UNIVERSITY OF SÃO PAULO
SÃO CARLOS SCHOOL OF ENGINEERING

BEATRIZ SELAN

The peer effects in asset price models: evidences from emerging and developed countries

São Carlos
2019

UNIVERSIDADE DE SÃO PAULO
ESCOLA DE ENGENHARIA DE SÃO CARLOS

BEATRIZ SELAN

Os efeitos dos pares nos modelos de precificação de ativos: evidências de países emergentes e desenvolvidos

São Carlos
2019

BEATRIZ SELAN

The peer effects in asset price models: evidences from emerging and developed countries

Corrected Version

Ph.D. Thesis presented to the Postgraduate Program in Production Engineering of São Carlos School of Engineering, University of São Paulo, to obtain the degree of Doctor of Science.

Concentration area: Economics, Organizations and Knowledge Management.

Advisor: Associate Professor Aquiles Elie Guimarães Kalatzis.

São Carlos

2019

BEATRIZ SELAN

Os efeitos dos pares nos modelos de precificação de ativos: evidências de países emergentes e desenvolvidos

Versão Corrigida

Tese apresentada ao Programa de Pós-Graduação em Engenharia de Produção da Escola de Engenharia de São Carlos, Universidade de São Paulo, para obtenção do título de Doutor em Ciências.

Área de Concentração: Economia, Organizações e Gestão do Conhecimento.

Orientador: Professor Associado Aquiles Elie Guimarães Kalatzis.

São Carlos

2019

Ficha catalográfica elaborada pela Biblioteca Prof. Dr. Sérgio Rodrigues Fontes da EESC/USP com os dados inseridos pelo(a) autor(a).

Selan, Beatriz
S464t The peer effects in asset price models: evidences from emerging and developed countries / Beatriz Selan; orientador Aquiles Elie Guimarães Kalatzis. São Carlos, 2019.

Tese (Doutorado) - Programa de Pós-Graduação em Engenharia de Produção e Área de Concentração em Economia, Organizações e Gestão Conhecimento -- Escola de Engenharia de São Carlos da Universidade de São Paulo, 2019.

1. Peer effects. 2. Co-movement. 3. Endogeneity problem. 4. Emerging economy. 5. Developed economy. I. Título.

Eduardo Graziosi Silva - CRB - 8/8907

FOLHA DE JULGAMENTO

Candidata: Bacharel **BEATRIZ SELAN.**

Título da tese: Os efeitos dos pares nos modelos de precificação de ativos: evidências de países emergentes e desenvolvidos".

Data da defesa: 04/04/2019.

Comissão Julgadora: **Resultado:**

Prof. Associado **Aquiles Elie Guimarães Kalatzis (Orientador)** (Escola de Engenharia de São Carlos/EESC) Aprovado

Prof. Associado **Marcio Poletti Laurini** Aprovado
(Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto/FEA-RP-USP)

Prof. Titular **Mário de Castro Andrade Filho** Aprovada.
(Instituto de Ciências Matemáticas e de Computação/ICMC-USP)

Profa. Dra. **Aline Damasceno Pellicani** Aprovada
(Centro Universitário Herminio Ometto de Araras/UNIARARAS)

Prof. Titular **Cláudio Ribeiro de Lucinda** Aprovada
(Faculdade de Economia, Administração e Contabilidade/FEA-USP)

Coordenador do Programa de Pós-Graduação em Engenharia de Produção:
Prof. Dr. **Marcelo Seido Nagano**

Presidente da Comissão de Pós-Graduação:
Prof. Titular **Murilo Araujo Romero**

To my family.

ACKNOWLEDGMENTS

First, I thank God for giving me the daily ability to learn new things and to have the curiosity to always seek new subjects and knowledges.

I can’t thank my family enough for all the understanding and support throughout these years when I needed to study some more and couldn’t always be with them. Mom and Dad, my life is better when I have you guys with me!

My sister Barbara always supported me to keep going and to never give up through my academic life. This journey was possible because of you. Thanks, sis!

I thank professor Aquiles Elie Guimarães Kalatzis for Ph.D. opportunity and for all contributions.

I thank professors Luiz Ricardo Kabbach de Castro and Márcio Poletti Laurini for all the important contributions in my qualification exam.

Also, I thank all employees of Postgraduate Program in Production Engineering of São Carlos School of Engineering, especially Jessyca Aparecida Duarte de Francisco for the support throughout these years.

ABSTRACT

SELAN, B. **The peer effects in asset price models: evidences from emerging and developed countries**. 2019. 100 p. Thesis (Ph.D. degree) − São Carlos School of Engineering, University of São Paulo, São Carlos, 2019.

