Foreign Ownership and World Market Integration *

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Abstract

The goal of this paper is to explain the *de facto* financial market integration to global markets with foreign equity ownership using a novel data set of foreign portfolio flows at the individual stock level. The main result is the positive link between global financial integration and past portfolio inflows by foreign investors on the cross-section of local stocks. The results have high economic significance: Across individual stocks a 1.4% increase in foreign portfolio inflows corresponds to up to 3.3% greater relative explanatory power of the global factor in explaining local stock returns in the following month. The results are indicative of a causal link: The lead-lag effect between foreign portfolio inflows and financial integration does not exist in the opposite direction. I show that stocks that experience an increase in foreign ownership are not more financially integrated in the past, i.e. the foreign portfolio flows are not a response to increased financial integration.

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1 Introduction

The goal of this paper is to explain *de facto* financial integration with foreign equity ownership at the individual stock level. The main research question is whether increases in foreign ownership lead to greater financial integration with global markets on the cross-section of individual stocks. Financial integration is broadly defined as the relative explanatory power of global factors over local factors in explaining the variation in returns. I use the data set on monthly foreign portfolio investment flows in the Turkish stock market. I show that changes in foreign ownership is an economically and statistically significant determinant of financial integration.

Global financial integration has important implications for asset pricing and international portfolio allocation. The degree to which individual stocks are integrated with global markets helps to determine the correct model specification for asset pricing. In the case of perfectly integrated global markets, the expected excess returns of equities are modeled by their covariance with global pricing factors (e.g. Stulz (1981a, 1981b)). Semi-integrated models use both global and local factors to explain asset returns (e.g. Errunza and Losq (1985)).[1] The switch from the local to global factor models has an enormous importance for local firms, since it directly determines the cost of equity and consequently the firm valuation. The level of global integration of stocks also determines their correlation with global factors and therefore has important portfolio allocation implications.[2] Therefore, international portfolio diversification requires information about the level of financial integration of individual securities.

Financial liberalizations is the most common *de jure* financial integration measure for the local markets. Various studies analyze the effects of financial integration on local markets using financial liberalization dates as proxies. The evidence suggests that there

[1] Stulz (1995, 1999) summarizes the theoretical work on the development of international asset pricing models.

[2] Brooks and DelNegro (2005) show the importance of financial integration in obtaining international diversification and use it for reducing the portfolio risk.

are stock price increases during financial liberalizations followed by a reduction in future expected returns of local stocks.[3] There is also an increase in foreign equity flows into local markets and in the size of local equity markets following financial liberalizations (e.g. Bekaert, Harvey and Lundblad (2002) and Henry (2000b)). Financial liberalizations also have a positive effect on the real economy of the local market. Levine and Zervos (1996) and Bekaert, Harvey and Lundblad (2005) show that financial liberalizations lead to higher rates of economic growth. Moreover, financial liberalizations are shown to be associated with higher levels of financial leverage in the local markets.[4] Bae, Bailey and Mao (2006) find a positive link between financial liberalizations and informational efficiency of local markets.

There are certain potential shortcomings of using financial liberalization dates as proxies for financial integration. For studies that measure the effects of financial integration on local markets the use of financial liberalization dates introduces endogeneity concerns. The potential endogeneity is due to the fact that local governments can decide on financial liberalizations in anticipation of future changes in local markets. In addition, numerous studies have empirically tested whether financial liberalizations lead to financial integration of local markets. The evidence suggests that financial liberalizations do not necessarily lead to instant *de facto* financial integration of local markets (e.g. Bekaert and Harvey (1995) and Bekaert, Harvey and Lumsdaine (2002)). In fact, Bekaert and Harvey (2000), Eiling and Gerard (2007) and Carrieri, Errunza and Hogan (2007) find that there is time variation in financial integration of local markets. Several studies examine the potential shortcomings of financial liberalizations as proxies for financial integration. International country funds, multinational corporations and cross-listed

[3]Bekaert and Harvey (2000) show that there is a 5 to 75 bps decrease in cost of capital following financial liberalizations. Henry (2000a) reports a stock price increase associated with financial integration as high as 3.3% per month. de Jong and de Roon (2005) document that across emerging markets a 5.5% decrease in segmentation translates to a 4.5% reduction in expected returns. Chari and Henry (2004) show that with liberalizations local stocks undergo price revaluations of up to 15%.

[4]Jaramillo, Schiantarelli and Weiss (1996) show that small firms have less financial constraints following financial liberalization in Ecuador.

stocks can result in the integration of a group of local stocks before the legal liberalization dates.[5] In addition, there is evidence from the home bias literature based on the actual portfolio holdings of foreign investors in financially liberated markets. Edison and Warnock (2004) show that there is less home bias for cross-listed stocks from emerging markets that are already financially integrated in *de jure* terms. Another potential issue with legal policy changes is the credibility of local governments. International investors may not interpret the liberalization of the local market as a credible commitment for the future, which effectively means that the investment barriers are not removed for the local market.[6] In this study, I show that foreign equity ownership explains *de facto* financial integration across individual stocks from a local market that is financially integrated in *de jure* sense.

I explain the variation in financial integration across individual stocks. My analysis is based on financial integration at individual stock level within a single market, and in that aspect it differs from index level analysis, which uses individual country or region level index returns. There is an important caveat of analyzing financial integration at index level, which is the exclusion of small-cap stocks. All MSCI and country specific stock indices are constituted of large-cap stocks that are internationally well known and may not be representative of the entire universe of local individual stocks. However, the exclusion of small firms in terms of financial integration can be problematic as shown by Christoffersen, Chung and Errunza (2006), who document that small firms are affected differently by financial liberalizations compared to large firms. Furthermore, cross-country studies that explain country level financial integration face the difficulty of controlling for the unobserved country specific factors. In this study, the use of a single market also mitigates the risk of omitted factors that can affect the empirical relationship

[5]See Mittoo (1992) and Foerster and Karolyi (1999) for cross-listed stocks, and Lombard, Roulet and Solnik (1999) for multinational corporations.

[6]See Bartollini and Drazen (1997) for a detailed model of the credible liberalization policies by local authorities.

between financial integration and its determinants. Another advantage of the individual stock level analysis that it has a direct portfolio allocation implication which is absent in index level studies as described in more detail by Pukthuanthong and Roll (2009).

I use changes in foreign equity ownership to explain changes in financial integration. Foreign equity ownership is an intuitive variable to link the actual financial integration in already financially liberalized markets as it constitutes a proxy for the widening investment opportunities sets for foreign investors in the local market. The extreme case is the pre financial liberalization state of local markets, where there is full restriction on foreign equity ownership, which characterizes perfect segmentation. In the case of completely open markets, foreign equity ownership can be thought of as a variable that measures implicit barriers foreign investors face when investing in local stocks or alternatively, the level of their awareness of local stocks. Three related studies empirically analyze the effect of foreign equity ownership on financial integration. Edison and Warnock (2003) use a measure that is based on the intensity of capital controls, which is considered as an obstacle for foreign equity ownership. Bartram, Griffin and Ng (2009) use a proxy for foreign ownership to explain the return co-movements of stocks from different countries. They conclude that foreign equity ownership is an important determinant of return co-movements in addition to other economic fundamentals. Lau, Ng and Zhang (2009) show that the degree of home bias for local countries, which is a country level proxy for the level of foreign equity ownership, is important for cost of equity in local markets.[7] Foreign ownership is crucial for Stulz (2005), who explains the limits of financial integration with corporate governance problems. In his model, concentrated ownership structures are optimal in countries with poor corporate governance but such concentration of ownership prevents foreign equity ownership and thus inhibits financial integration. This study contributes to the recent literature that attempts to explain *de facto* financial in-

[7]Low degrees of home bias or high levels of foreign equity ownership lead to better global risk sharing and lower cost of capital in local markets.

tegration with macroeconomic variables across countries. Chambet and Gibson (2005) use international trade diversification to explain financial integration. Bekaert, Harvey, Lundblad and Siegel (2009) explain the variation of financial integration across countries with political risk profiles and stock market development measures. Carrieri, Chaieb and Errunza (2009) relate financial integration to variables that measure the informational barriers institutional investors face.

