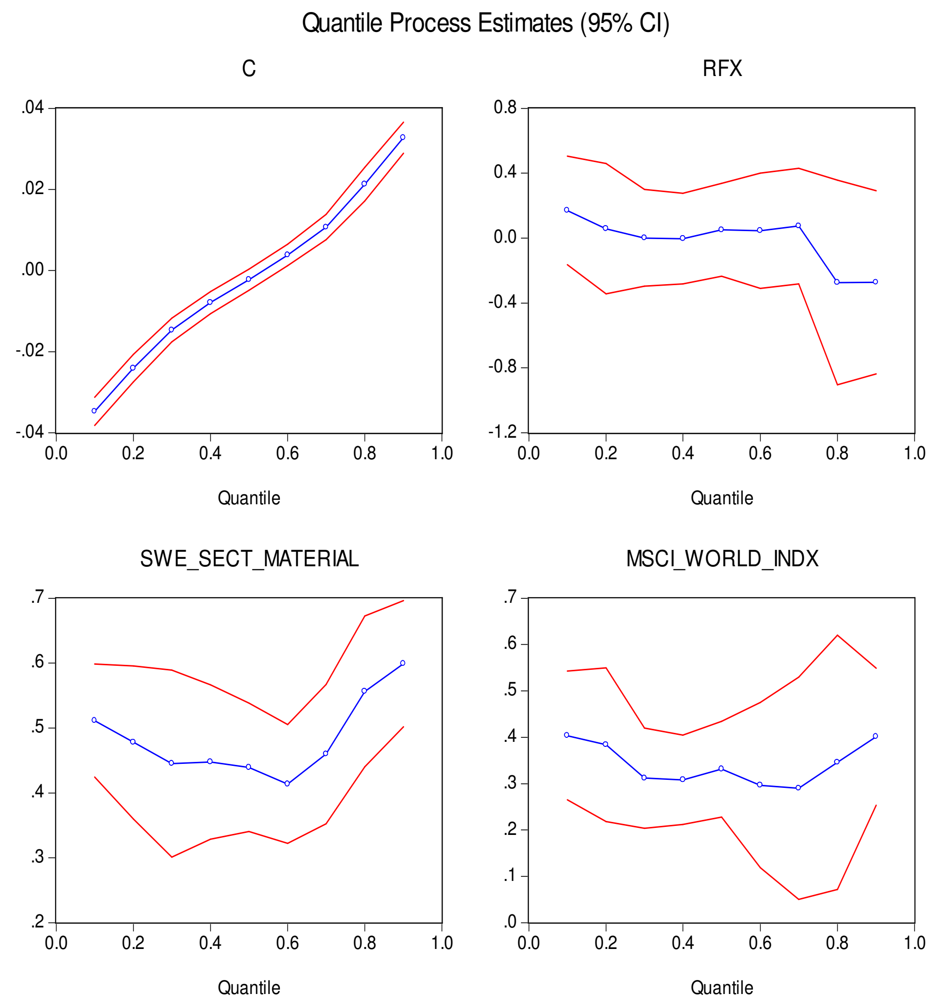


Appendix: B, Graph of Quantile Regression of Finnish *Materials Sector* Excess Returns Pre-Euro, Equation 3

Pre-Euro

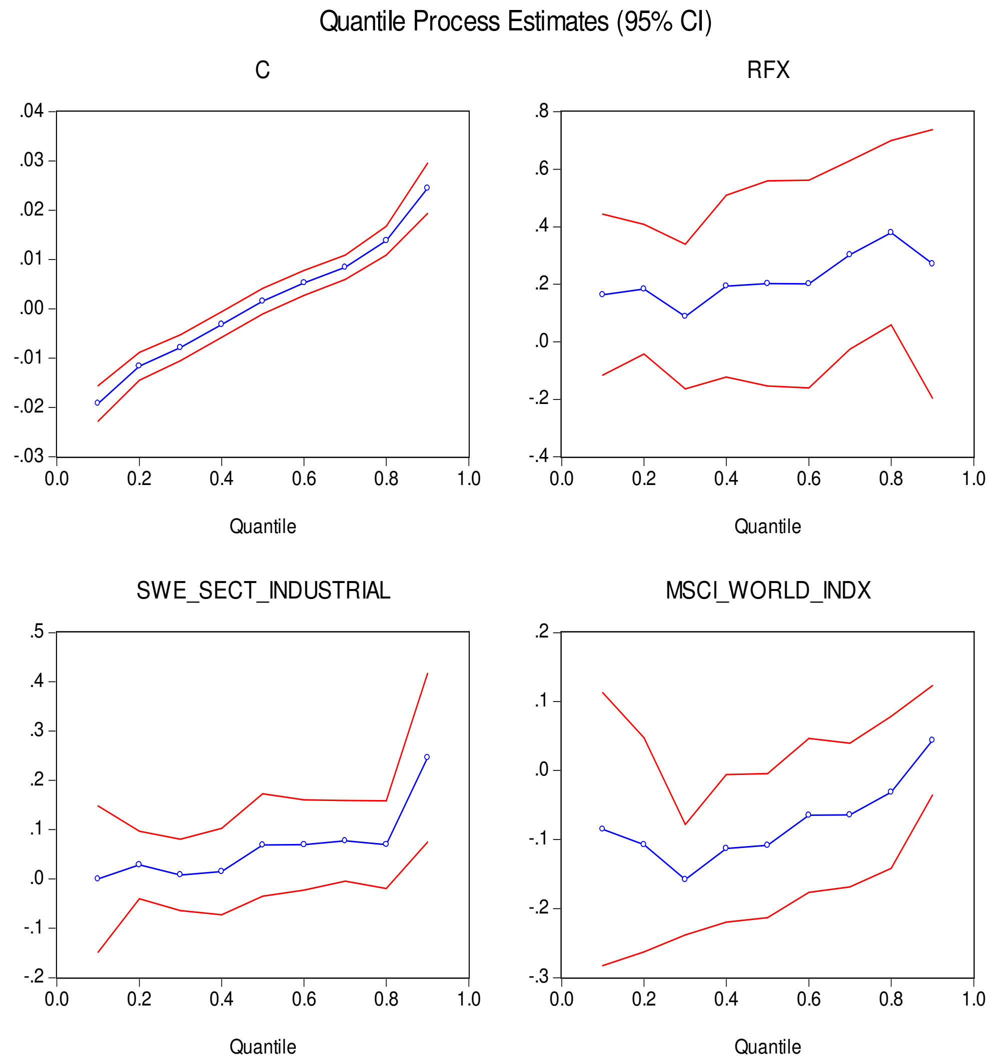


Post-Euro

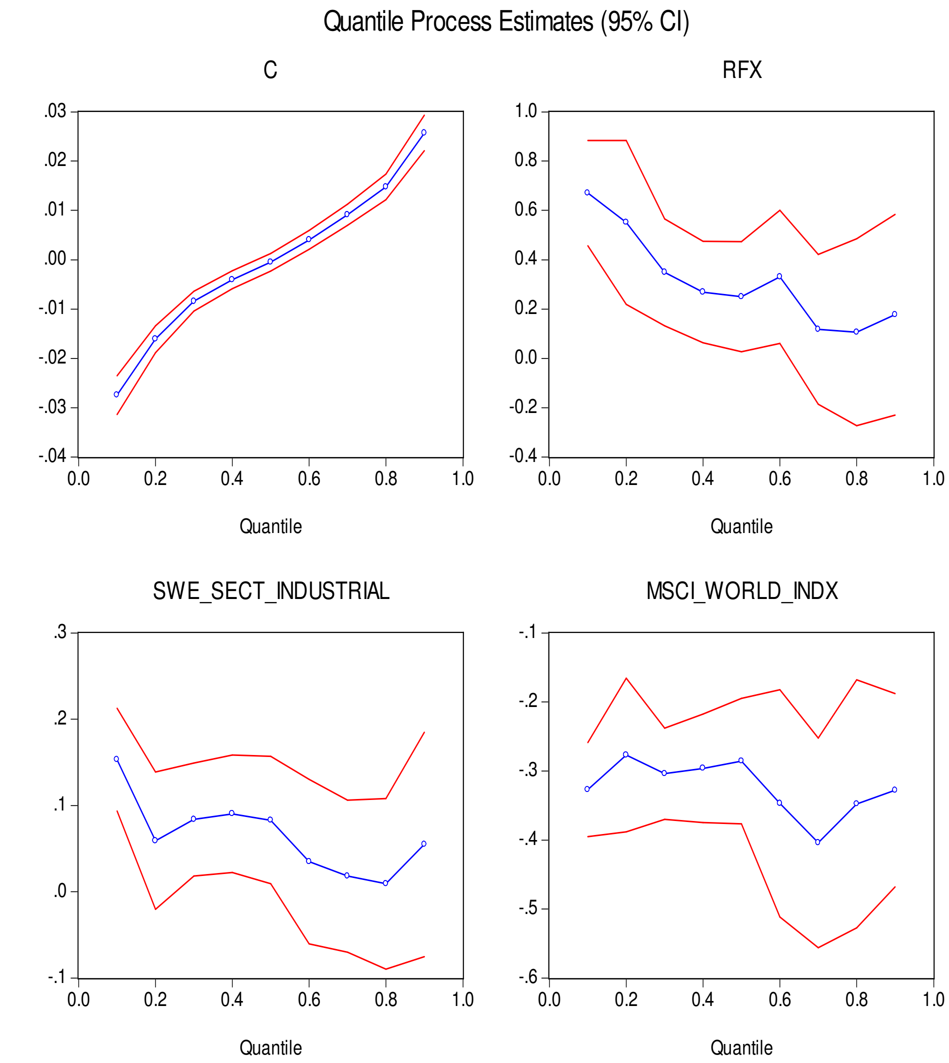


Appendix: C, Graph of Quantile Regression of Finnish *Industrial Sector* Excess Returns
Pre-Euro, Equation 3