This study investigates the peer effect in the asset pricing models in the international stock market. The peer effect theory proposes a dependence between individual decisions due to interactions that create a social network structure. The idea is that we need to understand the correlation between outcomes of individuals that interact in an environment and which could lead to a homogenous pattern of movement especially on asset pricing models. We use a sample of almost 7,000 companies listed on fourteen countries from 2006 to 2016 and arrange them in four peer groups. Since the peer effect has a reflection problem, we divide our empirical models in two aspects. First, we analyze the relationship between stock return from the firm, its financial aspects and the financial aspects for the peer group using a fixed effect regressor. Then, we try to understand the relationship between stock return from a firm, the stock return from the peer firms, the financial aspects from the firm and the financial aspects for the peer group by estimating a 2SLS model with an instrumental variable. Our findings show the existence of peer effects on stock return for all the peer groups. Also, the effects are always positive regardless if we select emerging or developed markets. Moreover, there is exogenous peer effect from the characteristics of the peer firms in the stock return that depends on the indicator and the peer group. Market-to-book ratio of the peers presents a positive relationship with the stock return. As a robustness test, we re-estimate the models for two subsamples and find that the results are consistent to the previous ones.

Keywords: Stock return. Peer effects. Emerging markets. Developed economies.

RESUMO

SELAN, B. **Os efeitos dos pares nos modelos de precificação de ativos: evidências de países emergentes e desenvolvidos**. 2019. 100 p. Tese (Doutorado) – Escola de Engenharia de São Carlos, Universidade de São Paulo, São Carlos, 2019.

Este estudo investiga o efeito dos pares nos modelos de precificação de ativos no mercado acionário internacional. A teoria do efeito de pares propõe uma dependência entre decisões individuais devido a interações que criam uma estrutura de rede social. A ideia é entender a correlação entre os resultados de indivíduos que interagem em um ambiente e que podem levar a um padrão de movimento homogêneo, especialmente em modelos de precificação de ativos. Utiliza-se uma amostra de quase 7.000 empresas de capital aberto em catorze países de 2006 a 2016 considerando quatro grupos de referência. Como o efeito par tem o conhecido problema de reflexão, divide-se os modelos empíricos em dois aspectos. Primeiro, analisa-se a relação entre o retorno das ações, os aspectos financeiros da firma e os aspectos financeiros do grupo de referência utilizando um modelo de efeito fixo em painel. Em seguida, busca-se entender a relação entre o retorno das ações de uma empresa, o retorno das ações das empresas pares, os aspectos financeiros de ambas, estimando um modelo 2SLS com uma variável instrumental. Os resultados mostram a existência de comovimento no retorno das ações para todos os grupos de referência. Os efeitos do retorno das ações dos pares são positivos e mais intensos para a indústria e país independentemente se se escolhe mercados emergentes ou desenvolvidos. Além disso, existe um efeito de pares exógeno a partir das características das empresas pares, principalmente para razão market-to-book, que depende do indicador financeiro e do grupo de referência. Como teste de robustez, reestimou-se os modelos para duas subamostras que mostraram resultados consistentes com os anteriores.

Palavras-chave: Retorno de ações. Efeitos pares. Mercados emergentes. Economias desenvolvidas.

LIST OF TABLES

SUMMARY

1 INTRODUCTION

Changes in economic structure always create incentives to individuals invest in unexplored areas especially in periods of economic crisis and political instabilities. The investor is one of them and the economic literature has extensively explored this subject to understand the asset prices. Stock return prediction, investors behavior throughout uncertainty, the influence of some factors on stock return and so many other subjects were discussed by several scholars (FAMA, 2014; CAMPBELL, 2014; LEARY; ROBERTS, 2014; CAMPBELL; SHILLER, 1988; FAMA; FRENCH, 1992, 1993, 2015).

In this context, using the modern portfolio theory, the asset price models state that the explanation of returns of individual assets is driven by general factors, like market movements, and other industry-, country-, firm-specific components. Finance theory offers, as illustrate by Campbell (2014), additional information for asset price models and their prediction by incorporating a larger group of variables to measure the assets' co-movement. Barberis et al. (2005) define this co-movement as a high covariance of asset prices since there is a correlation among stock returns through covariance of fundamentals. Also, Phan et al. (2015) identify a correlation between stock returns and industry characteristics like size and book-to-market ratios, as well as trade volume and book-to-market ratio from other firms (peer firms)[1]. The dependence of information of peer firms lead Leary and Roberts (2014) to apply the peer effect theory in the companies' capital structure choice by using the stock return of the peer firms as an instrument of the firms' dependence. They understand a peer firm as a group of competitors or allies for a company in an industry that can impact decision process.

This approach is primarily used on labor- and classroom-economic models that associate the achievement of a worker or a student to the interactions with their cohorts (co-workers or classmates). The motivation is to understand the correlation between outcomes of individuals that interact together in an environment, differentiating the influence of exogenous peer characteristics to the ones from the peer outcomes. This is known as the reflection problem and is an important factor for the peer effects analysis. Manski (1993) was a pioneer in studying this subject and is responsible for forging the term. The reflection problem "arises when a researcher observing the distribution of behaviour in a population tries to infer whether the

[1] Firms that are in the same industry are known as peer firms and not necessarily compete each other (FOUCAULT; FRESARD, 2014). They may also be companies exposed to either common demand shocks (suppliers/consumers) or because their products are complementary.

average behaviour in some group influences the behaviour of the individuals that comprise the group" (MANSKI, 1993, p.532).