In this study, I analyze financial integration on the cross-section Turkish stocks. In terms of explaining individual stock level financial integration within local markets this study is related to previous literature that uses partially liberalized markets from a legal stand point (e.g. Hietala (1989), Jaramillo, Schiantarelli and Weiss (1996), and Domowitz, Glen and Madhavan (1997)). The novel contribution of this study is to explain the cross-sectional differences in financial integration within a local market. The cross-sectional variation in global financial integration is explained with foreign portfolio inflows. The lead-lag relationship between foreign portfolio inflows and financial integration are both statistically and economically strong. A 1.4% (i.e. one standard deviation) increase in foreign ownership corresponds to up to a 3.3% greater relative explanatory power of the global factors in explaining local stock returns. The results are also robust to exogenous factors that potentially can affect the relationship between foreign portfolio inflows and financial integration, such as size, foreign trading volume, and previous levels of foreign ownership. The results also support a causal link between foreign portfolio inflows and financial integration. The lead-lag relationship between foreign portfolio inflows and financial integration suggests that foreign portfolio inflows precede financial integration. Moreover, the lead-lag relationship is only in one direction. Foreign investors do not invest more in stocks that were more financially integrated in the past. In addition to individual stock level analysis, I also analyze the effect at portfolio level primarily for robustness concerns to complement the individual stock level analysis.

The remainder of the paper is organized as follows. Section 2 describes the data set

and the variables, and provides background information on the Turkish Stock Market. Section 3 introduces the financial integration measures. Section 4 explains the lead-lag relationship between foreign portfolio inflows and financial integration using panel data. Section 5 analyzes the changes in financial integration at the portfolio level and Section 6 outlines my conclusions.

2 Data and Variable Descriptions

2.1 Data

The novel data set employs two sources. I collect monthly foreign portfolio transactions for all individual stocks listed on the Istanbul Stock Exchange (ISE) between January of 1997 and June of 2008. The foreign trading data is publicly available at ISE's Web page (http://www.ise.org/). The data set includes all buy and sell transactions for each individual stock by all foreign investors. I use Datastream to collect data on stock level variables, such as returns, market capitalization and trading volume. These data sources are matched reasonably well: on average more than 95% of stocks have foreign trades and Datastream data. In addition to stock level variables, I use the MSCI world index and emerging market index return data from Datastream. The variables on foreign ownership and foreign trades as well as firm level variables from Datastream are in Turkish Lira (TL), which is the local currency. On the other hand, MSCI index returns are reported in USD. In order to convert the MSCI index returns in TL and TL variables in USD I use the foreign exchange rate series for TL/USD from the Turkish Central Bank (http://www.tcmb.gov.tr/yeni/eng/).

The Turkish Stock Market provides an excellent environment to analyze financial integration. The legal liberalization date for the ISE is long before the sample period begins (08/1989).[8] All local stocks listed on the ISE can be bought and sold by foreign investors

[8]ISE is the only stock market in Turkey. The first closed-end country fund for Turkey started at

under the same conditions as for local investors. The ISE has grown throughout the sample period. The total market capitalization increased from approximately \$49 billion in 1997 to \$225 billion in 2008 (Table 1). Furthermore, there is a strong participation of foreign investors on the ISE. Foreign trading volume increases throughout the sample period. As of 2007, on average close to 43% of the total trading volume is the result of foreign trades.

2.2 Variables

The data set includes monthly buy (b_t^i) and sell (s_t^i) trades by foreign traders at the individual stock level, and both are measured in Turkish Lira (TL). Market capitalization for individual stocks (MC_t^i) is used to measure size. Size is employed in this study for two important reasons. I use size to normalize the foreign portfolio flows in order to create a net foreign portfolio flow variable. The main explanatory variable I use in empirical tests aims to measure the change in foreign ownership for individual stocks. I use γ_t^i as the net foreign portfolio flow variable. It is defined as the ratio of foreign portfolio flows over the previous month's market capitalization ($\gamma_t^i = \frac{b_t^i - s_t^i}{MC_{t-1}^i}$). It essentially measures the percentage change in foreign ownership for an individual firm during the given month.[9] MC_t^i is also used to control for the size effect. As shown later in this section, firm size is strongly correlated with financial integration. Therefore in empirical settings I include size as a control variable to explaine financial integration. Each month, MC_t^i is defined as the market capitalization of individual stocks measured in TL. In the portfolio analysis, I also create size terciles by determining the break-points in total market capitalization of the ISE every year.

In empirical tests, I utilize two foreign participation measures as control variables. Foreign trading volume, FV_t^i, measures the average relative foreign trading volume. It is

12/89 and the first Turkish stock was cross-listed in 07/90.

[9] Griffin, Nardari and Stulz (2004) use the same method to normalize foreign portfolio flows.

defined as the ratio of foreign trading volume over total trading volume for each stock in each month. There is an upward trend in foreign trading volume in the Turkish market: the average relative foreign trading volume in individual stocks has increased from 14.20% in 1997 to 46.40% in 2008 (Table 1). FO_t^i is the proxy for the level of foreign ownership. Unfortunately, in my sample I do not observe the actual portfolio holdings of foreign investors. The proxy for stock level foreign ownership is constructed by using the past foreign portfolio flows for individual stocks. I derive the holdings of foreign investors in individual stocks by using their net inflows every month. Nominal foreign ownership is also normalized by the MC_t^i in order to control for potential concentration of foreign investors in large cap stocks (Equation 1.1).

$$FO_t^i = \sum_{k=1}^{t-12} \frac{(b_k^i - s_k^i)(1 + r_k^i)}{MC_t^i} \tag{1}$$

FO_t^i is essentially biased because I assume that at the beginning of the sample period foreign ownership is negligible relative to their inflows during the sample period. I am reasonably confident in this assumption given the enormous increase in foreign portfolio flows during the sample period. More importantly the bias in the foreign ownership variable is not likely affect the key results in the paper qualitatively since it is only used as an exogenous control variable. The main variable of interest in empirical specifications is the foreign inflows variable (γ_t^i) which measures the changes in FO_t^i. I also use a measure for stock level liquidity to control for the potential effect of liquidity on financial integration and foreign portfolio flows. AM_t^i is the measure of liquidity and is based on the price impact measure in Amihud (2002). AM_t^i is calculated as the inverse of average daily price impact measures each month (Equation 1.2).

$$AM_t^i = \frac{1}{\frac{\sum_{k=1}^{K} \frac{|r_{k\epsilon t}|}{vol_{k\epsilon t}^i}}{K}} \tag{2}$$

where $vol_{k\epsilon t}$ stands for the daily trading volume in TL within the month t and $r_{k\epsilon t}$ stands for the daily individual stock returns. RV_t^i is the measure of volatility and defined as the monthly return variance estimated with daily stock returns.

3 Financial Integration Measures

The main financial integration measure used in this study is based on the relative fit of the global and local market models for expected individual stock returns. Stock level financial integration, FI_t^i, is defined as the relative explanatory power of global factors over local ones in explaining expected stock returns. The same type of financial integration variables are used in the studies that analyze financial integration at individual stock level (e.g. Gultekin, Gultekin, Penati (1989), Korajczyk and Viallet (1989) and Errunza, Losq and Padmanabhan (1992), Chari and Henry (2004)). The central idea behind comparing the explanatory power of the global market factor to the local market factor is that, in the case of perfect financial integration, the world market factor is the only relevant factor in explaining the variation in expected returns. On the other hand, in the case of perfect segmentation, the local market factor is the only relevant factor in explaining expected returns. The financial integration variable for individual stocks is calculated as the ratio of the global market explanatory power over the local market explanatory power. Higher explanatory power of the global market factor and/or a lower explanatory power of the local factor leads to greater financial integration for individual stocks.

Another method for measuring financial integration is to use co-movements with specific global industry factors to which individual local stocks belong. The utilization of industry indices is based on the argument that most of the emerging market economies are specialized in certain industries, which make the global industry return the appropriate benchmark for financial integration. There is also empirical evidence that shows that the global industry returns explain the international index returns and dominate

country specific factors (e.g. Roll (1992) and Brooks and DelNegro (2002)). However, there is substantial later evidence in the opposite direction, showing that the dominance of industry factors was a temporary empirical phenomena and that the country specific market factors are still important in explaining returns (e.g. Heston and Rouwenhorst (1994), Griffin and Karolyi (1998), Brooks and Del Negro (2005), Bekaert, Hodrick and Zhang (2008), and De Moor and Sercu (2009)). In line of the evidence in this literature, I base the financial integration measures in this paper using country and global market indices.