Pre-Euro

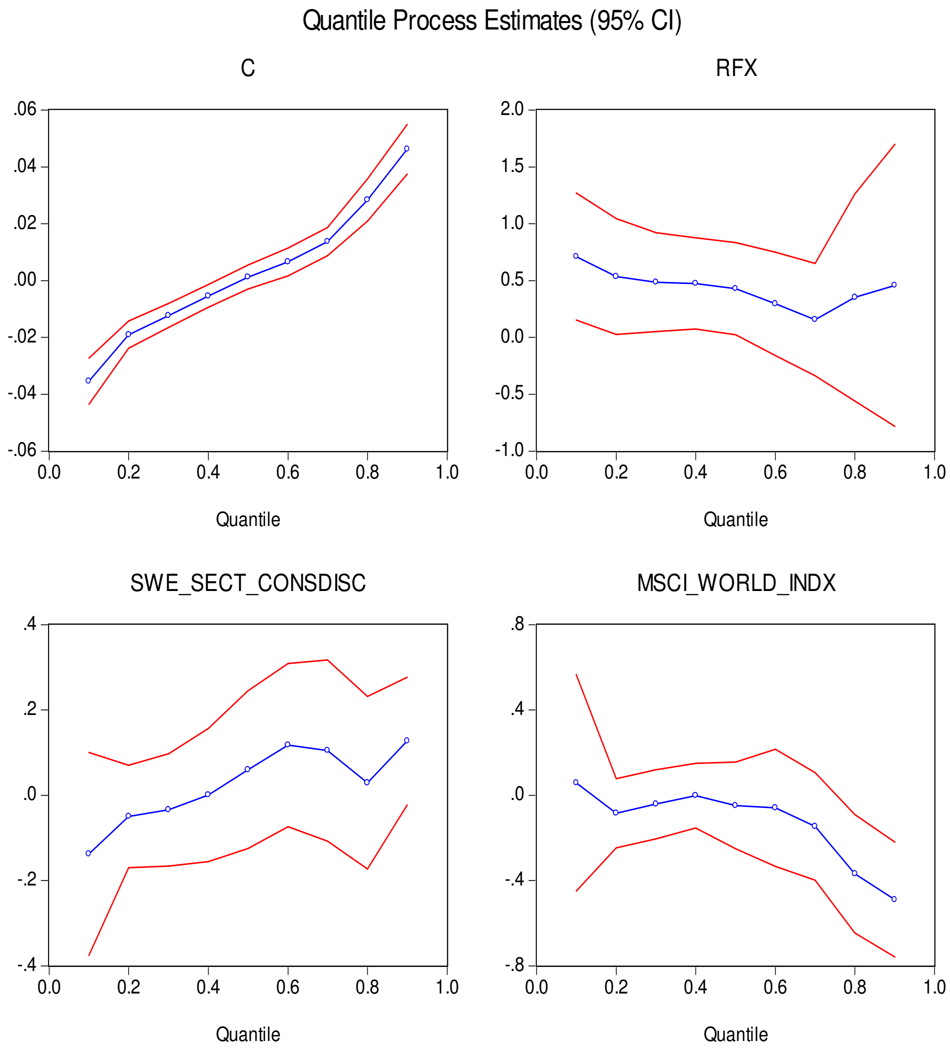


Post-Euro

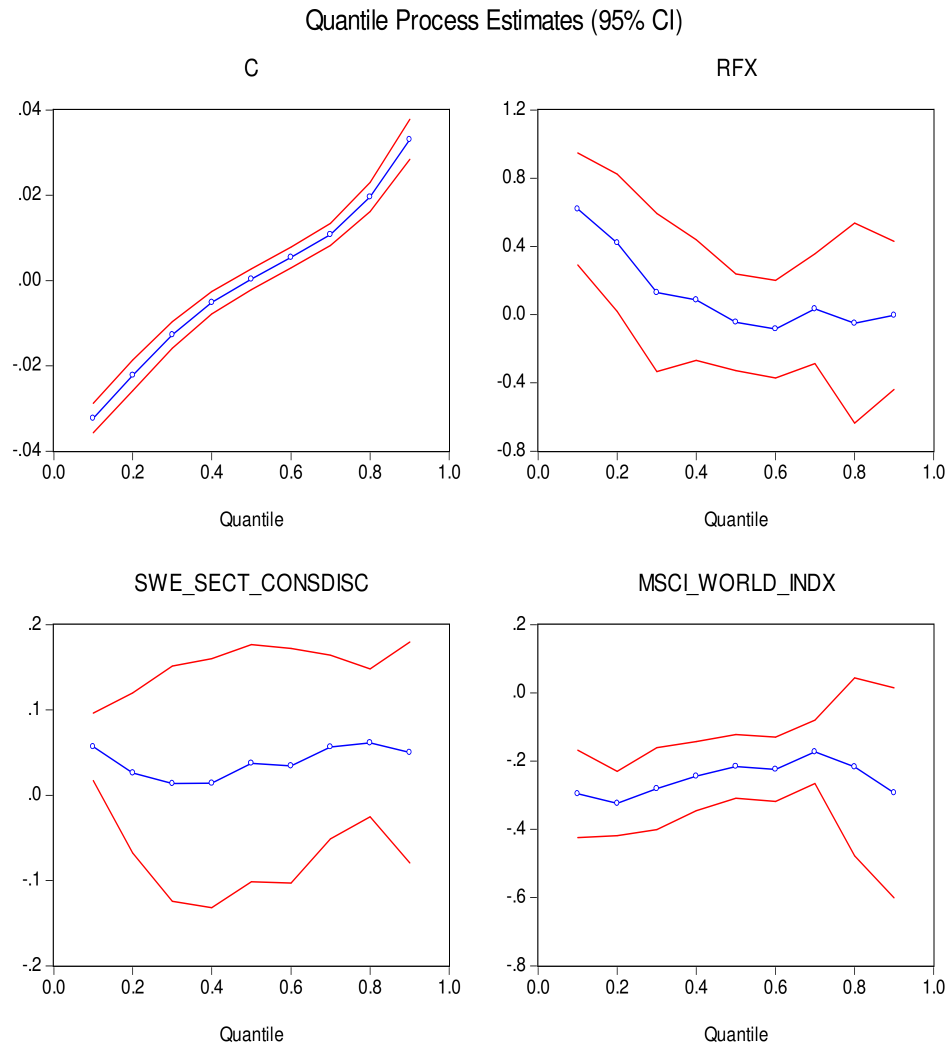


Appendix: D, Graph of Quantile Regression of Finnish *Consumer Discretionary Sector* Excess Returns Pre-Euro, Equation 3