Since the researcher cannot distinguish between an endogenous effect from a response of the behavior of the group and an exogenous effect from the response of the exogenous characteristics of the group, the reflection problem is an important issue for the peer effect models (MANSKI, 1993, 2000; ACEMOGLU; AUTOR, 2011; ANGRIST, 2014; LEARY; ROBERTS, 2014). This problem illustrates the importance of finding variables that can help understand the dependence between companies as well as the effect of characteristics and decisions' changes in the stock return. Chen et al. (2016, p. 624) suggest "there is growing evidence that prices move together for reasons that are seemingly unrelated to fundamentals".

In this context, we use the spillover effect and co-movement subjects to the peer effect literature in asset price model. For our purpose, the peer effect on stock returns happens among companies and their baseline groups (peer firms) because of institutional and fundamentals similarities. With this outlook, the natural question is, do firms and their peers have any relationship when analyzing stock returns? That is, what is the effect of a peer firms' stock return on the stock return of company? Our motivation is to understand the co-movement on stock returns and the presence of peer effects on characteristics and the stock returns for the company within the same baseline group.

We select a sample of emerging and developed financial markets which corresponds to more than 70% of the world GDP from 2016 and has higher stock market capitalization to GDP countries according the data from World Bank (2018). Our sample has almost 7,000 companies listed on fourteen countries from 2006 to 2016 and we arrange the companies in four reference groups as our peer groups: country, industry, trade openness and stock market size. To understand this co-movement between the stock return markets, we focus this paper on the peer effect literature for the asset pricing models considering the macro and microeconomic influences on the stock market[2].

Since there is the endogenous effect from the reflection problem, many authors apply the instrumental variable in empirical models of peer effect in the stock return analysis. Following this approach, we divide our analysis in two steps: (i) the fixed effect models for the stock return and some of the peers' financial features as the exogenous effect from the reflection problem; and (ii) the use of the instrumental variable to estimate the 2SLS for panel data for the

[2] From now on, the term peer effects refer to 'social norms', 'peer influences', 'neighborhood effects', 'contagion', 'social interaction', 'peer groups', 'herd behavior', 'peer agents', and many others for different disciplines (MANSKI, 1993).

peer effect in stock returns. For the second step, we follow Leary and Roberts (2014), Chen and Ma (2017), and Adhikari and Agrawal (2018) and construct the instrumental variable as the idiosyncratic return from the CAPM augmented to include the peer factor.

Our findings show that there is a positive peer effect on previous stock return for all the peer groups. This means that as the stock return of the peers rises in the previous year, there is an increase in the current stock return of the company for either emerging or developed countries. In emerging ones, the impact is higher than in developed ones for all peer groups which leads us to believe that the co-movement in stock return depends on the macroeconomic environment and the period.

Leary and Roberts (2014), Chen and Ma (2017) and Adhikari and Agrawal (2018) focus their peer effect analysis in the industry similarity and find evidences of peer effect for either the capital structure of the firm or the investment and dividend decision. Here, we also find evidences that the industry is an important link between the firms for the stock return models. As a determinant of the stock return, the past stock return experience of the peer firms enhances the current stock return by up to 1.15% in emerging markets. Therefore, by knowing the behavior of the stock return of a reference group, the investor can achieve better earnings if decides to invest in a firm of the same peer group.

Conversely, the market-to-book ratio is an important financial characteristic that always seems to impact the stock return. This is relevant because an investor can use the information of financial characteristics of the firm or of the peers to identify future opportunities for the firm and to gain better stock return. For all peer groups, this is the indicator that shows a positive externality effect. Perhaps, newer investment opportunities for the peer firms indicate the same opportunities to firm *i* and better future stock returns especially in emerging markets.

To test for robustness, we re-estimate the models by excluding four countries that aggregated more companies than the other countries to verify if the results are consistent with the previous one. Our results suggest that, by excluding Japan, USA, China and India, the peer effect in stock return is smaller for all peer groups, but we still find that investors and firms from emerging markets must observe the decisions of the peers more frequently to obtain higher gains. Therefore, the peer effect result is persistent even though China, India, USA and Japan are important markets. For the four excluded countries, we re-estimate the models for the industry peer group and identify a positive effect of the past stock return of the peer firms, especially in the Japan and the US companies, followed by China.

Besides this introduction, this work is divided as follows: the next section presents a brief financial literature review for the peer effects analysis and the co-movement in stock

return. Section 3 describes the data and the methodology for the peer effect approach for panel data. Section 4 presents our results and the robustness tests estimated. Lastly, we make some final remarks.

2 LITERATURE REVIEW

In this chapter, we present a brief financial literature review about the asset price models, their empirical studies, as well as the peer effects theory, its application in finance theory, the co-movement approach and a report of the peer groups.

2.1 The asset price literature

Nobel prizes and researchers have already delved into the financial market earnings, portfolio selection and stock return prediction. Samuelson (1969) and Merton (1969), for example, show that the investors will rearrange its optimal investment portfolio and will choose the same allocation if the equity return does not depend on previous ones. Thus, if an investor understands the relationship between stock return and all the factors that can affect it, one will improve the stock return prediction and will have better results. Moreover, Chen and Ma (2017, p. 172) assert that, "in a developed stock market, a firm's stock price provides useful information such as growth opportunities, the state of the economy, the position of competitors and consumer demand".