I model the expected stock returns with an uncondional partially integrated world market model within each month.[10] The advantage of using the partially integrated market model is the flexibility for cases where both local and global factors are relevant for explaining expected returns. The expected returns for individual local stocks in excess of the risk-free rate is modeled with the excess expected returns of the local and global market factors (Equation 1.3).

$$E(r^i_{k\epsilon t}) - r^f_{k\epsilon t} = \alpha^i_t + \beta^i_{w,t}(E(r^w_{k\epsilon t}) - r^f_{k\epsilon t}) + \beta^i_{l,t}(E(r^l_{k\epsilon t}) - r^f_{k\epsilon t}) \tag{3}$$

Where $\beta^i_{w,t}$ and $\beta^i_{l,t}$ stand for the factor betas of the individual stocks with respect to the global and local market factors, respectively. α^i_t represents the pricing error of the partially integrated model. Financial integration variables are based on the variance decomposition of expected individual stock returns. I measure financial integration (FI^i_t) by the ratio of partial R^2 of the global market factor over the total R^2 of the partially integrated model which is the sum of the partial R^2 values for the local and global market factors (Equation 1.4). I use total systematic risk in the denominator for the formula of FI^i_t instead of the total return variance for individual stocks. The reason for excluding the idiosyncratic risk is that it can be diversified away by investors.

[10] See Stehle (1977) and Errunza and Losq (1985) for a detailed theoretical description of the partially integrated world market model.

$$FI_t^i = \frac{R^2_{global}}{R^2_{global} + R^2_{local}} = \frac{(\beta^i_{w,t})^2 \sigma^{i,2}_{t,w}}{(\beta^i_{l,t})^2 \sigma^{i,2}_{t,l} + (\beta^i_{w,t})^2 \sigma^{i,2}_{t,w}} \tag{4}$$

Where $\sigma^{i,2}_{t,w}$ and $\sigma^{i,2}_{t,l}$ stand for the return variances of the global and local market factors estimated using daily returns for each month. Higher explanatory power of the global market factor and/or lower explanatory power of the local market factor lead to a higher value of FI_t^i. The explanatory power of each factor can change due to a change in the factor-β for the individual stocks or a change in the factor return volatility. A true measure of financial integration should be due to changes in factor-β and not due to the changes in factor return volatilities. Since FI_t^i is time-varying at monthly frequency it can clearly change with time-varying volatility estimates for factor returns. However, since I analyze the relationship between financial integration and foreign portfolio flows on the cross-section of individual stocks my results are not driven by the time-varying factor return volatilities.

In order to take advantage of the panel data set I use financial integration variables that are time varying.[11] Stock level financial integration variables are estimated each month using daily returns series. International equity data from Datastream has certain data entry errors (see Ince and Porter (2006)). I use two different screenings to eliminate stocks with data errors. When I use daily data I eliminate errors by removing all daily observations with returns greater than one in absolute value and require each stock to have at least 17 return observations any given month. In the monthly data set, each stock has to have at least nine valid return, trading volume and price observations in a given year to be included in the data set. My final data set includes 38,168 stock-month observations that have a financial integration measure.

The empirical estimation of the model is done each month using daily realized returns for the local and global market indices and individual stock returns. The underlying

[11] Monthly estimation of the unconditional partially integrated market model with daily returns is based on the assumption that financial integration is not time-varying within a given month.

modeling assumption behind the monthly estimation using daily returns is that within the month the coefficients are constant. For the global market factor I employ the daily returns of the MSCI world index. For the local market factor the value-weighted average returns of individual stocks is used.[12] In order to avoid potential multicollinearity biases between local and global index returns I use a two-step estimation method where in the first step the local factor returns are orthogonalized with respect to the global factor returns. In the second step the orthogonalized local factor returns are used with global factor returns to estimate the individual stock betas.[13] FI_t^i for individual stocks is estimated using the local and global beta estimates and monthly return variances of the local and global factors.

In addition, I utilize an alternative financial integration measure that uses the MSCI index returns for emerging markets as the global factor returns. The main reason behind using an emerging markets index as the global factor is the structural differences between developed and emerging stock markets. Moreover, Brooks and Del Negro (2002) show the importance of regional factors in explaining in stock returns. $EMFI_t^i$ is the financial integration measure that uses the MSCI index returns for emerging countries as the global factor.

In order to analyze variation in financial integration across individual firms, I begin by estimating average pair-wise cross-sectional correlation coefficients. Pair-wise cross-sectional correlations between the financial integration measures and firm level variables are reported in Table 2. The calculation of average correlation coefficients is done in two steps. In the first step, monthly pair-wise correlation coefficients between the financial integration measures and firm level variables are calculated on the cross-section of indi-

[12]The main results in the rest of the paper do not depend on the choice of the local market index. The positive lead-lag relationship between foreign equity ownership and financial integration persists if I use equal-weighted average of the local stock returns as the local market factor returns.

[13]The same method is used by numerous studies that have tested mild global financial integration at individual stock level, e.g. Stehle (1977), Jorion and Schwartz (1986), Gultekin, Gultekin and Penati (1989), Errunza, Losq and Padmanabhan (1992), and Mittoo (1992)

vidual stocks. In the second step, the time-series averages of the estimated correlation coefficients are calculated. Table 2 summarizes the correlation patterns between financial integration variables and firm level variables.

The results in Table 2 identify several important sets of correlations, such as the preferences of foreign investors across different stock characteristics. There is higher foreign ownership of larger stocks that are more liquid and less volatile. Moreover, the foreign trading volume variable, FV_t^i, suggests that foreign investors trade larger stocks more and avoid illiquid and volatile stocks. The correlation structure between foreign trading variables and firm level variables confirm previous results in the home bias literature, which suggests that foreign investors trade and own large stocks in their foreign equity investments.

There is a strong correlation between the financial integration variables and the firm level variables, such as, size, foreign trading volume, foreign ownership, liquidity, and return volatility. There is a high positive correlation between both financial integration variables. Stocks, for which the global market factor has a relatively higher explanatory power also seem to be more integrated with the emerging markets index. The most striking result from Table 2 is that financial integration seems like a 'small stock' phenomena on the cross-section of individual stocks. Both FI_t^i and $EMFI_t^i$ are negatively correlated with size and liquidity, and positively correlated with volatility.

To analyze the negative correlation between size and the financial integration variable, I decompose FI_t^i into global and local components. One potential explanation of this pattern is the negative coefficient in front of the local market explanatory power in the formula for FI_t^i. If the explanatory power of both local and global factors are positively related to size there can be still a negative correlation with FI_t^i, since there is a minus sign in front of the local component. In other words, if the correlation between size and the explanatory power of the local market factor is higher than the one between size and the explanatory power of the global market factor, this counterintuitive result can be

explained as one of mechanical nature. The absolute values of the local and global beta estimates are used as the local and global components of FI_t^i. I use absolute values of betas instead of partial R^2 values in order to avoid the effect of stock level return volatility. $\mid \beta_{w,t}^i \mid$ is the absolute value of the local beta and corresponds to a higher explanatory power of the global factor on the cross-section of individual stocks. Similarly, $\mid \beta_{l,t}^i \mid$ is the absolute value of the local beta and leads to higher explanatory power of the local market factor for individual stocks. The local component of the financial integration measure suggests that the local beta is greater in absolute value for larger stocks. Moreover, the global component is positively correlated to size but the correlation is weak compared to the local component. Hence, the results in Table 2 suggest that the negative correlation between size and financial integration is of a mechanical nature.

4 Foreign Portfolio Flows and Financial Integration

4.1 The lead-lag relationship between foreign portfolio flows and financial integration

The main goal in this section is to show that an increase in foreign ownership leads to greater financial integration on the cross-section of individual stocks. In order to analyze the dynamic relationship between financial integration variables and foreign portfolio inflows I use lead-lag variables. The use of the lead-lag variables helps to minimize potential endogeneity concerns between foreign portfolio flows and financial integration. The use of contemporaneous values for financial integration and foreign portfolio inflows can suffer from endogeneity issues, since it is hard to determine the direction of the causal link between two variables. One could easily interpret the positive contemporaneous regression coefficient as the preference of foreign investors for stocks that are more financially integrated. Moreover, I use the lead-lag relationship as evidence to support the causal

link between foreign portfolio flows and financial integration. The main result in this section is that on the cross-section of stocks higher foreign portfolio inflows correspond to higher financial integration. I use the Fama and MacBeth (1973) (henceforth FM) regression methodology which includes estimation of the cross-sectional model each month. In the second step the time series averages of the cross-sectional coefficient estimates are taken. Heteroskedasticity- and autocorrelation-robust standard errors for the time-series averages of the coefficient estimates are calculated to determine the significance levels of the FM results.