Pre-Euro

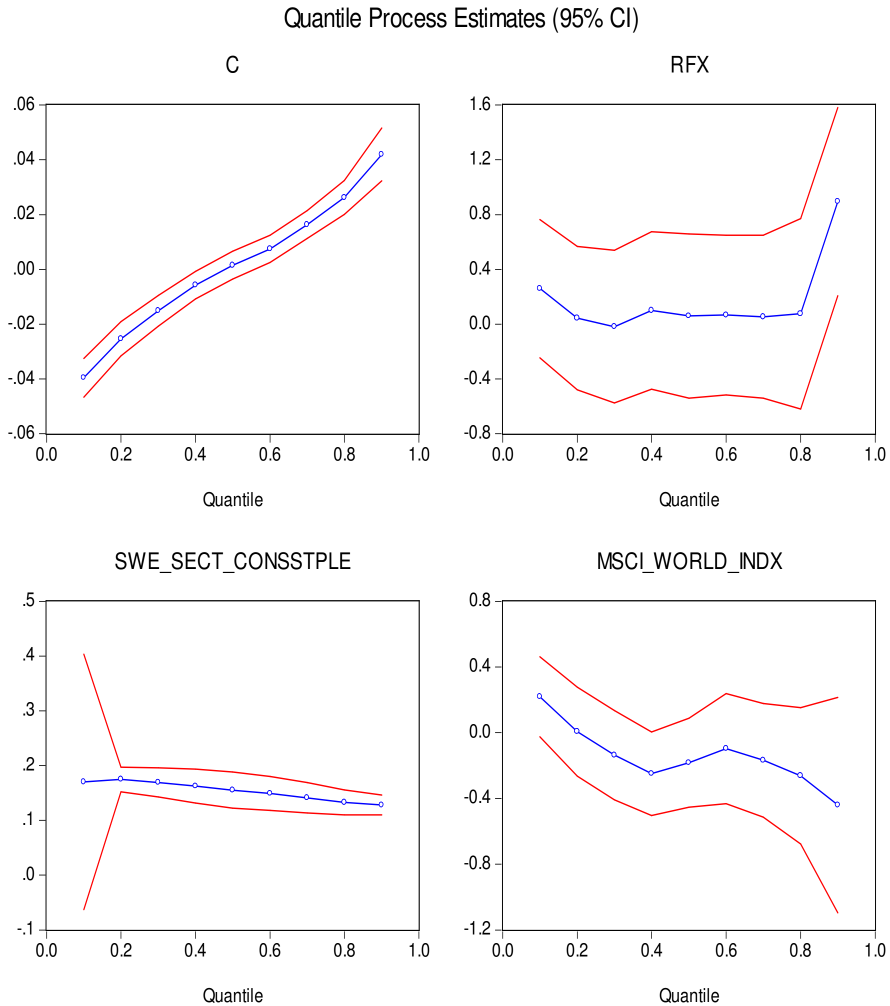


Post-Euro

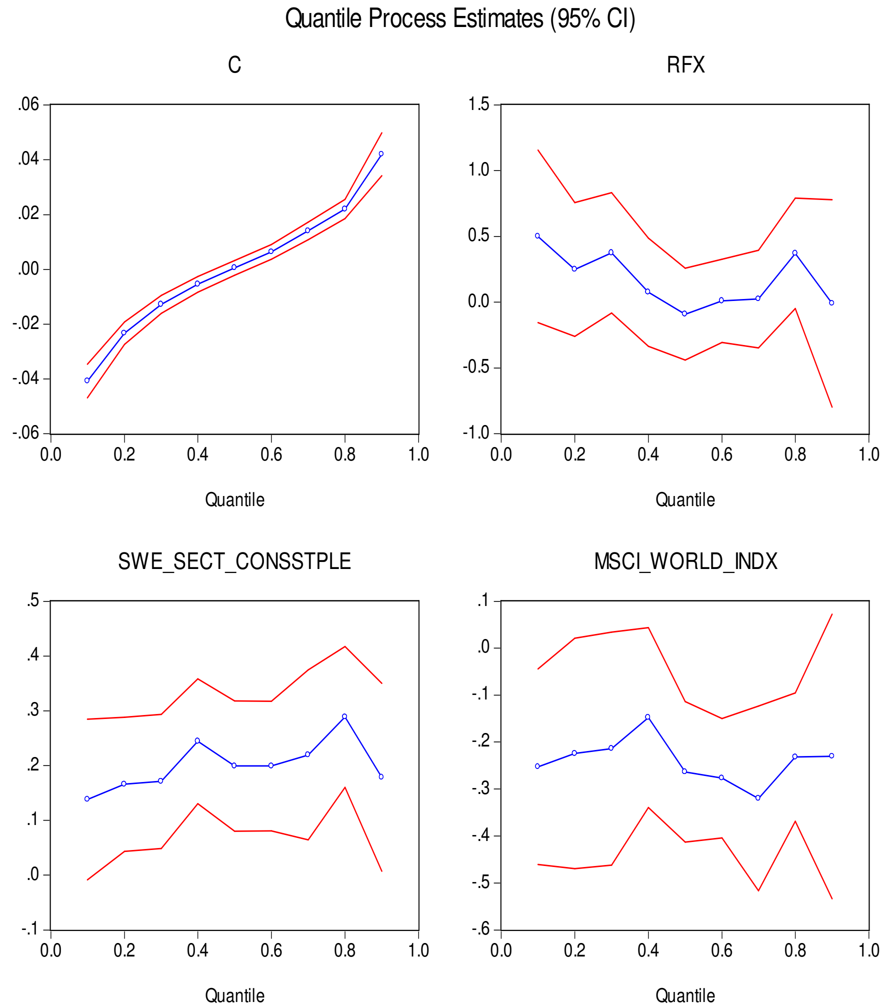


Appendix: E, Graph of Quantile Regression of Finnish *Consumer Staples Sector* Excess Returns Pre-Euro, Equation 3

Pre-Euro

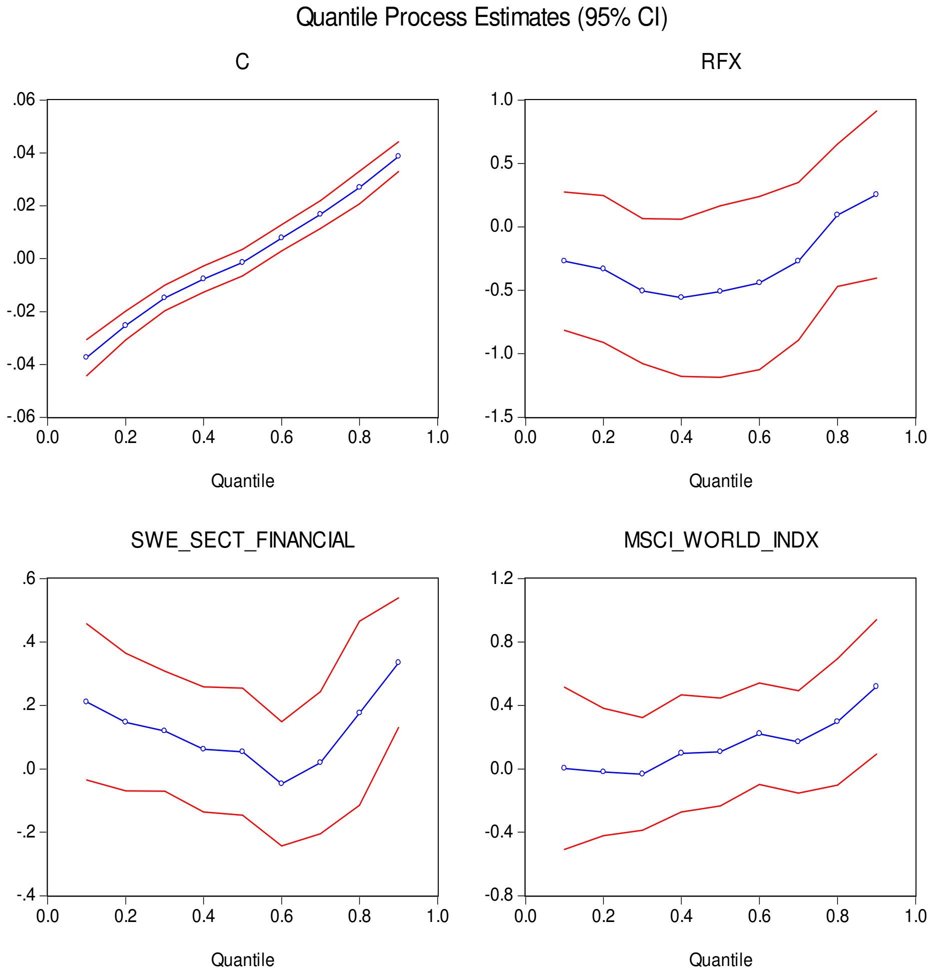


Post-Euro

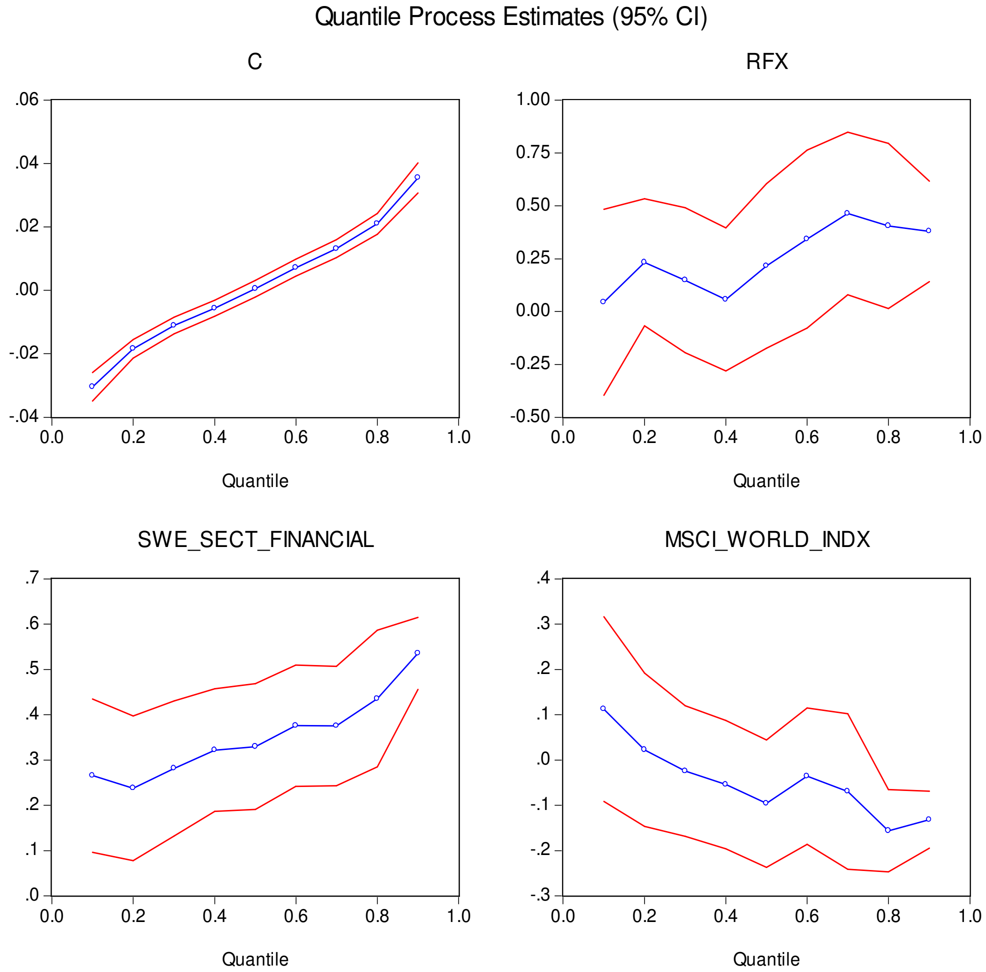


Appendix: F, Graph of Quantile Regression of Finnish *Financials Sector* Excess Returns Pre-Euro, Equation 3