Therefore, this important subject has driven many researchers to better understand the risk-return relationship. This relationship is a promising area for studies, mainly since the asset pricing models' advent such as CAPM (Capital Asset Price Model) and APT (Arbitrage Pricing Theory). Sharpe (1964) and Lintner (1965) propose the CAPM model as a tool to identify the risk-return relationship from efficient markets. They believe there is a direct relationship between stock return and the market risk premium, besides a risk-free rate. Applying the portfolio choice model from Markowitz (1952), Sharpe (1964) and Lintner (1965) consider that investors choose a mean-variance-efficient portfolio when they seek to minimize the risk and maximize the expected return. Nevertheless, the very restrictive assumptions underlying the CAPM have been lifted by recent contributions like the existence of transaction costs and taxes. Also, a critical concept in CAPM is the risk aggregation exclusively in the market risk factor.

However, Ross (1976) accepts as true the existence of other factors that affect stock returns, like industrial-, fundamental- and macroeconomic-factors. This is the reason Ross (1976) propose a multifactor theory with the arbitrage pricing theory (APT). The model's main purpose is to help predict asset's returns by using a linear relationship between expected return and any common risk factor. These types of models are extensively studied by economic and financial literature, especially after Fama and French (1993) seminal work of a three factors

model: risk premium factor, size (or market capitalization) factor and value or future opportunities factor. The same authors, in their previous work of 1992, evaluate the joint roles of market risk premium, size, earnings-price ratio, leverage and book-to-market equity in cross-section stock returns from 1962 to 1990.

Fama and French (1992) affirm that size and book-to-market equity are related to cross-section average returns and that there is no evidence of the deterioration through time for the book-to-market equity explaining average stock return. These two fundamentals are important factors for the determination of stock return and must be more explored academically. Complementing their work, Fama and French (1993) use monthly stock return data from 1963 to 1990 of US listed companies from the Center for Research in Securities Prices and the COMPUSTAT and verify the importance of financial attributes to explain stock return. Their results indicate that the CAPM have more applications for capital asset pricing explanations previously 1969 since there is an exclusive relationship with market risk premium, while for recently years this assumption is inaccurate.

The most important point in Fama and French (1993)'s work is that their paper relates stock return, size, book-to-market equity and market risk premium by using time-series regressions for the 25 stock portfolios. These financial and economic variables help identify the company's exposure and its economic risks by the size and the book-to-market ratio. They follow the model in equation (1)

$$R(t) - RF(t) = \alpha + \beta_M[RM(t) - RF(t)] + \beta_{SMB}SMB(t) + \beta_{HML}HML(t) + e(t) \quad (1)$$

in which, the R(t) is the return of asset for month *t*, *RF(t)* is the risk-free rate, *RM(t)* is the market return, *SMB(t)* is the stock returns differences on portfolios with small and big stocks, and *HML(t)* is also the stock returns differences on portfolios with high book-to-market (value) stocks and low book-to-market(growth) stocks.

For them, size and book-to-market equity are the probable proxy for the sensitivity to common risk factors in returns if the assets are priced rationally. This happens because their stock portfolios are constructed "to mimic risk factors related to size and BE/ME capture strong common variation in returns, no matter what else is in the time-series regressions" (FAMA; FRENCH, 1993, p.5). Thus, they conclude that their model does a better job by separating the components that are firm-specific in stock price event studies. Moreover,

> the fact that small firms can suffer a long earnings depression that bypasses big firms suggests that size is associated with a common risk factor that might explain the negative relation between size and average return. Similarly, the relation between book-to-market equity and earnings suggests that relative profitability is the source of a common risk factor in returns that might explain the positive relation between BE/ME and average return (FAMA; FRENCH, 1993, p.8).

In 2015, the same authors improved their initial model and test a five-factor model which include, in addition to the previous three factors, profitability and investment. They also order the portfolios in these five factors and determine different combinations for the stock's exposure by building the profitability and investment factors the same way as the traditional risk factors[3]. Considering monthly data from July 1963 to December 2013, Fama and French (2015) suggest that value, profitability and investment factors are negatively related to market and size risk premium. For their sample and this period, the book-to-market ratio is redundant with the inclusion of profitability and investment. But they caution that these results apply to this specific sample and can be different for other countries. They recommend the use of a four- (excluding book-to-market ratio) or five-factor model depending the propose of the researcher and its sample.

In Fama and French (2017), the authors compare their three- and five-factor models to test the patterns of international returns by using factors from the same region. They collect international stock returns and accounting data for 23 developed markets from 1990 to 2015 and apply the same approach from their previous works. Their results indicate "low average returns in Europe and Asia Pacific for small stocks with factor loadings like those of unprofitable firms that invest a lot" (FAMA; FRENCH, 2017, p. 443). For them, either the five- or the three-factor model capture patterns in average stock returns, suggesting a common effect that can occur in lower intensity for small stocks with similar returns to firms with higher investment despite their lower profitability.

We understand the importance of the asset pricing models, but "asset pricing models are simplified propositions about expected returns that are rejected in tests with power" (FAMA; FRENCH, 2015, p.10). For this same reason, these authors would prefer a

> theoretical model that captures the salient features of expected returns. The experience of the last 50 years says, however, that the task is difficult and the wait for a successful model is likely to be long. In the meantime, [...] there is value in searching for a small set of RHS (Right Hand Side) portfolios that span the Markowitz (1952) mean-variance-efficient set and so capture expected returns on all assets (FAMA; FRENCH, 2017, p. 458).