The lead-lag relationship between foreign portfolio inflows and financial integration is tested by regressing each financial integration variable on the lagged foreign portfolio inflows (γ^i_{t-1}) on the cross-section of individual stocks. Each month I estimate the cross-sectional model and then take the time series averages in line with FM method. The results are reported in Table 3.[14] In order to control for exogenous effects, the cross-sectional regressions are estimated using various firm level controls in different empirical specifications. In the most basic specification, I do not use any control variables and estimate univariate cross-sectional regressions. In the second specification, I use size (MC^i_t) as the only control variable. In other specifications, variables such as level of foreign ownership (FO^i_{t-1}), foreign trading volume (FV^i_t), liquidity (AM^i_t), and return volatility (RV^i_t) are added as control variables. Furthermore, I control for the lagged values of the financial integration variable (FI^i_{t-1}) to minimize the threat of endogeneity due to unobserved factors that can dynamically determine both financial integration and foreign portfolio flows.[15]

The variable of interest is foreign portfolio flows which can also be interpreted as

[14] In FM regressions, I use the data starting from 01/1998. The reason for not using the data from 1997 is the way I construct the foreign ownership variable, FO^i_t, which is cumulatively created using γ^i_t. I use 1997 to create more sensible estimates for firm level foreign ownership variable. The results are qualitatively similar if I include 1997 in estimation.

[15] The use of lagged values of the financial integration variable as a right hand side variable in cross-sectional regressions also controls for the effect of the potential time series persistency in FI^i_t.

the changes in foreign ownership. The results suggest a strong lead-lag relationship between foreign portfolio inflows and financial integration. The statistical significance of the effect is high: Except the first specification the coefficient estimate of γ^i_{t-1} is significant at the 5% level. The effect also has high economic significiance: a 1.4% increase in (γ^i_{t-1}) corresponds to close to 3.3% higher relative explanatory power of the global factor. The coefficient estimates for firm level control variables confirm the correlation structure in Table 2. The use of control variables mostly does not reduce the economic significance of the effect. Most importantly, the effect of foreign portfolio inflows is robust to lagged levels of foreign ownership, showing the incremental effect of increases in foreign ownership.

One potential concern with the results in Table 3 is that the financial integration variables are estimated using the returns measured in local currency, which can be problematic in the case of high inflation in the local market. As a robustness check I estimate the financial integration measure (DFI^i_t) using returns measured in USD and use firm level control variables measured in USD. In Table 4 I report the results with DFI^i_t. The results in Table 4 are qualitatively similar to those in Table 3 suggesting that potential effects of high levels local market inflation do not affect the relationship between foreign portfolio flows and financial integration.

Another robustness check for the results in this section is the choice of the global market factor used in the estimation of financial integration variable. As suggested by Brooks and Del Negro (2002) and Eiling and Gerard (2007) the regional factors have become more important in explaining individual stock returns. In order to address this robustness concern, I report the results with the emerging market financial integration variable, $EMFI^i_t$, in Table 5. The results in Table 5 qualitatively confirm the positive effect of the past foreign portfolio flows on financial integration on the cross-section of individual stocks. From this section, I conclude that the positive lead-lag relationship between foreign portfolio inflows and financial integration is economically and statistically

significant on the cross-section of Turkish stocks. The effect is also robust to the currency used to measure returns and the choice of global market index.

4.2 The Symmetry of the Relationship

In this section, I analyze the symmetry of the effect of foreign portfolio flows by addressing the question of whether the effect is symmetric for global and local components of the financial integration measure, FI_t^i. I test whether foreign portfolio inflows lead to lower (higher) explanatory power of the local (global) factor on the cross-section of individual stocks. In order to analyze the symmetry of the effect, I first decompose FI_t^i into two components: $\mid \beta_{w,t}^i \mid$ stands for the global component and is the absolute value of the global market factor beta. Greater explanatory power of the global market factor corresponds to a higher $\mid \beta_{w,t}^i \mid$ on the cross-section of individual stocks. On the other hand, $\mid \beta_{l,t}^i \mid$ is defined as the absolute value of the local market factor beta and is negatively related to financial integration on the cross-section of individual stocks.

The FM regression results are reported in Table 6. The results suggest that changes in foreign ownership are a positive factor for the global component and a negative factor for the local component of FI_t^i. The statistical significance of the effect is higher for the local component. In five out of six empirical specifications the coefficient estimate for $\mid \beta_{l,t}^i \mid$ is statistically significant at the 5% level. The statistical significance is lower for the global component: only in one specification the coefficent estimate for $\mid \beta_{w,t}^i \mid$ is statistically significant at the 5% level. On the other hand, the economic significance of the effect is higher for the global component. A 2.4% increase in γ_{t-1}^i corresponds to a 15% higher $\mid \beta_{w,t}^i \mid$ and to a 7% lower $\mid \beta_{l,t}^i \mid$ on the cross-section of individual stocks.

4.3 Quarterly Results

One potential concern with the monthly results in the previous sections is the possibility of using noisy financial integration variables. The monthly financial integration variables in previous sections are estimated for each stock-month observation using daily returns. I motivate the analysis of quarterly financial integration variables by the low number of degrees of freedom in the estimation of monthly financial integration variables. In this section, I reproduce the main results in Table 3 with quarterly financial integration variables and foreign portfolio inflows. In order to maximize the power of the FM estimation, I use overlapping periods and not calendar quarters. Starting from the first quarter (1997/02-1997/04) the cross-sectional estimation is done by regressing the quarterly financial integration variable on the last quarter's foreign portfolio flows. For the next period the quarter is moved forward by one month (1997/03-199/05). The results are reported in Table 7. There is a statistical significant lead-lag relationship between foreign portfolio flows and financial integration on the cross-section of local stocks for all the empirical specifications. The economic significance of the effect seems to be lower compared to the results with monthly frequency: a 4% increase in last quarter's foreign portfolio inflows correspond to a 0.3% higher relative explanatory power of the global market factor.

4.4 Panel Regression Result

So far, I have documented the lead-lag relationship between foreign ownership and financial integration using the FM regressions. One of the disadvantages of using FM regressions with panel data is the potential overestimation of statistical significance for coefficient estimates (Skoulakis (2008)). In this section, I conduct the empirical analysis using panel regressions. The biggest advantage of FM regressions compared to panel regressions is the ability to focus on the cross-sectional effect. On one hand, the FM

regressions are based on estimating the time-series average of cross-sectional coefficient estimates. On the other hand, with panel regressions the cross-sectional and time-series effects are analyzed simultaneously, which prevents the study of each effect in isolation.

The panel regressions are estimated on the pooled sample with firm- and month- fixed effects. The results for the same empirical specifications are reported in Table 8. The results suggest a significant decline in the statistical and economic significance of the main coefficient of interest, which shows the effect γ^i_{t-1} on FI^i_t. Lagged foreign portfolio inflows are only significant at 10% level and their level of economic significance is around 4% of the ones from monthly FM regressions. Most of the other variables have similar coefficient estimates to the FM regressions except the one for foreign trading volume, which seems to be a positive determinant of financial integration in panel regression analysis.

4.5 Reverse Causality

Here I analyze the lead-lag relationship between foreign portfolio flows and financial integration in the opposite direction. The main question is whether foreign investors choose stocks that were financially more integrated in the past to invest in. The analysis of the reverse lead-lag relationship is necessary in order to rule out the endogeneity bias and the reverse-causality between the two variables. Results in this section contribute to the argument on the causal effect of foreign ownership on financial integration. The basic empirical framework in this section is regressing the foreign investment inflows (γ^i_t) on lagged financial integration variables by controlling for firm level variables.

The results are for the reverse lead-lag relationship are reported in Table 9. There is clear evidence against the reverse causality argument. The coefficient estimate for the lagged financial integration variable lacks statistical significance in all empirical specifications. Foreign investors do not prefer stocks that were more financially integrated in

the past when allocating their portfolios.

The overall conclusion in Section 4 is that there is a robust lead-lag relationship between foreign portfolio inflows and financial integration on the cross-section of Turkish stocks. The relationship is robust to use of monthly and quarterly financial integration variables. Foreign portfolio inflows affect both components of the financial integration measure: Higher foreign equity ownership leads to higher (lower) explanatory power of the global (local) market factor. The statistical significance of the effect declines with the estimation using panel regressions, which indicates that the cross-sectional effect is stronger for Turkish stocks.

5 The Portfolio Analysis

In order to provide further robustness checks and to analyze the duration of the effect of foreign portfolio inflows on financial integration a portfolio analysis is conducted in this section. The portfolio analysis is used to remedy the potential noise concerns regarding the individual stock level results in the previous sections. With the portfolio analysis, I estimate financial integration at portfolio level, which does not suffer from the potential noisy estimates at individual stock level. Moreover, the duration of the effect is also tested with the portfolio analysis.