Pre-Euro

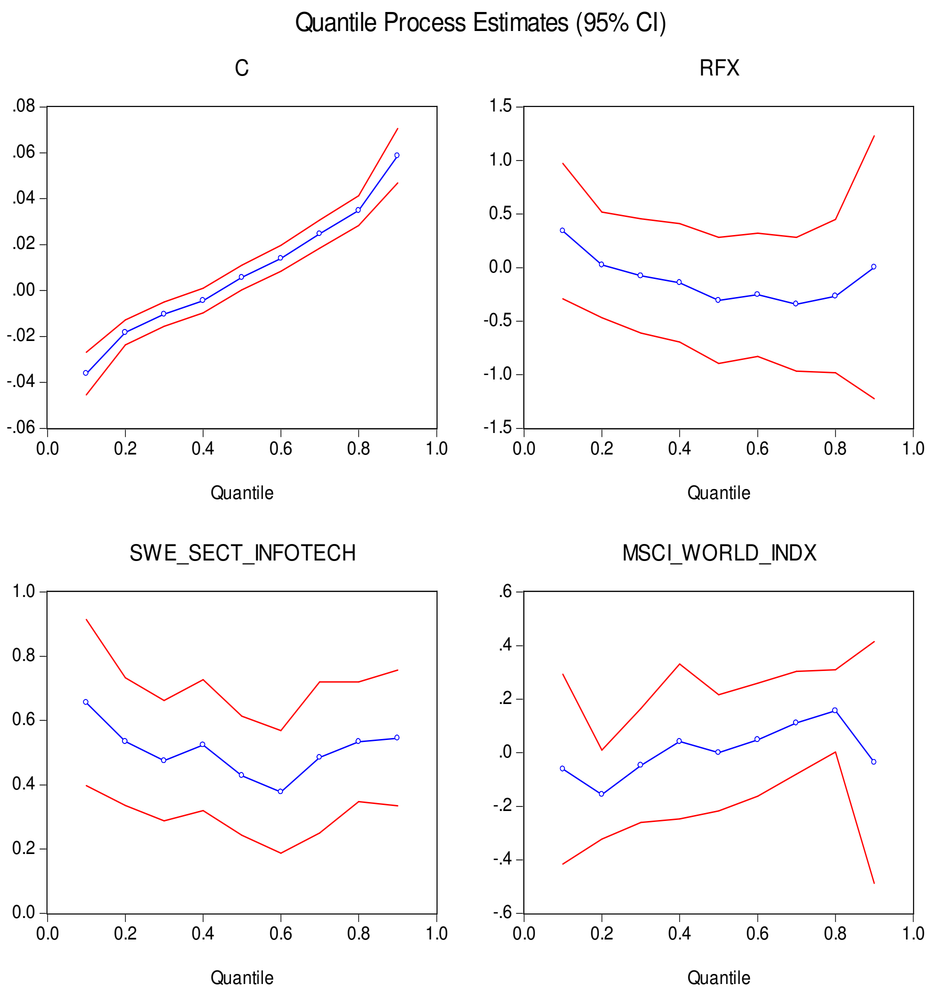


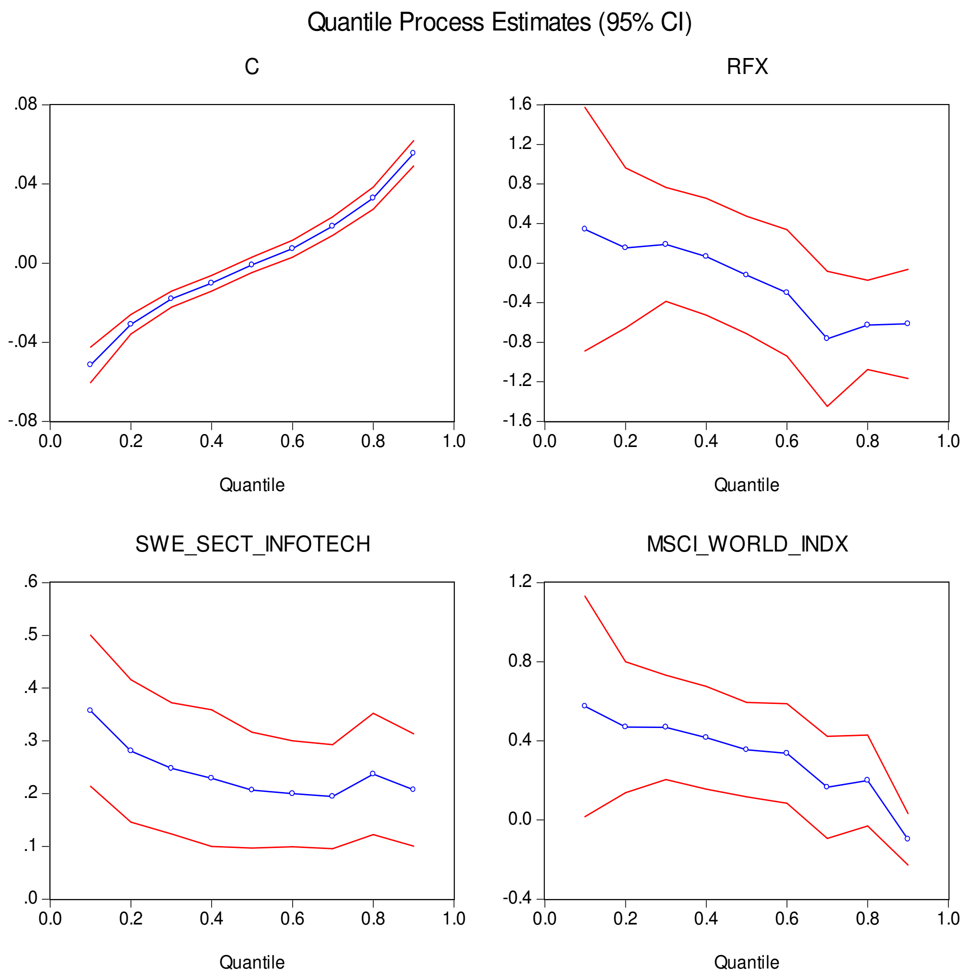
Post-Euro



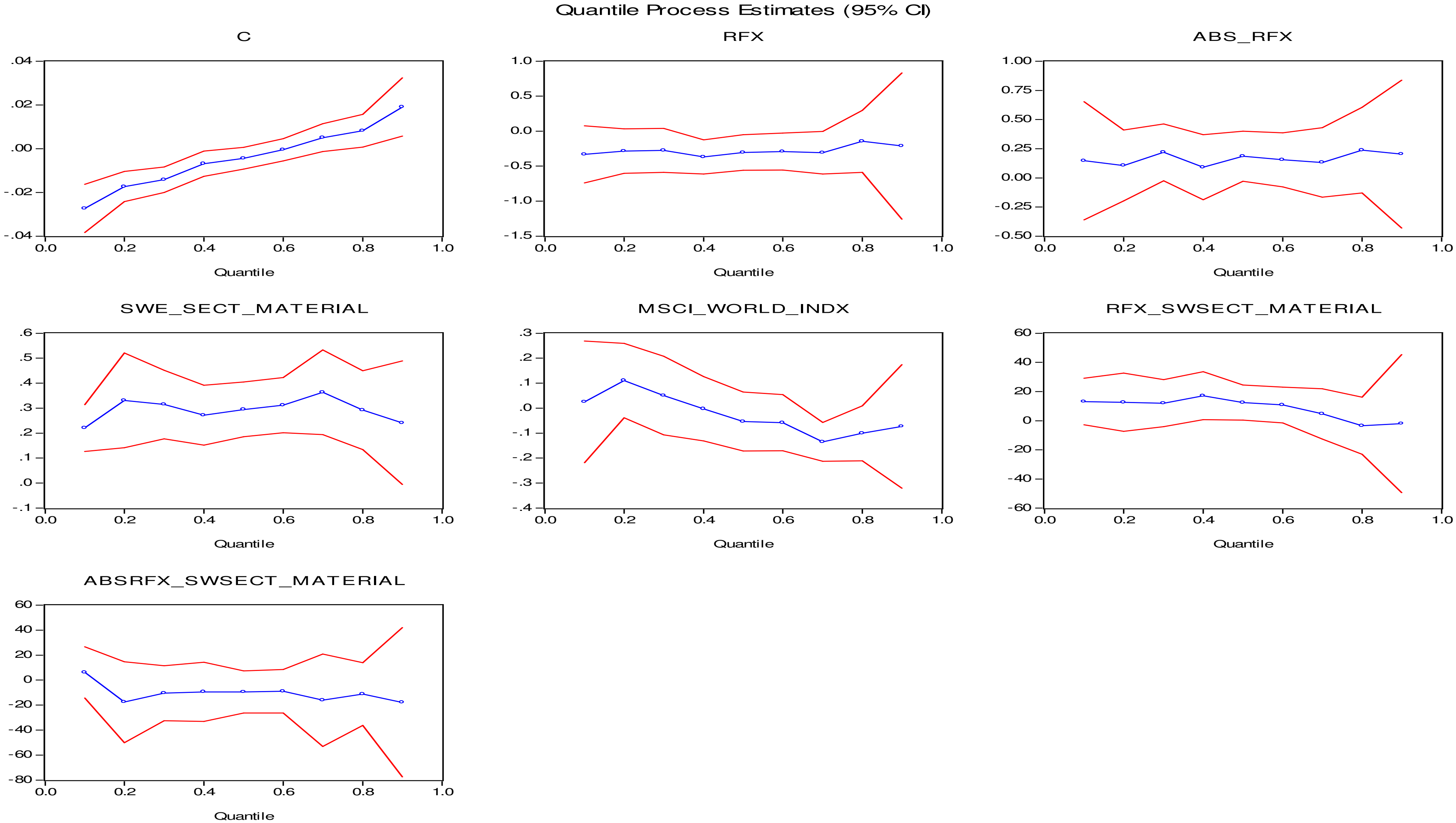
Appendix: G, Graph of Quantile Regression of Finnish *Information Technology Sector* Excess Returns Pre-Euro, Equation 3