[3] These new risk factors are built as the difference between robust and weak profitability as well as the difference among low (conservative) and high (aggressive) investment firms, respectively.

Thus, we see a broad academic effort to identify financial and economic variables to help predict stock returns (AVRAMOV, 2004; MUSSO; SCHIAVO, 2008; PETTENUZZO et al., 2014). Dividend yield, price-earnings and book-to-market ratios are some fundamental variables already used as determinants to predict stock returns or to explain the cross-section of average stock returns (FAMA; FRENCH, 1992; ANG; BEKAERT, 2007; CROCHANE, 2011; PHAN et al., 2015). In addition, company's attributes and their impacts on the stock returns have attracted the interest of scholars in the search for sophisticated methods to solve problems in asset price theory.

Some authors relate the changes in the stock returns to certain components of the peer companies or the economic distance between international stock markets (PHAN et al., 2015; SUCHECKA; LASZKIEWICZ, 2011; ASGHARIAN et al., 2013). As Fama and French (2015, p.10) affirm, "we want to identify the model that is the best (but imperfect) story for average returns on portfolio formed in different ways". Thus, the next section provides a new literature that can influence the stock returns and it is not overly used in capital asset pricing models: the peer effects theory.

2.2 The peer effects literature and its applications on financial literature

Many studies focus their methodological strategy in the portfolio creation, the main factors to influence stock returns and the relationship between idiosyncratic and systematic risk. We propose a distinct approach by using an economic branch that intensify its findings in the dependence analysis of economic agents and similar behaviors of their markets: the peer agents.

The peer effect literature study the influence of peer agents on product pricing decisions (BERTRAND, 1883), social interactions in labor market productivity (MAS; MORETTI, 2009; ACEMOGLU; AUTOR, 2011; ANGRIST, 2014), analysts' recommendations for financial investment (CESPEDES; PARRA, 2016), domestic and international capital structure decisions (LEARY; ROBERTS, 2014; FRANCIS et al., 2016), corporate investment decision (CHEN; MA, 2017), payout policies (ADHIKARI; AGRAWAL, 2018) among others. Kaustia and Rantala (2015, p. 653) affirm that "peer influence is interesting as it can create social multiplier effects, whereby a small initial shock can lead to larger changes as individuals are directly influenced by each other's actions".

This type of analysis elucidates the externality effects and the dependence among economic agents in the decision-making. For the companies, one can verify that the group of leading companies from a certain industry determines their strategies based on their internal

knowledge and on the market particularities, while the followers make their decisions based on the leading ones. This behavior from the followers indicates a certain concern for risk reduction in the decisions plans by pursuing an already tested strategy. For Lieberman and Asaba (2006, p. 366), "firms may imitate to avoid falling behind their rivals, or because they believe that others' actions convey information". In a competitive environment, imitation can preserve the status quo among competitors since reduces the uncertainty of the outcomes' likelihood (LIEBERMAN; ASABA, 2006).

The peer effects theory is largely used in school achievement, labor studies, participation in retirement plans and any other study that analyzes social or neighborhood effects (MANSKI, 1993; ANGRIST, 2014; MAS; MORETTI, 2009). This theory proposes that individuals interact in groups and are affected by all the others in their group[4] creating a social network structure with interdependency ties like friendship, alliances or values. Since this technique is mostly affected by the endogeneity social effects, Manski (1993) analyzes the reflection problem that arises when researchers try to infer the direction of the effect of the groups' interactions on the individual outcomes. He shows that the peer influence can occurs in three channels through which an individual can be affected by its group:

i. an endogenous effect in which the behavior of the individual varies with the behavior of the group – we identify this effect as the direct peer influence;
ii. an exogenous effect in which the individual behaves accordingly to the exogenous characteristics of the group – we understand this effect as the feedback influence of the group; and
iii. correlated effects in which "the individuals in the same group tend to behave similarly because they have similar individual characteristics or face similar institutional environment" (MANSKI, 1993, p.533).

The reflection problem proposed by Manski (1993) occurs when the researcher uses a linear model to estimate the mean of an outcome from an individual using the same outcome of an individual's reference group as an explanatory variable. In this case, the endogeneity problem arises because "the researchers do not know how individuals form reference groups and perceive reference-group outcomes" (MANSKI, 1993, p.536). Manski (2000) complements

[4] We define the peer groups as the reference group of individuals (firms or people) who have similar characteristics or interests. In stock markets, peer group refers to firms that are in the same industry or belong to the same category the investor proposed.

this analysis by indicating that the source of the peer effect is the preference interactions that arises from individuals caring about other's outcomes or caring about other's choices.

Thus, being a type of externality in microeconomic studies, this approach inspired researchers to test the technique in corporate finance and some stock market analysts' studies. The motivation for the financial data and peer effects analysis is the identification of the interdependency among capital structure's decisions, dividend and investment policies, as well as a person's financial decisions for the purchases of an asset and the cross-country (LEARY; ROBERTS, 2014; FRANCIS et al., 2016; ADHIKARI; AGRAWAL, 2018; CHEN; MA, 2017; BURSZTYN et al.; 2014).