The portfolio analysis is based on grouping stocks by their past cumulative foreign portfolio inflows into portfolios. The future returns of the different portfolios are analyzed in terms of global financial integration. The advantage of the portfolio analysis is the reduced amount of noise in the data and to be able to directly detect the duration of the effect of foreign portfolio investments on financial integration. The downside of the portfolio analysis is the lack of exogenous controls that can affect the relationship between the changes in foreign ownership and financial integration, which can be easily done with the regression analysis given in the previous sections. In other words, the degree of

financial integration of different portfolios are not controlled for with firm level controls. There is some control for the size variable as part of the portfolio formation method. The stocks are conditionally sorted by changes in foreign ownership after controlling for size.

5.1 The Results

I employ a portfolio formation period of six months. In order to control for the effect of size on the relationship between foreign ownership and financial integration, I use a double-sorting method. Each month, I first sort stocks by size (MC_t^i) and then by their cumulative foreign equity inflow variables in the last six months ($cum\gamma_t^i$=$\sum_{s=t-5}^{t} \gamma_s^i$).[16] The stocks are sorted into three portfolios by their $cum\gamma_t^i$ values. For each portfolio the value-weighted portfolio returns are calculated. The low, medium and high portfolios formed by their past changes in foreign ownership are called pf_t^l, pf_t^m and pf_t^h, respectively. In addition, pf_t^s is the spread portfolio that is created by subtracting the returns of the low foreign ownership portfolio from the high foreign ownership portfolio (pf_t^h-pf_t^l). The idea is that the spread portfolio tracks the difference in the return patterns between the portfolios with high and low changes in foreign ownership.[17]

The future returns of the portfolios are analyzed in terms of their global financial integration. For each portfolio the future returns of k months ahead of the end of the portfolio formation period are regressed on global and local factors to create financial integration measures. I analyze future portfolio returns up to a year into the future (k=12). For each different k the portfolio returns are regressed on global market returns and orthogonalized local returns for the partially integrated model. Similar to the previous sections, the financial integration of the different portfolios is measured as the ratio

[16] I use portfolio formation periods where the past cumulative foreign inflows of three months and a year are used. Only the results for the portfolio formation period of six months are reported in the paper as the other results are qualitatively similar.

[17] With the portfolio formation period of six months the portfolio of high changes in foreign ownership (pf_t^h) receives a monthly average γ_t^i of 3.7% which is significantly higher compared to the -2.85% monthly γ_t^i of the negative changes in foreign ownership portfolio (pf_t^l).

of the global partial R^2 over the total R^2. I report the financial integration measure for the portfolios with high and low levels of foreign portfolio inflows (pf_t^h and pf_t^l) in Table 10.

The results suggest that there is an increase in financial integration of the pf_t^h at the start of the portfolio holding period. For most of the non-negative values of k FI_t^h is higher than FI_t^l. The financial integration values prior to the portfolio formation period (k¡0) suggest that the results are not driven by the potential endogeneity between foreign portfolio flows and financial integration. In other words, the results in Table 10 confirm the previous finding that foreign investors do not prefer stocks that were more financially integrated prior to the portfolio formation period.

In order to analyze the changes in local and global market betas, I estimate the partially integrated model for the spread portfolio (pf_t^s). In Table 10, the local and global betas of the pf_t^s are reported. The results suggest that the increase in FI_t^i during the portfolio formation period is because of higher global betas of the pf_t^h compared to pf_t^l. The spread portfolio has positive global market betas throughout the portfolio holding period. Furthermore, the spread portfolio also has negative local market betas showing the higher local market betas of the pf_t^l compared to pf_t^h.[18] The values of the local and global market betas for the period prior to portfolio formation (k¡0) shows that the results are not driven by a potential endogeneity between foreign portfolio flows and financial integration.

6 Conclusions

In this study, I establish firm level evidence that is indicative of a causal link between foreign portfolio inflows and financial integration at the cross-section of individual stocks.

[18] Given that throughout the sample the average return for the global and local market returns are 1.5% and 2.5% per month, respectively, I also calculate the cost of equity implication of financial integration. The differences in local and global betas between pf_t^h and pf_t^l corresponds to lower cost of equity of pf_t^h of up to 2.88% per annum.

The lead-lag effect between foreign portfolio inflows and financial integration has high economic significance and is robust to firm level controls, such as size, foreign trading volume and levels of past foreign ownership. Further, the lead-lag relationship exists only in one direction; foreign investors do not invest more in stocks with high levels of financial integration. The effect is also temporary. The portfolio analysis shows that foreign portfolio inflows of six months triggers high financial integration, which disappears in less than a year. The results should be interpreted with some caution, however, as the estimates potentially can suffer from other endogeneity biases. Specifically, the findings are observationally equivalent to a scenario where a third factor causes both foreign portfolio inflows and financial integration.[19] I am cautions of claiming the documentation of a unidirectional causal link since the results can potentially suffer from other endogeneity biases.

My results are also important since financial integration has cost of equity implications for local firms. A natural consequence of higher financial integration of individual stocks is changes in their global and local market betas. A higher (lower) global (local) market beta is important for local firms in terms of having lower cost of equity and therefore easier access to equity financing.

[19] In regressions the use of the lagged values of the left hand side variables as a control variable on the right hand side minimizes the risk of the possibility having a third factor that determines both variables.

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8 Tables

Table 1: Summary Statistics for the Turkish Market. Summary statistics for foreign portfolio flows in Turkish stock market between 1997/01-2008/06. MC^{ise} stands for the market capitalization of the ISE measured in USD. FV_t^{avg} is the average relative foreign trading volume across individual stocks. FI_t^{avg} is the value-weighted average financial integration variable across individual stocks. $pR_l^{2,avg}$ and $pR_g^{2,avg}$ stand for the average partial R^2 of the local and global market factors from partially-integrated CAPM model for individual stocks, respectively. r_t^{avg}, RV_t^{avg} and AM_t^{avg} stand cross-sectional averages for TL return, realized return volatility and Amihud (2002) liquidity measure across individual stocks, respectively.

year	MC^{ise}	FV_t^{avg}	FI_t^{avg}	$pR_g^{2,avg}$	$pR_l^{2,avg}$	r_t^{avg}	RV_t^{avg}	$AM_t^{avg}{}_{*10^{-9}}$
1997	\$48.8bn	27.03%	30.20%	13.50%	39.10%	11.50%	27.2%	0.15
1998	\$51.1bn	25.20%	21.50%	10.80%	51.90%	-0.40%	28.4%	0.42
1999	\$56.9bn	27.30%	22.40%	11.40%	51.40%	15.50%	20.3%	1.09
2000	\$99bn	23.10%	16.04%	8.90%	58.02%	-3.40%	21.2%	2.99
2001	\$43.8bn	20.80%	23.30%	15.60%	55.70%	4.70%	21.4%	2.78
2002	\$38.6bn	23.30%	22.80%	13.40%	54.10%	-0.90%	12.1%	3.18
2003	\$43.9bn	26.60%	22.30%	11.50%	54.40%	4.80%	10.0%	5.81
2004	\$74bn	37.40%	26.80%	12.80%	47.50%	2.80%	10.2%	8.94
2005	\$117bn	50.90%	34.90%	15.10%	36.60%	3.90%	10.1%	12.4
2006	\$158bn	49.90%	30.10%	14.10%	42.90%	-0.20%	10.0%	14.5
2007	\$230bn	52.20%	39.20%	18.50%	35.70%	2.10%	10.1%	19.1
2008/01-06	\$226bn	42.90%	37.10%	17.60%	37.30%	-3.80%	10.1%	17.0

Table 2: Average Cross-Sectional Correlation between Variables. Correlation structure between the financial integration variables and firm characteristics for the sample period 1997/01-2008/06. Each month pair-wise correlation coefficients between the variables are calculated. The time-series averages of monthly cross-sectional correlation coefficients are reported. t-values are reported below the averages. MC_t^i stands for market capitalization. FV_t^i stands for the foreign trading volume relative to the total trading volume. FO_t^i stands for foreign ownership. AM_t^i is a measure of liquidity and stands for the inverse of the average daily price pressures each month. RV_t^i is the monthly realized volatility created using daily returns. FI_t^i is the measure of financial integration and is defined as the ratio of the partial R^2 of the global factor over the total R^2 of the partially integrated market model for individual stock returns. $\mid \beta_{w,t}^i \mid$ and $\mid \beta_{l,t}^i \mid$ stand for the absolute values of the global and local market factor betas, respectively. $EMFI_t^i$ is an alternative financial integration variable that is estimated with MSCI emerging market index.