Pre-Euro | Post-Euro

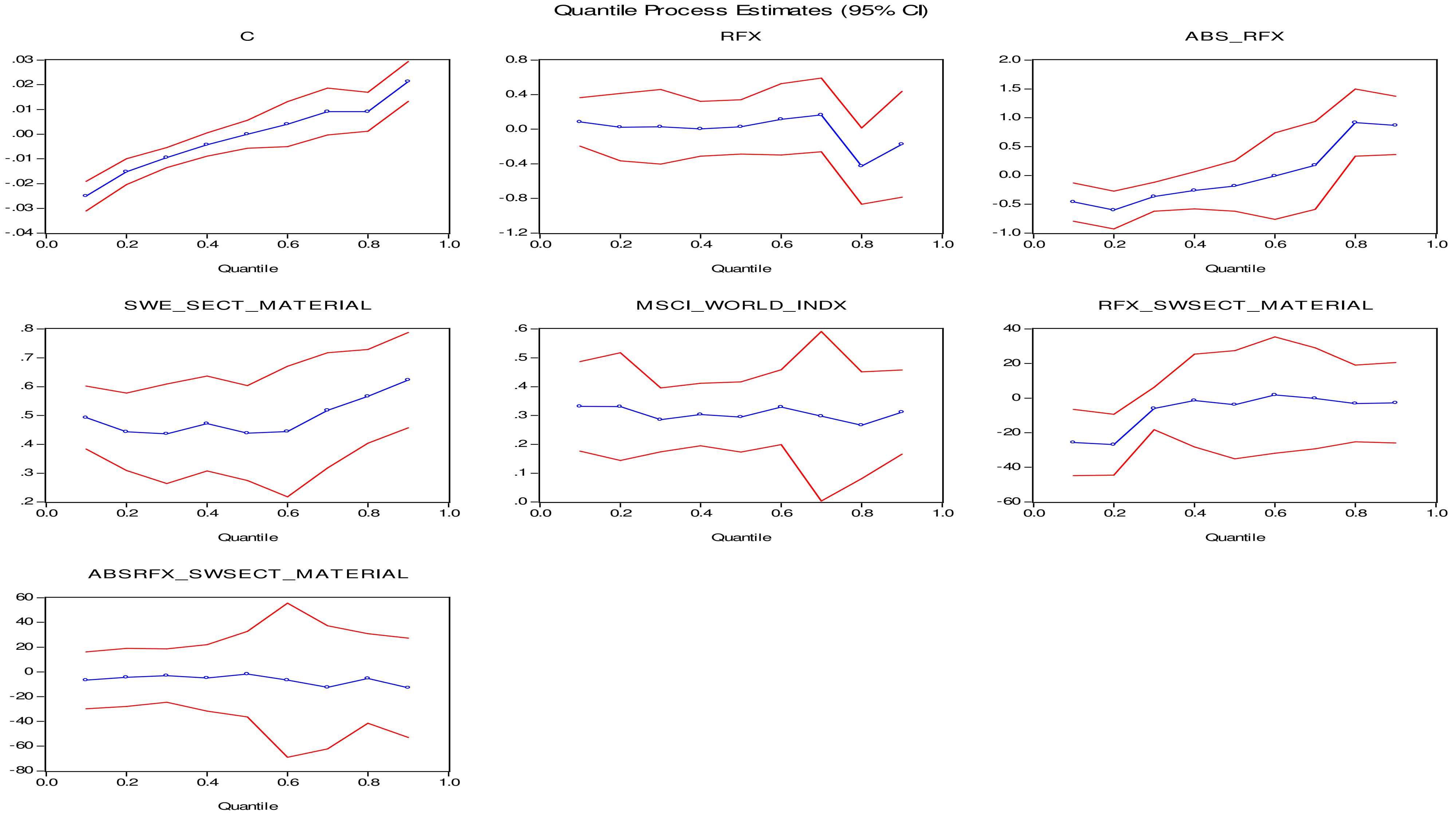




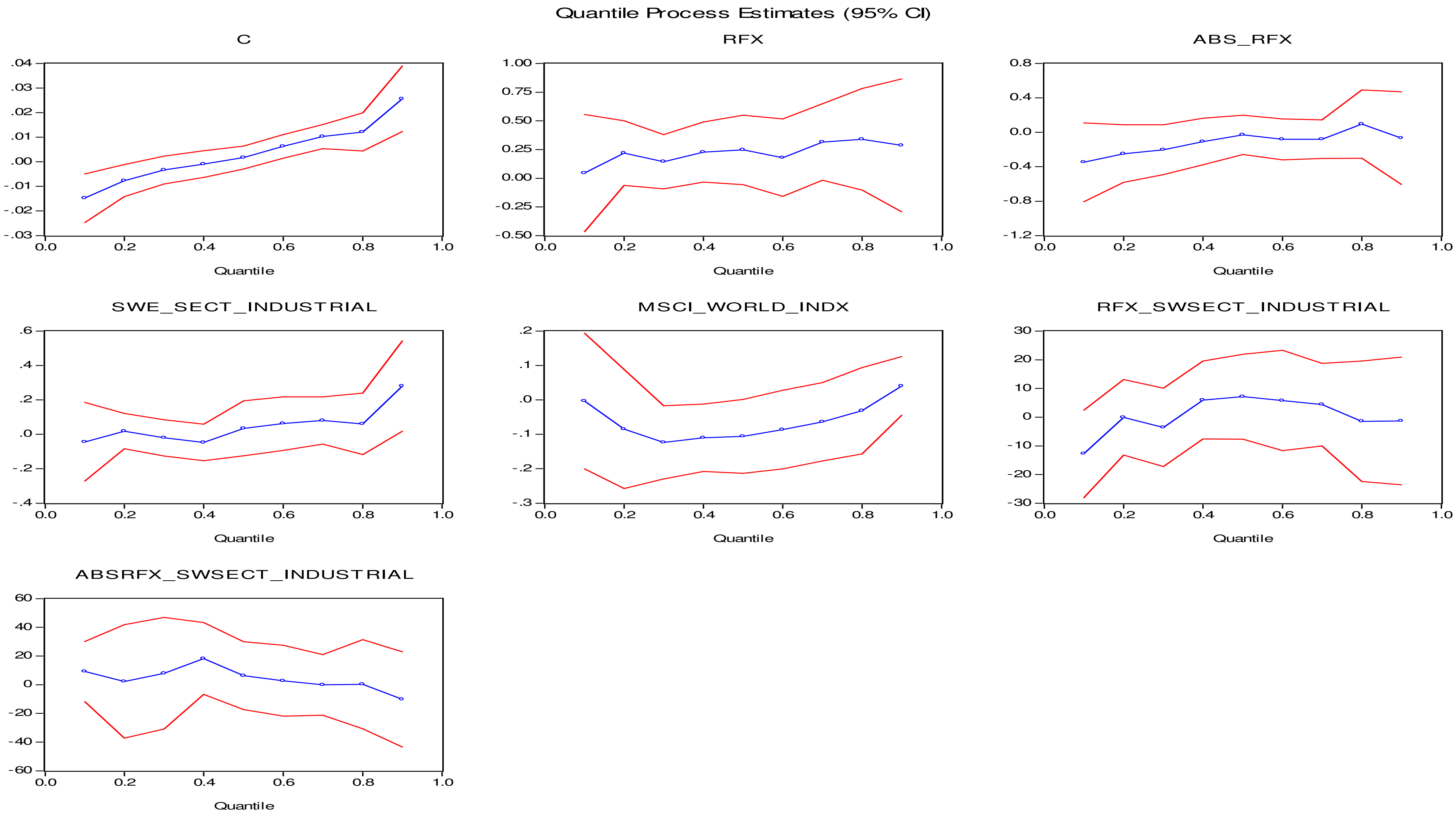
Appendix: H, Graph of Quantile Regression of Finnish *Materials Sector* Excess Returns Pre-Euro, Equation 4



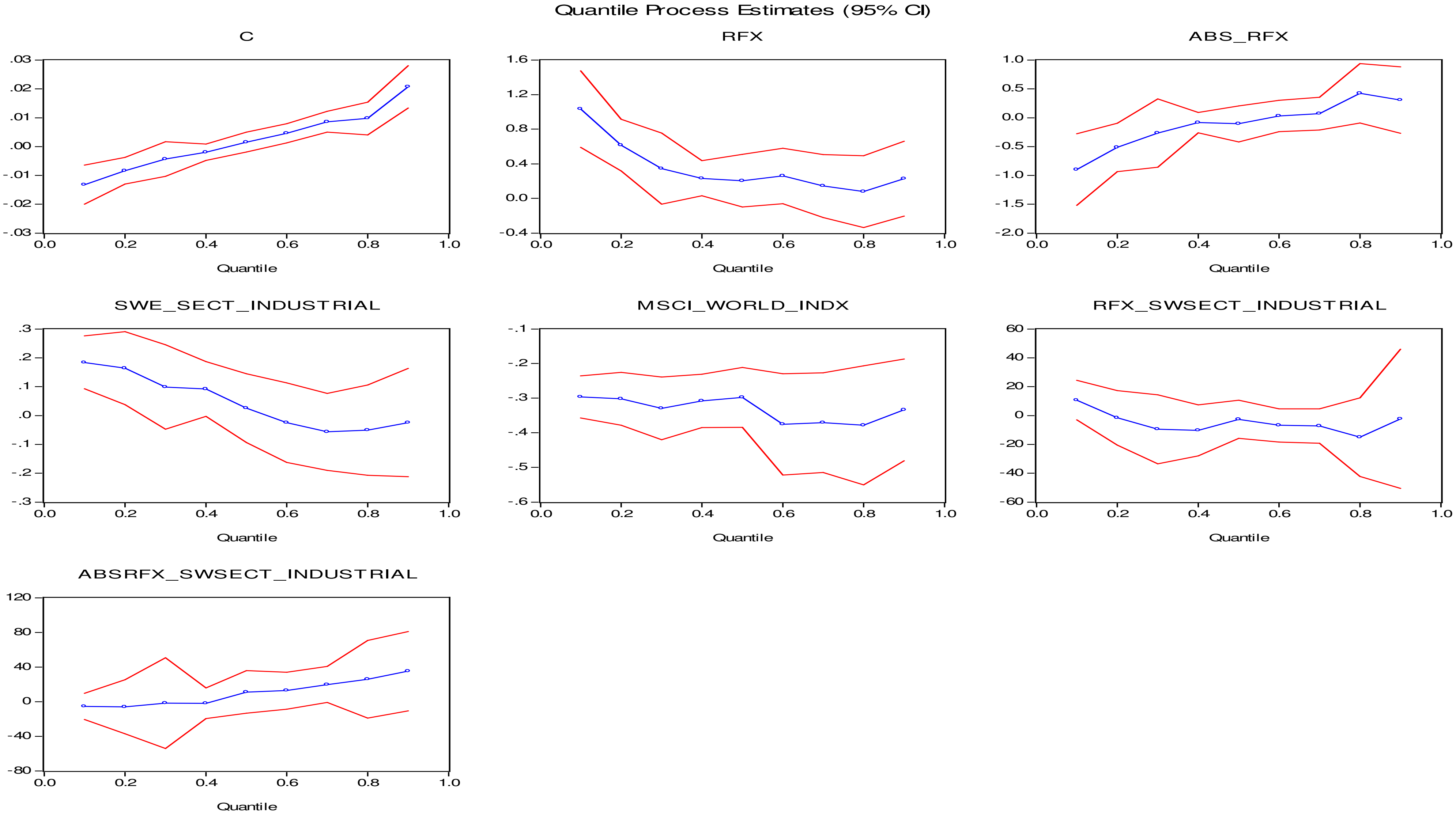
Appendix: H, Cont… Quantile Regression of Finnish *Materials Sector*
Post-Euro, Equation 4