The seminal work of Leary and Roberts (2014) in corporate finance literature propose a new approach to understand capital structure's decision for a company by incorporating the externality of the peer's decision as a shock that affect all the other firms in the reference group. "Peer effects in capital structure occur when the actions or characteristics of peer firms explicitly enter a firms' financing objective function" (LEARY; ROBERTS, 2014, p. 140). As an example of peer effects or peer influence, consider the effects of a profitability shock from company A in its baseline group consisting of competitors, suppliers and business allies. The changes of the baseline group's financial policy can feed back to company A' financial decision and so on as a continuous dependence effect (LEARY; ROBERTS, 2014).

With this idea, they analyze 9,126 unique firms from Center for Research in Security Prices (CRSP)-Compustat database from 1965 to 2008 by applying an instrument for the peer effects of capital structure. They define the peer groups as the three-digit SIC industry and construct the average leverage for the peers using as a proxy the idiosyncratic residual of the regression of a modified CAPM that includes the stock return of the peers. We detail this approach in the methodological section since we follow the same pattern.

With the average for the peer group minus the company analyzed, Leary and Roberts (2014) also reveal the presence of endogeneity problems and their impact on identifying the appropriate characteristics of the group on individual decisions like Manski (1993) had already identified. According to them, selection bias and/or omitted common factor can cause endogeneity problem, with the selection bias surfacing when firms belong to the same institutional environment and have similar features correlated to financial policy, characteristics and the actions of the baseline group. Alternatively, the omitted common factor arises when changes in the company's characteristics from the baseline group can produce a feedback effect on capital structure decisions of a firm.

Leary and Roberts (2014) show evidences of a company's dependence to peers' decisions for capital structure's choice. Some of their conclusions are that, in industries with fewer companies, the spillover effects of changes in the peers' characteristics can either increase or decrease the effects of exogenous variables in financial policies. The imitation behavior indicates that financial policies from bellwether firms are insensible to shocks from followers returns (LEARY; ROBERTS, 2014).

For stock return, the idea is that, adapting the corollary of Foucault and Fresard (2014), since two or more firms belong to the same peer group, they will have similar information about each other and the stock price of one firm will covary with the stock price of the peer firms. Thus, if any investor has information about one company that can change its stock prices and affect the stock price of a peer firm, the investor will have a better understanding of the co-moment in the stock market. Figure 1 illustrates our understanding for the peer effect and the co-movement of stock returns for these two firms. Thus, if the firms belong to the same peer groups, there is a feedback effect on the financial and economic decisions from one to the other which could lead to a dependence on stock return from each firm.

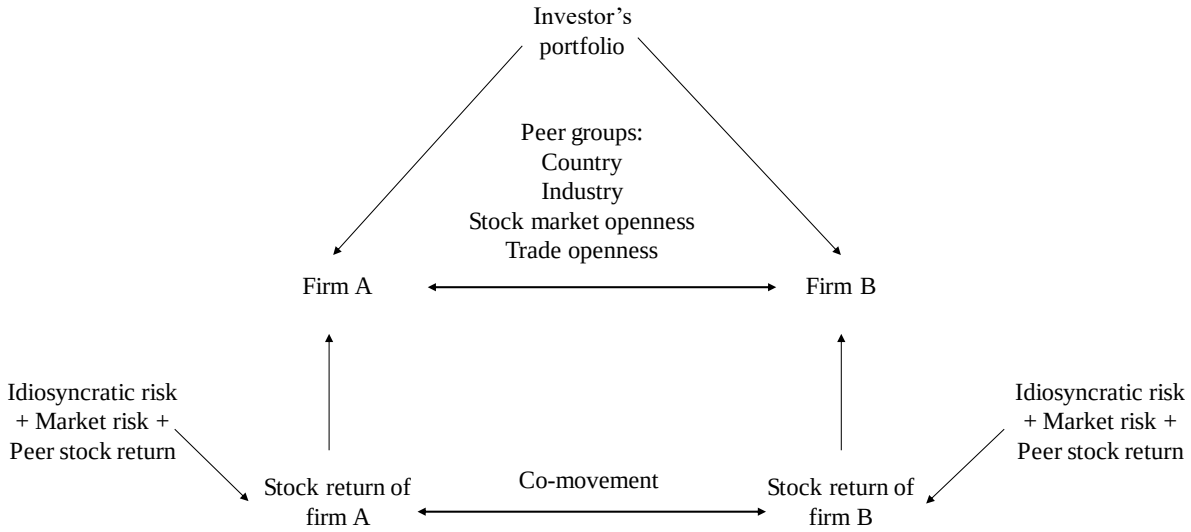


Figure 1 – The co-movement and the peer effect in stock return

Considering how a person decides to purchase an asset in the stock market, Bursztyn et al. (2014) study channels in which the peer effects in financial data work to create a linkage among individual financial decisions and the "keeping up with the Joneses" effect. They apply a field experiment (a type of lottery considering information about a group of stocks) in a large financial brokerage in Brazil to identify a learning from peers' choices in a person's financial

decisions[5]. It is well known that people do not want to perform less well than their peers, especially if they are family or friends. The authors observe a dependence from the peer's revealed preference if the peer has a greater financial sophistication, indicating a social learning channel for the unsophisticated investor. Also, there usually is a need to obtain the same financial return as the peers which leads the individual investor to mimic its peers' behavior. Thus, "social learning from peers matters for financial decisions, especially for unsophisticated investors" (BURSZTYN et al., 2014, p. 1297).