	MC_t^i	FO_t^i	FV_t^i	AM_t^i	RV_t^i	FI_t^i	$\mid \beta_{w,t}^i \mid$	$\mid \beta_{l,t}^i \mid$	$EMFI_t^i$
MC_t^i	1								
FO_t^i	0.055	1							
	(2.78)								
FV_t^i	0.643	0.089	1						
	(126.63)	(3.79)							
AM_t^i	0.632	-0.053	0.568	1					
	(97.18)	(-3.12)	(102.29)						
RV_t^i	-0.125	0.008	-0.058	-0.028	1				
	(-11.87)	(1.27)	(-5.85)	(-2.33)					
FI_t^i	-0.126	0.021	-0.111	-0.137	0.094	1			
	(-13.37)	(3.04)	(-12.93)	(-14.55)	(10.11)				
$\mid \beta_{w,t}^i \mid$	0.038	0.005	0.031	0.040	-0.015	0.775	1		
	(4.44)	(0.76)	(3.77)	(4.13)	(-1.96)	(84.70)			
$\mid \beta_{l,t}^i \mid$	0.317	-0.0.04	0.272	0.340	-0.184	-0.545	-0.025	1	
	(29.31)	(-3.73)	(28.40)	(31.66)	(-18.31)	(-43.09)	(-1.38)		
$EMFI_t^i$	-0.189	0.015	-0.167	-0.208	0.047	0.361	0.052	-0.577	1
	(-18.10)	(2.16)	(-17.57)	(-20.85)	(4.14)	(26.31)	(3.42)	(-44.31)	

Table 3: Financial Integration and Foreign Portfolio Inflows. Fama and MacBeth (1973) (FM) regression results for the relationship between foreign portfolio flows and financial integration for the sample period 1997/01-2008/06. FI_t^i is the measure of financial integration and is defined as the ratio of the partial R^2 of the global factor over the total R^2 of the partially integrated market model for individual stock returns. The FM results for the lead-lag relationship between foreign portfolio flows and financial integration are reported. Each month the financial integration variable (FI_t^i) is regressed on the previous month's foreign portfolio inflows (γ_{t-1}^i). MC_t^i stands for market capitalization. FV_t^i stands for the foreign trading volume relative to the total trading volume. FO_t^i stands for foreign ownership. AM_t^i is a measure of liquidity and stands for the inverse of the average daily price pressures each month. RV_t^i is return volatility and estimated with daily return each month. Robust t-statistics are reported in parenthesis below the FM coefficient estimates.

	FI_t^i	FI_t^i	FI_t^i	FI_t^i	FI_t^i	FI_t^i	FI_t^i
α	0.425	0.441	0.369	0.374	0.378	0.381	0.342
	(33.64)	(37.67)	(37.91)	(29.70)	(30.14)	(29.93)	(24.95)
γ_{t-1}^i	0.340	0.513	0.567	0.638	0.341	0.353	0.365
	(1.75)	(2.91)	(3.36)	(3.93)	(2.07)	(2.25)	(3.34)
$MC_{t*10^{-10}}^i$		-9.10	-7.25	-6.51	-6.56	-7.79	-51.6
		(-10.05)	(-9.53)	(-8.65)	(-8.77)	(-6.49)	(-6.45)
FI_{t-1}^i			0.177	0.175	0.172	0.165	0.153
			(20.15)	(19.85)	(19.80)	(19.29)	(19.06)
FV_t^i				-0.096	-0.101	-0.102	-0.086
				(-5.50)	(-6.31)	(-6.47)	(-5.50)
FO_{t-1}^i					0.267	0.241	0.233
					(7.54)	(6.97)	(6.78)
$AM_{t*10^{-10}}^i$						-1.12	-1.04
						(-2.80)	(-2.68)
RV_t^i							37.64
							(12.68)
N	128	128	128	128	128	128	128

Table 4: Financial Integration Measured in USD returns and Foreign Portfolio Inflows. Fama and MacBeth (1973) (FM) regression results for the relationship between foreign portfolio flows and financial integration for the sample period 1997/01-2008/06. DFI_t^i is the measure of financial integration measured with USD returns and is defined as the ratio of the partial R^2 of the global factor over the total R^2 of the partially integrated market model for individual stock returns. The FM results for the lead-lag relationship between foreign portfolio flows and financial integration are reported. Each month the financial integration variable (DFI_t^i) is regressed on the previous month's foreign portfolio inflows (γ_{t-1}^i). MC_t^i stands for market capitalization. FV_t^i stands for the foreign trading volume relative to the total trading volume. FO_t^i stands for foreign ownership. AM_t^i is a measure of liquidity and stands for the inverse of the average daily price pressures each month. RV_t^i is return volatility and estimated with daily return each month. Robust t-statistics are reported in parenthesis below the FM coefficient estimates.

	DFI_t^i	DFI_t^i	DFI_t^i	DFI_t^i	DFI_t^i	DFI_t^i	DFI_t^i
α	0.381	0.394	0.331	0.336	0.338	0.341	0.297
	(34.90)	(34.87)	(27.89)	(28.00)	(28.46)	(28.30)	(22.89)
γ_{t-1}^i	0.376	0.522	0.529	0.587	0.305	0.342	0.356
	(2.16)	(3.28)	(3.40)	(3.80)	(2.05)	(2.23)	(2.31)
$MC_{t*10^{-11}}^i$		-8.29	-6.63	-5.75	-5.82	-4.68	-4.59
		(-9.28)	(-8.84)	(-7.84)	(-7.97)	(-6.17)	(-6.08)
DFI_{t-1}^i			0.176	0.170	0.168	0.165	0.142
			(15.31)	(15.96)	(16.02)	(15.89)	(14.50)
FV_t^i				-0.097	-0.099	-0.099	-0.079
				(-5.89)	(-6.09)	(-6.16)	(-4.94)
FO_{t-1}^i					0.245	0.228	0.216
					(6.74)	(6.34)	(6.14)
$AM_{t*10^{-11}}^i$						-10.8	-10.1
						(-2.33)	(-2.23)
RV_t^i							47.94
							(11.82)
N	128	128	128	128	128	128	128

Table 5: Financial Integration to Emerging Market Index and Foreign Portfolio Inflows. Fama and MacBeth (1973) (FM) regression results for the relationship between foreign portfolio flows and financial integration for the sample period 1997/01-2008/06. $EMFI_t^i$ is the measure of financial integration to MSCI emerging market index and is defined as the ratio of the partial R^2 of the global factor over the total R^2 of the partially integrated market model for individual stock returns. The FM results for the lead-lag relationship between foreign portfolio flows and financial integration are reported. Each month the financial integration variable (FI_t^i) is regressed on the previous month's foreign portfolio inflows (γ_{t-1}^i). MC_t^i stands for market capitalization. FV_t^i stands for the foreign trading volume relative to the total trading volume. FO_t^i stands for foreign ownership. AM_t^i is a measure of liquidity and stands for the inverse of the average daily price pressures each month. RV_t^i is return volatility and estimated with daily return each month. Robust t-statistics are reported in parenthesis below the FM coefficient estimates.

	$EMFI_t^i$	$EMFI_t^i$	$EMFI_t^i$	$EMFI_t^i$	$EMFI_t^i$	$EMFI_t^i$	$EMFI_t^i$
α	0.551	0.564	0.5	0.507	0.509	0.513	0.494
	(46.01)	(46.83)	(35.42)	(36.27)	(36.95)	(37.01)	(32.50)
γ_{t-1}^i	0.181	0.354	0.444	0.502	0.258	0.289	0.271
	(0.91)	(1.93)	(2.51)	(2.92)	(1.52)	(1.66)	(1.60)
$MC_{t*10^{-11}}^i$		-6.58	-5.75	-4.72	-4.76	-9.72	-9.16
		(-11.31)	(-10.22)	(-9.64)	(-9.69)	(-2.64)	(-2.51)
$EMFI_{t-1}^i$			0.122	0.113	0.111	0.108	0.102
			(12.15)	(11.70)	(11.83)	(11.65)	(11.66)
FV_t^i				-0.096	-0.097	-0.098	-0.089
				(-5.60)	(-5.76)	(-5.86)	(-5.36)
FO_{t-1}^i					0.213	0.193	0.179
					(6.20)	(5.77)	(5.34)
$AM_{t*10^{-11}}^i$						-9.72	-9.16
						(-2.64)	(-2.51)
RV_t^i							17.91
							(7.49)
N	128	128	128	128	128	128	128

Table 6: The Symmetry of the Relationship: Fama and MacBeth (1973) (FM) regression results for the relationship between foreign portfolio flows and financial integration for the sample period of 1997/01-2008/06. FI_t^i is decomposed into local and global parts. $\mid \beta_{w,t}^i \mid$ stands for the absolute value of the global market factor beta from the partially-segmented model. $\mid \beta_{l,t}^i \mid$ stands for the absolute value of the local market factor beta from the partially-segmented model. The FM results for the lead-lag relationship between foreign portfolio flows and financial integration are reported. Each month the local and global squared market betas are regressed on the previous month's foreign portfolio inflows (γ_{t-1}^i). MC_t^i stands for market capitalization. FV_t^i stands for the foreign trading volume relative to the total trading volume. FO_t^i stands for foreign ownership. AM_t^i is a measure of liquidity and stands for the inverse of the average daily price pressures each month. RV_t^i is return volatility and estimated with daily return each month. Robust t-statistics are reported in parenthesis below the FM coefficient estimates.