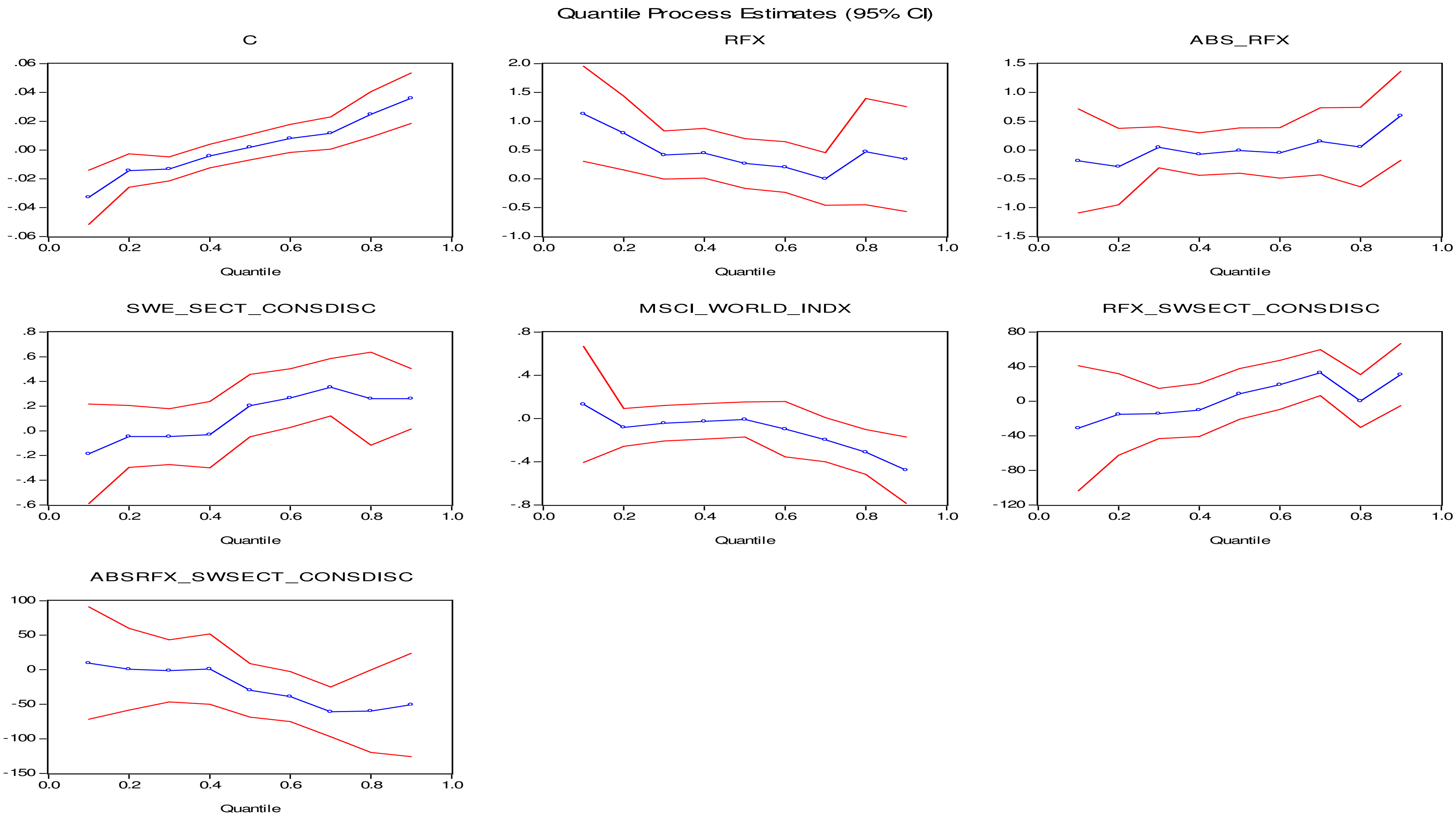
Appendix: I, Graph of Quantile Regression of *Industrial Sector* Finnish Excess Returns Pre-Euro, Equation 4



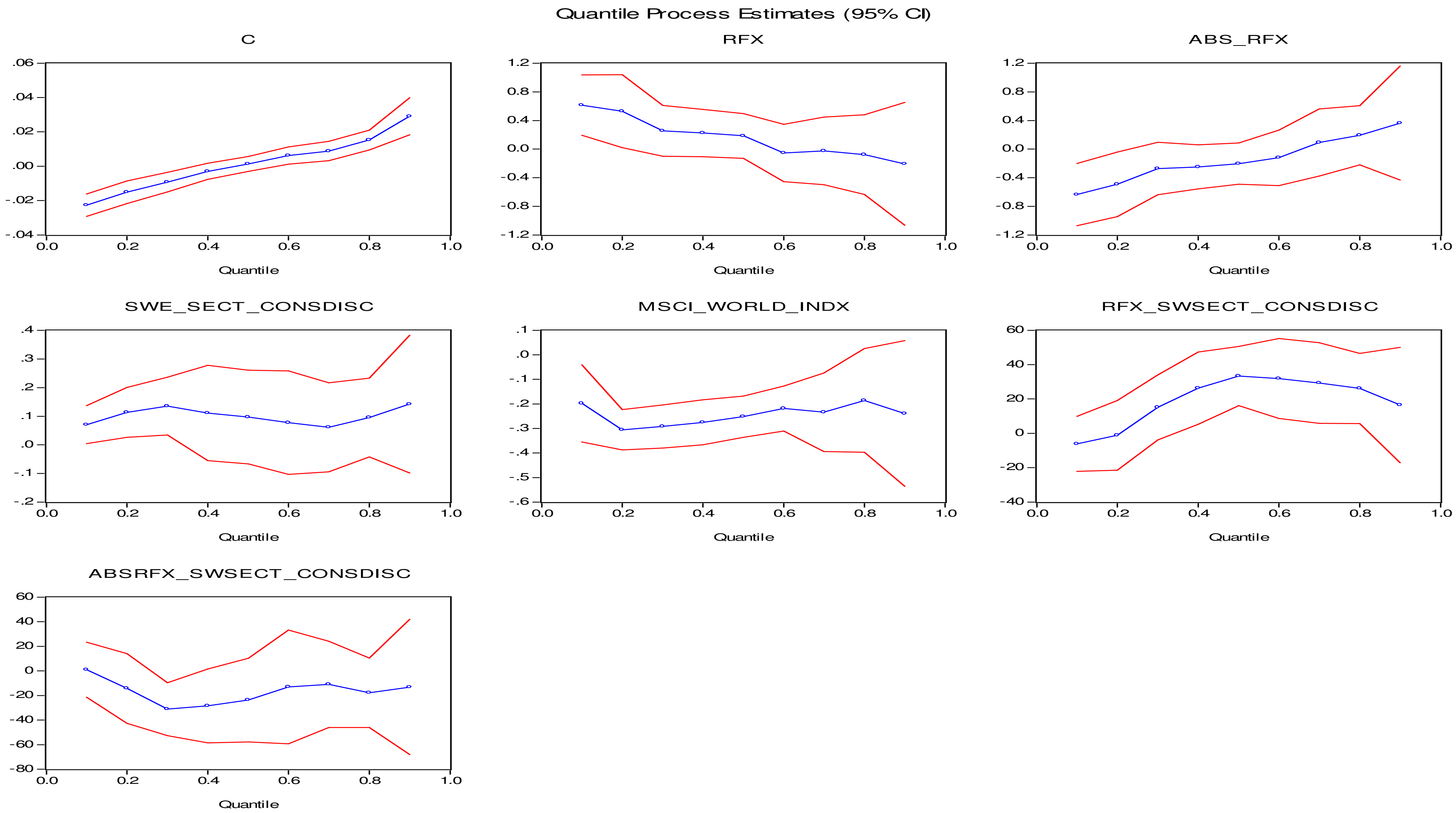
Appendix: I, Cont… Quantile Regression of *Industrial Sector*
Post-Euro, Equation 4