Cespedes and Parra (2016), on the other hand, analyze the security analysts' accuracy comparing to its peer for the same social networks and the same industry analysis. With an annual sample that covers 1990-2014, they analyze the accuracy of an analyst and the effect of the accuracy of its group formed by all analysts covering the same industries but in a different brokerage house. They also treat the peer reflection problem and conclude that the main motivation for peer effects is the learning channel in which the peers' analysts follow fewer industries. There are evidences that "a one standard deviation increases in peers' earnings forecast accuracy increases analyst's accuracy by 25.7%" (CESPEDES; PARRA, 2016, p.18). Also, the internet and other popular technologies after the 2000's intensify the effects for the learning process.

This analysis is also applied in Chen and Ma (2017) for the corporate investment decisions from Chinese companies listed from 1999 to 2013, using the same methodology applied by Leary and Roberts (2014). They provide a large literature linking stock return to investment decisions as well as the peer effects in investment decisions in developed and emerging countries. For them, the similar characteristics used to choose the peer firms is important and influence the firm's investment policies since it responds to their peers' characteristics.

"Firms actively learn from peers' decisions as they have imperfect information on decision-making and they believe that peers' actions convey some useful information to guide their real decisions" (CHEN; MA, 2017, p.181). Therefore, it seems that imitating a rival can reduce the risk of any financial decision and, incentive the mimicking of investment decisions. This could be applied to stock returns and the influence the financial characteristics of the peers have in asset pricing models.

Adhikari and Agrawal (2018) also use the peer approach to analyze the mimicking behavior in payout policy and share repurchases. They use a large sample of US non-financial

[5] The social connection is a member of the same family and/or a friend that is a client from the same brokerage.

firms from 1965 to 2010 and find that the dividend policy is significantly influenced by their industry peers. To them, the peer effect is higher the more similar in size and age the companies and their peers are. Using the stock return to construct the peer average idiosyncratic equity shocks and the idiosyncratic volatilities to predict the peers, they find that a dividend paying peer firm increases in 26% the chances of a firm to pay dividends. Robustness tests indicate the consistency of the rivalry-based theory of imitation as the more likely one to dividend policies in industry peers.

In a cross-country perspective, Francis et al. (2016) increment the analysis of Leary and Roberts (2014) using 47 countries and 87 different industries from 1990 to 2011 but apply the same methodological approach to identify the peer effect in financial policy decisions. They find evidences that the increase in the market or book leverage of a peer company positively impact the average leverage of a company. They also test in subsamples if the peer effects matter more if there are investor protection and/or creditor rights laws because the equity and debt markets are noticeably different.

In weak investor protection countries, the peer effects are higher and matters more because the companies must build a reputation that they are as well as their peers. For the creditor rights laws, Francis et al. (2016, p.378) find that "peer effects are more pronounced when creditors are better protected, and they have more power in times of distress", although not persistent unless the firm must always indicate their quality.

Thus, in develop capital markets, stock prices reflect information about firms' financial policies, investment decisions, competitive strategies and the effects of firms' characteristics (EDMANS et al., 2012; BOND et al., 2012). Hence, the peer effect approach helps identify externalities in the financial markets as well as the dependence among financial aspects and stock return (LEARY; ROBERTS, 2014; FERNANDEZ, 2011; WENG. GONG, 2016).

As the peer effect is possible in many areas, the conclusions about peer influence and their ramifications on stock returns should not focus only on interactions with macroeconomic environments and companies' characteristics, since it is possible to have a co-movement from stock returns. Some authors have sought to understand the intricate features of co-movement from stock returns, financial policies or economic dependence. Since we understand this co-movement as a peer effect, next section discusses briefly this co-movement effect for the stock return.

2.3 The co-movement studies as a peer effect

Usually, the financial studies indicate the existence of common movements on stock returns with economic news, industry and fundamental characteristics, and peer firms. The idea of co-movement emerged when some researchers identified a homogenous pattern of movement on asset returns. Understanding this subject favors the decisions of financial analysts and investors, as well as being a broad field for academics. The main theorical point for co-movement is the existence of changes in fundamentals that reflect in the price movements of some stocks. This traditional view of co-movement, the fundamentals, suggests the asset returns are affected by cash flow's news from companies in the same category. The co-movement in prices, thus, reflect a co-movement in fundamentals and happens with rational investors (BARBERIS et al, 2005; LIU et al, 2015; CHEN et al, 2016).