	$\mid \beta_{l,t}^i \mid$	$\mid \beta_{l,t}^i \mid$	$\mid \beta_{l,t}^i \mid$		$\mid \beta_{w,t}^i \mid$	$\mid \beta_{w,t}^i \mid$	$\mid \beta_{w,t}^i \mid$
α	0.766	0.616	0.513	α	0.653	0.621	0.397
	(58.53)	(38.70)	(33.42)		(25.79)	(24.79)	(20.02)
γ_{t-1}^i	-0.917	-0.599	-0.726	γ_{t-1}^i	0.789	0.652	0.378
	(-2.98)	(-2.16)	(-2.91)		(2.08)	(1.55)	(0.96)
$MC_{t-1*10^{-11}}^i$	12.7	9.53	8.22	$MC_{t-1*10^{-11}}^i$	-4.99	-3.92	-2.02
	(8.82)	(7.54)	(6.25)		(-5.22)	(-4.22)	(-1.79)
$\mid \beta_{l,t-1}^i \mid$		0.192	0.168	$\mid \beta_{l,t}^i \mid$		0.074	0.023
		(14.8)	(14.19)			(9.40)	(3.26)
FV_t^i		0.062	0.128	FV_t^i		-0.121	-0.0003
		(2.43)	(5.60)			(-4.25)	(-0.01)
FO_{t-1}^i		-0.322	-0.314	FO_{t-1}^i		0.163	0.142
		(-6.79)	(-7.52)			(2.37)	(2.35)
$AM_{t*10^{-11}}^i$			15.9	$AM_{t*10^{-11}}^i$			-8.72
			(2.30)				(-1.26)
RV_t^i			92.91	RV_t^i			201.26
			(14.66)				(15.40)
N	128	128	128	128	128	128	128

Table 7: Quarterly Financial Integration Measure and Foreign Portfolio Inflows. Fama and MacBeth (1973) (FM) regression results for the relationship between foreign portfolio flows and financial integration for the sample period 1997/01-2008/06. FI_t^i is the measure of financial integration measured every quarter and is defined as the ratio of the partial R^2 of the global factor over the total R^2 of the partially integrated market model for individual stock returns. The FM results for the lead-lag relationship between foreign portfolio flows and financial integration are reported. Each month the financial integration variable (FI_t^i) is regressed on the previous month's foreign portfolio inflows (γ_{t-1}^i). MC_t^i stands for market capitalization. FV_t^i stands for the foreign trading volume relative to the total trading volume. FO_t^i stands for foreign ownership. AM_t^i is a measure of liquidity and stands for the inverse of the average daily price pressures each month. RV_t^i is return volatility and estimated with daily return each month. Robust t-statistics are reported in parenthesis below the FM coefficient estimates.

	FI_t^i	FI_t^i	FI_t^i	FI_t^i	FI_t^i	FI_t^i	FI_t^i
α	0.116	0.099	0.101	0.102	0.103	0.092	0.121
	(28.32)	(24.66)	(24.91)	(24.98)	(24.98)	(21.07)	(21.45)
γ_{t-1}^i	0.088	0.062	0.053	0.06	0.063	0.058	0.052
	(3.80)	(2.87)	(2.56)	(2.90)	(3.04)	(2.83)	(2.13)
$MC_{t*10^{-11}}^i$	-3.46	-2.85	-2.01	-1.98	-1.22	-6.52	-4.05
	(-7.98)	(-7.83)	(-7.00)	(-6.86)	(-4.27)	(-4.40)	(-4.15)
FI_{t-1}^i		0.137	0.133	0.129	0.1287	0.125	0.108
		(13.22)	(12.86)	(12.67)	(12.62)	(12.43)	(10.36)
FV_t^i			-0.039	-0.043	-0.043	-0.038	-0.045
			(-4.78)	(-5.10)	(-5.13)	(-4.62)	(-4.94)
FO_{t-1}^i				0.068	0.062	0.059	0.045
				(3.60)	(3.34)	(3.18)	(3.20)
$AM_{t*10^{-11}}^i$					-7.29	-6.52	-5.43
					(-4.32)	(-4.40)	(-3.67)
RV_t^i						5.448	5.93
						(5.42)	(3.12)
N	128	128	128	128	128	128	128

Table 8: Panel Regression Results for Financial Integration Measure and Foreign Portfolio Inflows. Pooled regression results with firm- and time-fixed effects are reported for the sample period 1997/01-2008/06. FI_t^i is the measure of financial integration measured every quarter and is defined as the ratio of the partial R^2 of the global factor over the total R^2 of the partially integrated market model for individual stock returns. The results for the lead-lag relationship between foreign portfolio flows and financial integration are reported. FI_t^i is regressed on the previous month's foreign portfolio inflows (γ_{t-1}^i). MC_t^i stands for market capitalization. FV_t^i stands for the foreign trading volume relative to the total trading volume. FO_t^i stands for foreign ownership. AM_t^i is a measure of liquidity and stands for the inverse of the average daily price pressures each month. RV_t^i is return volatility and estimated with daily return each month. T-statistics are reported in parenthesis below the coefficient estimates.

	FI_t^i	FI_t^i	FI_t^i	FI_t^i	FI_t^i	FI_t^i	FI_t^i
α	0.274	0.277	0.277	0.281	0.281	0.281	0.278
	(8.90)	(8.99)	(8.96)	(9.09)	(9.08)	(9.07)	(8.99)
γ_{t-1}^i	0.018	0.018	0.016	0.015	0.015	0.015	0.015
	(1.39)	(1.38)	(1.18)	(1.11)	(1.08)	(1.10)	(1.10)
$MC_{t*10^{-11}}^i$		-4.30	-4.21	-6.20	-6.22	-3.70	-3.78
		(-2.68)	(-2.62)	(-3.78)	(-3.78)	(-1.97)	(-2.01)
FI_{t-1}^i			0.036	0.035	0.035	0.035	0.033
			(7.04)	(6.91)	(6.91)	(6.87)	(6.47)
FV_t^i				0.065	0.065	0.064	0.065
				(5.50)	(5.50)	(5.37)	(5.46)
FO_{t-1}^i					0.001	0.001	0.001
					(1.03)	(1.03)	(1.10)
$AM_{t*10^{-11}}^i$						-12.0	-11.0
						(-2.79)	(-2.68)
RV_t^i							5.342
							(10.94)
firm-fixed	yes	yes	yes	yes	yes	yes	yes
time-fixed	yes	yes	yes	yes	yes	yes	yes
R^2	18.1%	18.1%	18.5%	18.5%	18.5%	18.5%	18.8%
N	39,055	39,055	38,278	38,266	38,266	38,266	38,266

Table 9: The Reverse Lead-Lag Relationship between Foreign Portfolio Inflows and Financial Integration. Fama and MacBeth (1973) (FM) regression results for the relationship between financial integration and changes foreign ownership for the sample period 1997/01-2008/06. The FM results for reverse lead-lag relationship between foreign portfolio flows and financial integration are reported. Each month foreign portfolio flows (γ_t^i) are regressed on the previous month's financial integration variable (FI_{t-1}^i). MC_t^i stands for market capitalization. FV_t^i stands for the foreign trading volume relative to the total trading volume. FO_t^i stands for foreign ownership. AM_t^i is a measure of liquidity and stands for the inverse of the average daily price pressures each month. RV_t^i is return volatility and estimated with daily return each month. r_t^i is the monthly individual stock return. Robust t-statistics are reported in parenthesis below the FM coefficient estimates.