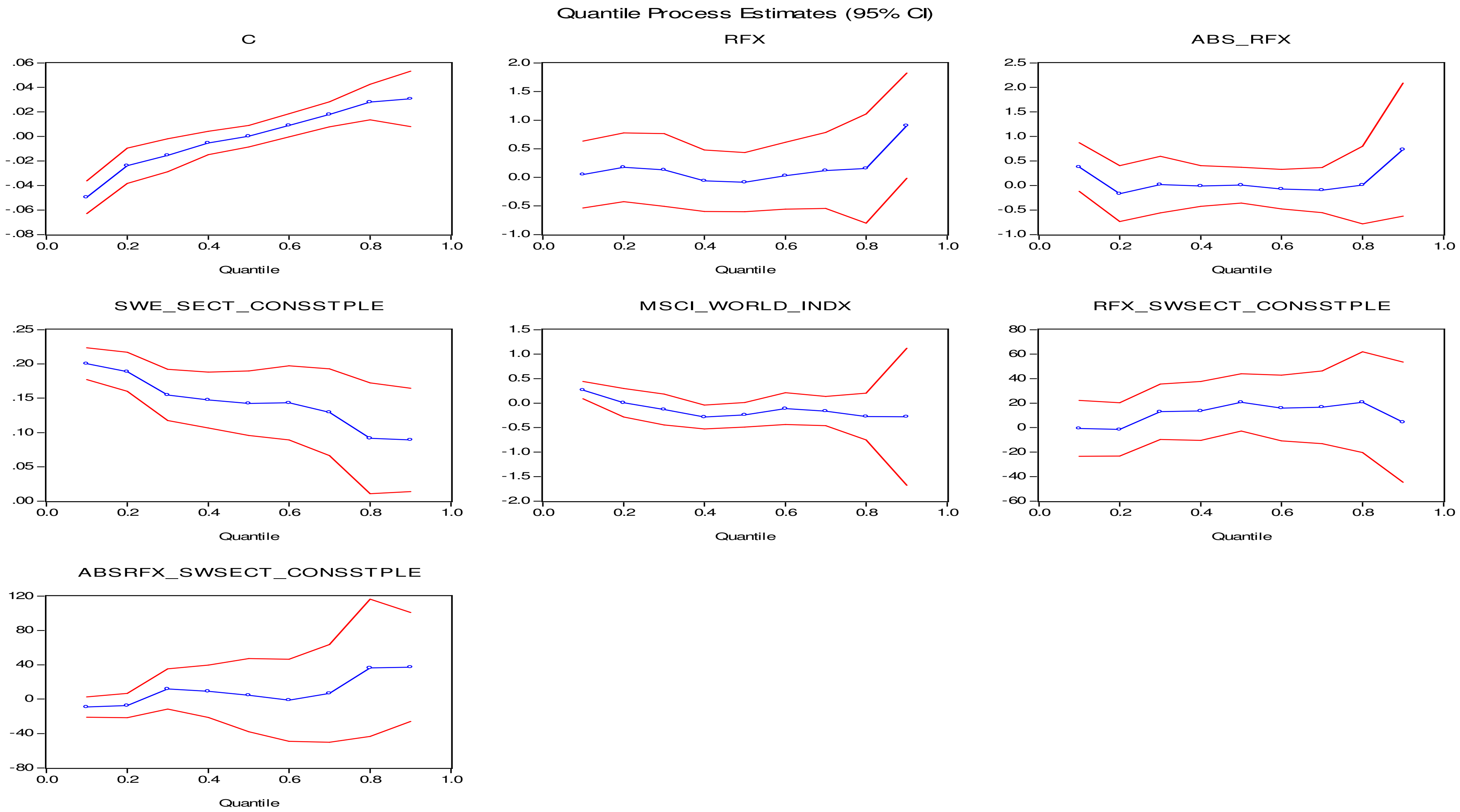
Appendix: J, Graph of Quantile Regression of *Consumer Discretionary Sector* Finnish Excess Returns Pre-Euro, Equation 4



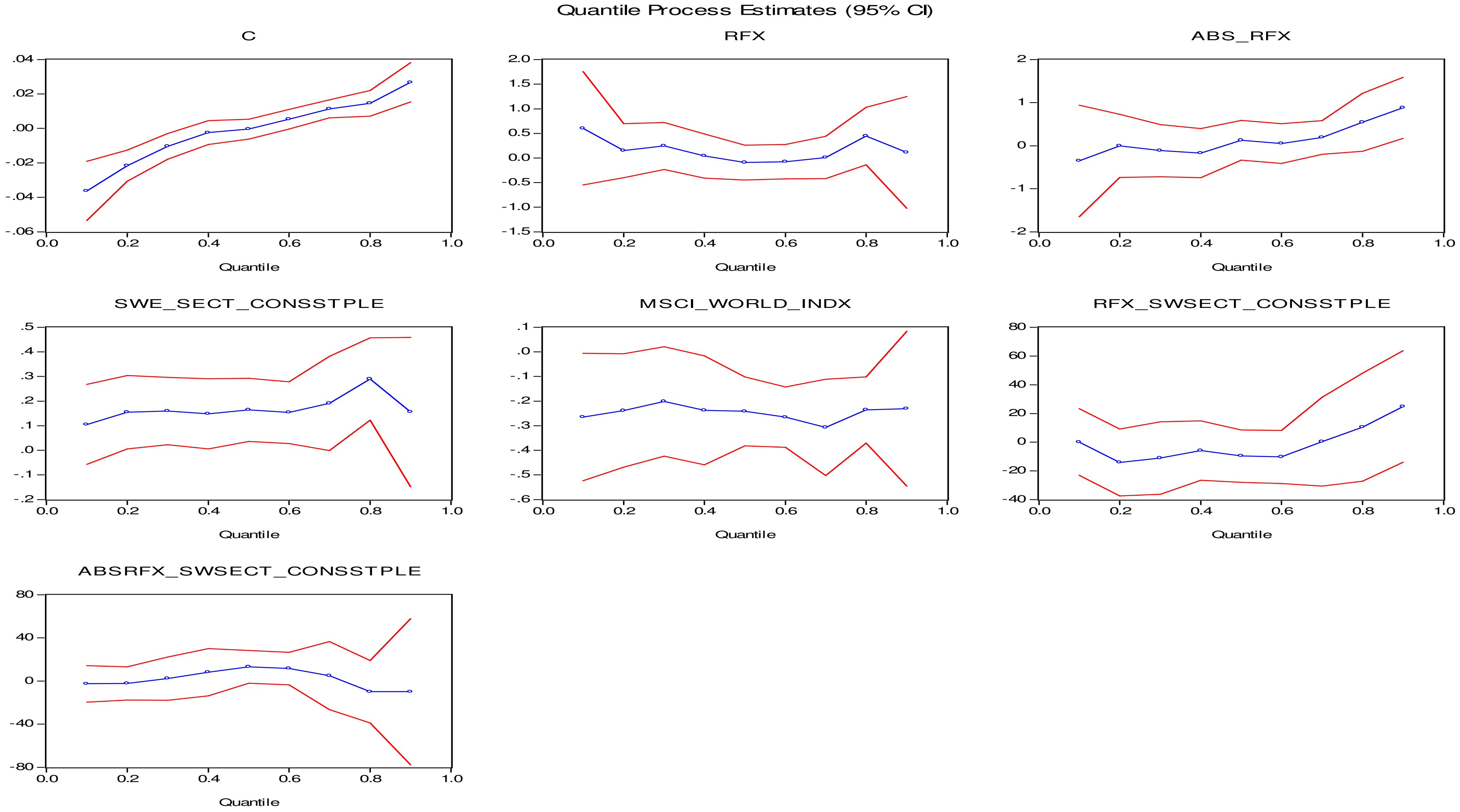
Appendix: J, Cont… Quantile Regression of *Consumer Discretionary Sector*
Post-Euro, Equation 4



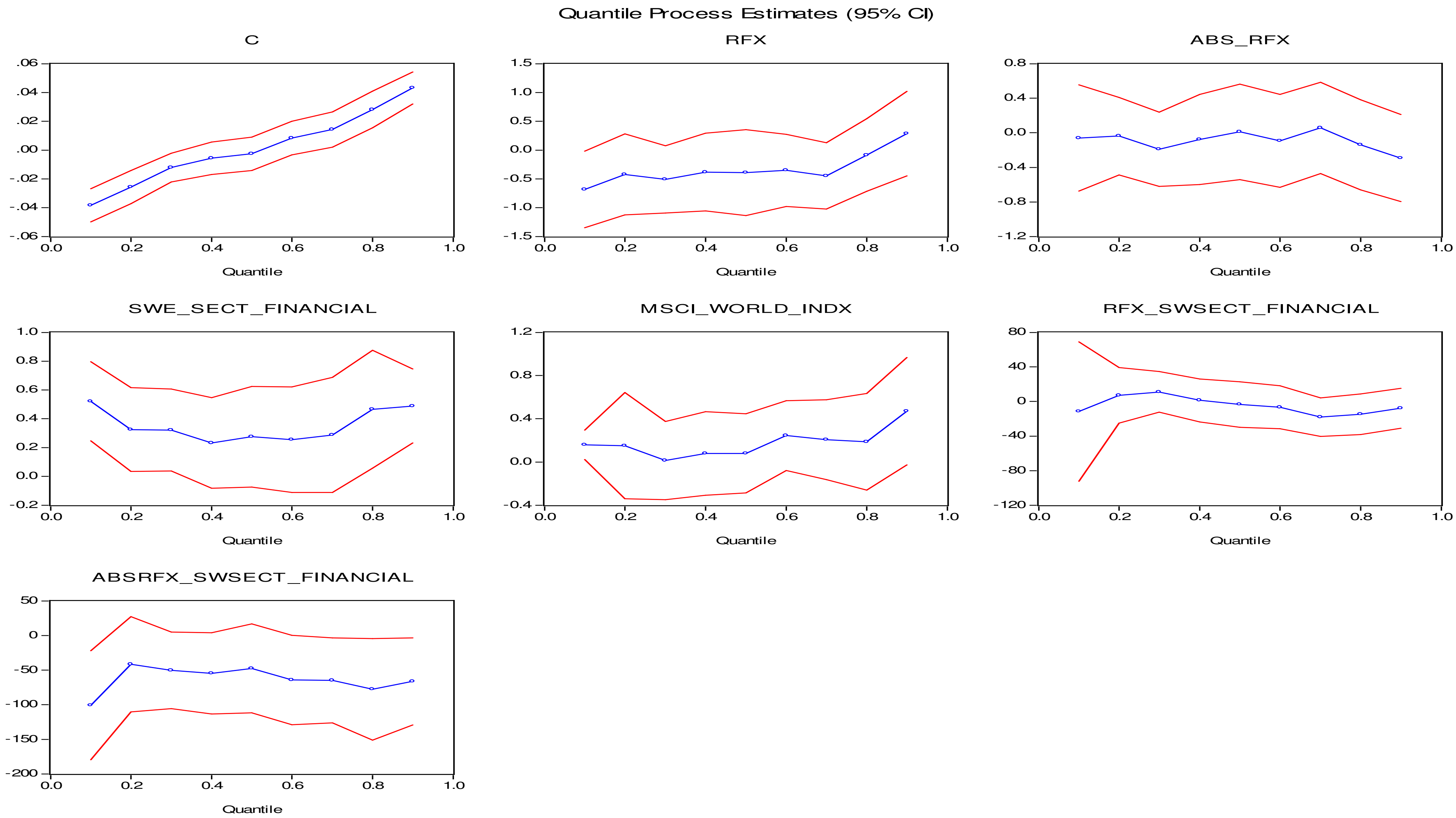
Appendix: K, Graph of Quantile Regression of *Consumer Staples Sector* Finnish Excess Returns Pre-Euro, Equation 4