	γ_t^i	γ_t^i	γ_t^i	γ_t^i	γ_t^i	γ_t^i	γ_t^i
α	0.0004	0.0003	0.0003	-0.0001	0.0002	0.0002	0.0002
	(1.68)	(1.26)	(1.34)	(-0.65)	(1.31)	(0.92)	(1.17)
$FI_{t-1*10^{-5}}^i$	-20.0	10.0	-2.0	4.0	-10.0	-4.0	-9.0
	(-0.50)	(0.03)	(-0.06)	(0.14)	(-0.49)	(-0.16)	(-0.34)
$MC_{t*10^{-13}}^i$		4.55	3.36	-3.39	-6.53	-6.39	-6.58
		(1.56)	(1.01)	(-0.83)	(-0.16)	(-1.09)	(-1.13)
γ_{t-1}^i			0.128	0.118	0.117	0.116	0.115
			(5.22)	(4.86)	(4.84)	(4.77)	(4.78)
FV_t^i				0.007	0.009	0.009	0.009
				(4.33)	(5.69)	(5.73)	(5.65)
FO_{t-1}^i					0.005	0.005	0.005
					(4.35)	(4.33)	(4.36)
$AM_{t-1*10^{-12}}^i$						5.38	5.43
						(1.52)	(1.53)
RV_t^i							-0.126
							(-1.00)
N	128	128	128	128	128	128	128

Table 10: The Portfolio Analysis: The effect of foreign inflows on financial integration is analyzed at the portfolio level for the the sample period 1997/01-2008/06. Each month individual stocks are sorted first by MC_t^i and then by their cumulative foreign inflows in the last six months ($cum\gamma_t^i$) into three portfolios. Different values of k correspond to number of periods after and before the portfolio formation period. The financial integration is measured using the partially integrated market model for three portfolios. Financial integration variable is reported for the portfolios with low and high foreign portfolio inflows. FI_t^h and FI_t^l stand for the ratio of the partial R^2 of the global factor over the total R^2 for the high and low portfolios, respectively. The spread portfolio returns are calculated by subtracting the value-weighted returns of the low foreign inflow portfolio from the high foreign inflow portfolio. β_{t+k}^l and β_{t+k}^w stand for the local and global betas of the spread portfolio with respect to the partially integrated model and k periods after the end of the portfolio formation period. t-values are reported next to β estimates. $\Delta\gamma_t^{i,pfh-pfl}$ stands for the differences in average foreign inflows between the high and low foreign inflow portfolios. T-values are reported next to the average $\Delta\gamma_t^{i,pfh-pfl}$ estimates.

k	β_{t+k}^l	t-value	β_{t+k}^w	t-value	FI_{t+k}^l	FI_{t+k}^h	$\Delta\gamma_t^{i,pfh-pfl}$ $_{(*10^{-4})}$	t-value
-6	-0.02	(-0.63)	-0.194	(-2.1)	9.19%	5.83%	-4.0	(-0.08)
-5	-0.03	(-0.87)	-0.064	(-0.72)	7.69%	6.88%	0.2	(0.05)
-4	-0.032	(-0.82)	0.019	(0.2)	6.14%	6.85%	7.0	(1.70)
-3	-0.047	(-1.31)	0.032	(0.35)	5.06%	6.12%	13	(2.72)
-2	-0.017	(-0.46)	-0.023	(-0.24)	7.25%	7.03%	18	(3.60)
-1	-0.043	(-1.20)	-0.116	(-1.27)	6.86%	5.31%	21	(4.52)
1	-0.063	(-2.14)	0.054	(0.72)	5.99%	7.75%	11	(2.77)
2	-0.075	(-2.51)	0.020	(0.20)	5.92%	7.18%	8.0	(1.64)
3	-0.094	(-2.80)	0.080	(0.95)	4.85%	7.31%	7.0	(1.56)
4	-0.103	(-3.19)	0.112	(1.42)	5.10%	8.54%	7.0	(1.71)
5	-0.093	(-2.53)	0.132	(1.45)	5.42%	9.29%	1.0	(0.16)
6	-0.077	(-1.84)	0.131	(1.25)	5.32%	9.15%	0.5	(0.09)
7	-0.059	(-1.57)	0.114	(1.21)	5.11%	9.29%	3.0	(0.63)
8	-0.085	(-2.18)	0.029	(0.29)	6.35%	8.02%	6.0	(1.20)
9	-0.046	(-1.26)	0.073	(0.81)	5.68%	7.92%	4.0	(1.02)
10	-0.038	(-0.99)	0.021	(0.22)	6.35%	7.33%	2.0	(0.56)
11	-0.022	(-0.60)	-0.129	(-1.39)	5.86%	4.04%	6.0	(1.53)
12	0.018	(0.46)	-0.086	(-0.86)	7.02%	5.29%	1.0	(0.33)

9 Appendix: Examples for individual stock level financial integration

In this section, I analyze the relationship between financial integration and foreign ownership for six individual stocks at ISE. The main goal is to analyze the time-series relationship between financial integration and foreign ownership for individual stocks. I select five biggest Turkish stocks in terms of average market capitalization during the sample period. Akbank and Isbank are the biggest Turkish banks. Eregli is a steel manufacturer and has the largest market capitilization at ISE. Koc Holding is a family owned conglomerate, which has operations in various industries. Tupras is the biggest oil refinery in Turkey. In order to have an example from small-cap stocks, I also analyze Dardanel, which is in food processing industry.

For each stock, I regress FI_t^i on past foreign portfolio inflows and on other firm-level control variables. The results suggest that the relationship between financial integration and changes in foreign ownership is weaker in time-series (Table 11). Each column shows the regression results for one of the six individual stocks. For individual stocks the lagged foreign portfolio inflows are not significant positive factor for financial integration. For four out of six stocks the coefficient estimate for γ_{t-1}^i is positive but the statistical significant is relatively low compared to the results in previous sections. A potential explanation for the low levels of significance is the potential high levels of noise in estimating firm-level regressions, which is confirmed by the volatile R^2 values across six regressions. On the other hand, the coefficient estimates for the past levels of foreign ownership is significant for Akbank and Koc Holding. The coefficient estimates for the other firm level control variables mostly confirm the previous results with the exception of return volatility. For individual stocks volatility seems to be a negative determinant for financial integration.

Table 11: Individual stock level regression results for Financial Integration Measure and Foreign Portfolio Inflows. Time series regression results with are reported for six individual stocks during the sample period 1997/01-2008/06. FI_t^i is the measure of financial integration measured every quarter and is defined as the ratio of the partial R^2 of the global factor over the total R^2 of the partially integrated market model for individual stock returns. The results for the lead-lag relationship between foreign portfolio flows and financial integration are reported. FI_t^i is regressed on the previous month's foreign portfolio inflows (γ_{t-1}^i). MC_t^i stands for market capitalization. FV_t^i stands for the foreign trading volume relative to the total trading volume. FO_t^i stands for foreign ownership. AM_t^i is a measure of liquidity and stands for the inverse of the average daily price pressures each month. RV_t^i is return volatility and estimated with daily return each month. T-statistics are reported in parenthesis below the coefficient estimates.

	Akbank	Dardanel	Eregli	Isbank	Koc Holding	Tupras
α	0.251	0.406	0.116	0.237	0.248	0.209
	(4.60)	(5.89)	(1.85)	(4.56)	(4.29)	(3.44)
γ_{t-1}^i	0.866	-1.178	1.446	1.786	0.303	-0.077
	(0.60)	(-0.68)	(1.06)	(0.95)	(0.12)	(-0.05)
$MC_{t-1*10^{-12}}^i$	-10.00	-29.00	24.80	-4.92	-2.11	0.66
	(-1.61)	(-0.09)	(1.80)	(-1.17)	(-0.17)	(0.02)
FI_{t-1}^i	0.289	0.017	0.124	0.087	0.013	0.151
	(3.48)	(0.20)	(1.43)	(0.99)	(0.14)	(1.68)
FV_t^i	-0.231	-0.567	0.367	-0.194	0.002	0.188
	(-2.72)	(-1.18)	(2.47)	(-1.79)	(0.02)	(1.00)
FO_{t-1}^i	2.621	1.229	-0.862	0.618	3.546	0.565
	(2.79)	(1.18)	(-1.48)	(0.71)	(1.96)	(0.91)
$AM_{t-1*10^{-12}}^i$	15.50	3150.00	7.04	13.90	-47.70	-83.40
	(0.55)	(2.42)	(0.21)	(1.92)	(-1.29)	(-1.47)
RV_t^i	-17.12	-23.79	-26.13	-18.28	-39.95	-31.54
	(-1.27)	(-1.38)	(-1.24)	(-1.34)	(-2.27)	(-1.54)
R^2	15.5%	14.5%	25.9%	4.0%	7.0%	12.0%
N	127	127	127	127	127	127