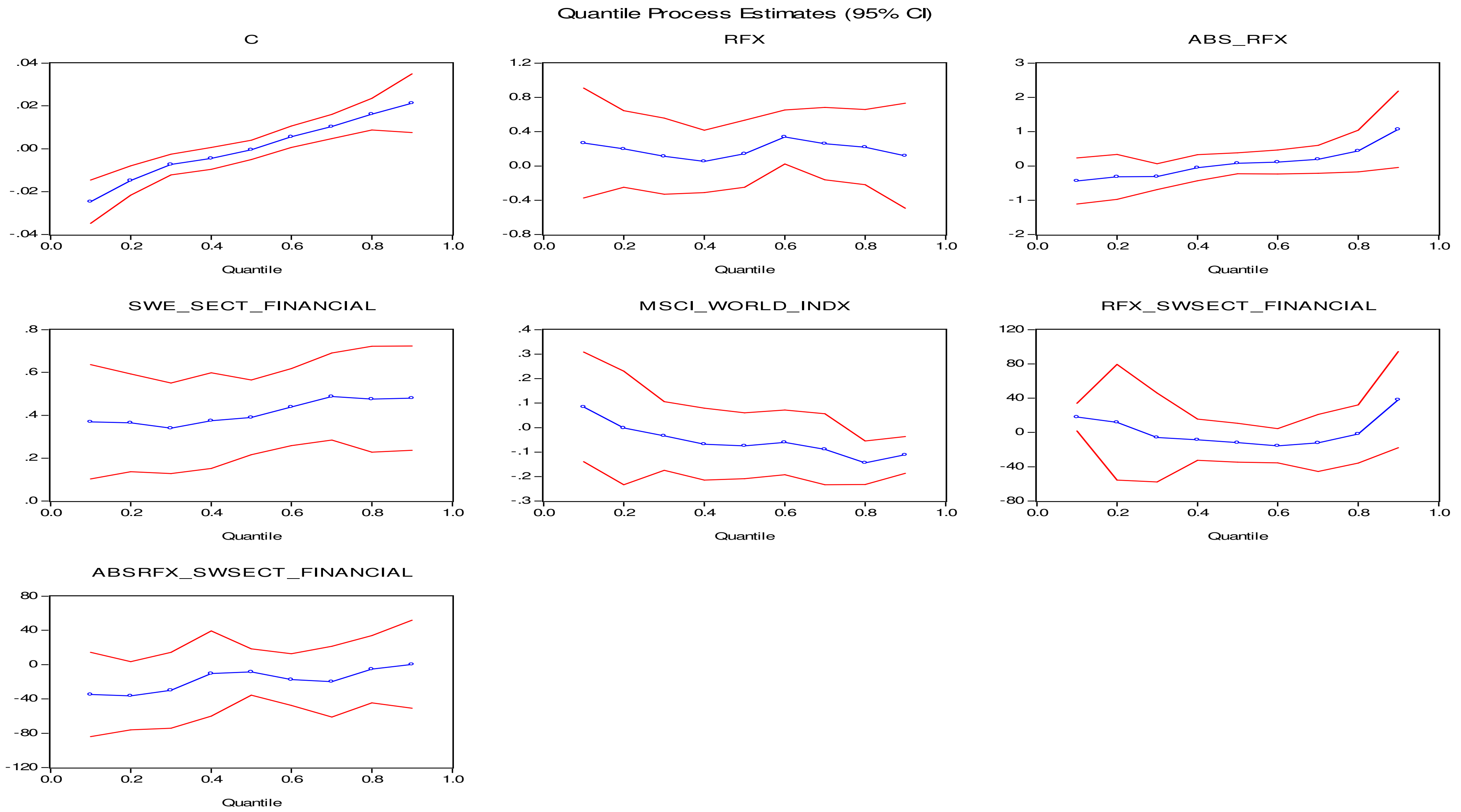
Appendix: K, Cont… Quantile Regression of *Consumer Staples Sector*
Post-Euro, Equation 4



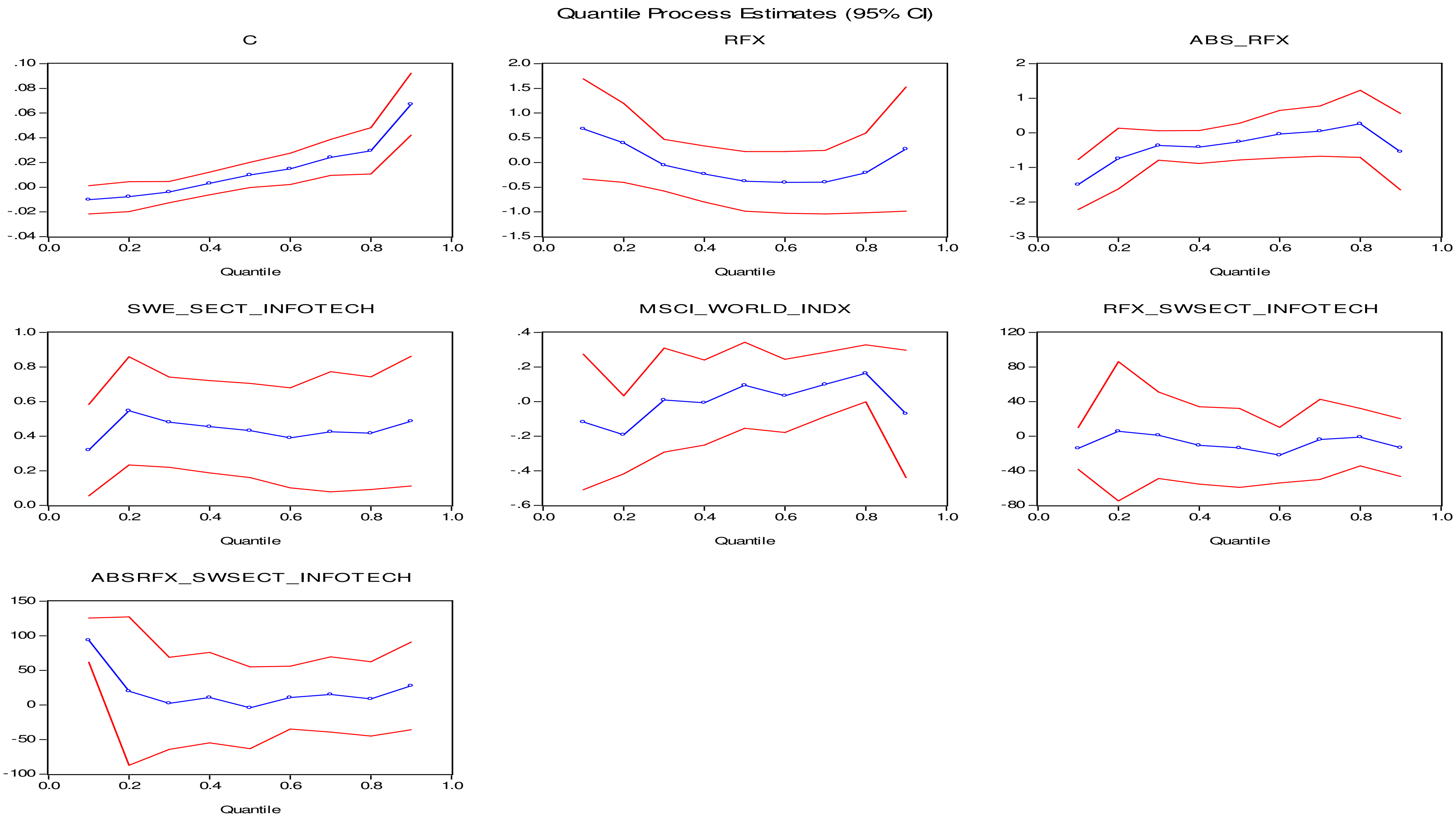
Appendix: L, Graph of Quantile Regression of *Financials Sector* Finnish Excess Returns Pre-Euro, Equation 4



Appendix: L, Cont… Quantile Regression of *Financials Sector*
Post-Euro, Equation 4



Appendix: M, Graph of Quantile Regression of *Information Technology Sector* Finnish Excess Returns Pre-Euro, Equation 4



Appendix: M, Cont… Quantile Regression of *Information Technology Sector*
Post-Euro, Equation 4