Barberis et al (2005), in their classic paper, indicate that there are some other factors for the co-movement completely unrelated to fundamentals like economic frictions and investors trading patterns. They separate the friction- and sentiment-based co-movements in three views: category, habitat and information diffusion. The first one, category view, is the most similar to our approach as well as some other papers since the co-movement is linked to groups of stocks separated in categories that are unrelated to fundamentals of the firms. This category view propose that investors first arrange the assets in categories like small-capitalization stocks or industry and then allocate funds in these categories. This is similar to our approach since we separate the stock returns in four classes: countries, industries, trade openness and stock market size.

The habitat view focus on the fact the investors trade only a subset of all securities, possibly because of transaction costs, lack of information or any type of trading restriction that they can identify. Thus, securities that are held and trade by individual investors, for example, can have a common factor in their returns since these investors' risk aversion can change even when the firms' fundamentals do not shift. To better understand, contemplate the following situation: consider an individual investor that follows the stock index definitions and organizes its assets in small-cap stocks and value stocks. If there is a redefinition on the stock index with the down-weighting of a small-cap stock of the index, this investor can reduce its holdings and buy more of those included in the index. If other investors have the same behavior, it can be a co-movement in the stock returns for this situation that has nothing to do with fundamentals information. Lastly, the information diffusion view indicates a quicker incorporation of the market frictions into prices of some stocks rather than others (BARBERIS et al., 2005).

The authors test this co-movement idea considering the inclusions in the S&P 500 index between September 22, 1976 and December 31, 2000 and deletions between January 22, 1979 and December 31, 2000. They estimate univariate and bivariate regressions between the stock return and the contemporaneous return on the S&P 500 index (and the contemporaneous return on the firms not in the S&P 500 index). They find evidences of stock co-movement based in friction or sentiment views either in the univariate or the bivariate regressions. For the univariate regressions, the friction- or sentiment-based stock co-movement is higher between 1988 and 2000. Their most important contribution occurs in the bivariate regressions when they "provide evidence of friction- or sentiment-based comovement altogether stronger than that uncovered by the univariate tests" (BARBERIS et al., 2005, p. 286).

Chen et al. (2016) revisit the co-movement proposed by Barberis et al. (2005) by expanding the period and including the analysis of stock splits. They found the co-movement is due, firstly, to fundamentals dependence, except for the 1988-2000 subperiod. They indicate that the stocks in the S&P500 index move more with all stocks. After this fundamental dependence, the beta changes for the winner stocks along the stock market index when not controlling for changes in the winner's betas. Chen et al. (2016) also use univariate and bivariate regressors to identify co-movement in two different events: the entry in the S&P500 index and stock splits. They divide the companies in two groups, non-S&P500 group and S&P500 index group, to analyze the co-movement in stock return using a difference-in-difference/matching approach. In general, these robustness test results indicate that the changes across the two univariate regressions are statistically identical for the sample and control stocks. Thus, it seems that the co-movement is related to changes on the fundamental component of returns.

For Lo and MacKinlay (1990), by splitting the firms among small and large capitalizations, they find that returns for smaller firms are influenced by common information initially represented by the prices of larger ones. This means that, although they do not explicitly apply the co-movement theory for stock return, there seems to be a covariation of firms' characteristics between groups of firms.

Diversely, Hameed et al. (2015, p.3154) examine the role of the analysts for understanding the stocks co-movement and have found that some analysts follow "stocks whose fundamentals are more correlated with the fundamentals of many other firms" as a strategy to have better compensations. Using all common stocks from different datasets as well as analysts' coverage data from the Institutional Brokers' Estimate System, their sample covers almost 5,000 firms per year from 1984 to 2011. They propose that bellwether firms (the ones that are followed by analysts and with fundamentals related to price prediction of other firms) must

comove in stock returns because their analysts' forecasts are similar. Stocks "more broadly followed exhibit more comovement precisely because they are more information-laden, letting investors use them to value many other less heavily followed stocks" (HAMEED et al., 2015, p.3183).

Moreover,

> comovement in stock returns and in the liquidity of individual stocks is an important aspect of market stability and risk. Comovement in returns determines the benefits of cross-sectional diversification, the level of systematic risk, and therefore can affect companies' cost of capital. Comovement or "commonality" in liquidity similarly attracts a return premium because investors dislike stocks that become illiquid when the market becomes illiquid. Comovement also affects the way shocks are transmitted and thus the level of systemic risk (MALCENIECE; MALCENIEKS; PUTNIŅŠ, 2019).

Therefore, by understanding the co-movement in stock returns, the investor and the firm can comprehend the dynamic influence of the stock market. Other studies identify the co-movement between stocks considering some fundamental variable in common. Daniel and Titman (1997), for example, find that high book-to-market stocks covary with other high book-to-market stocks, reflecting institutional aspects like the same industries, the same line of businesses.

The three-factor model of Fama and French (1993) seems to identify some co-movement since the jointly varying stock return among firms with similar characteristics create patterns. We can interpret this fact as evidence of observed cross-level differences in average stock returns as well as due to differences in systematic risk exposure. Also, the set of firms with more growth opportunities pays lower risk premiums and their stock returns should mimic the returns from similar firms. Therefore, it must have a co-movement among stocks accordingly the theory.

Another example of co-movement happens with financial constrained firms that have their stock returns moving with the stock returns of the baseline group, indicating the presence of some common financial constrained factor on stock returns (CHAN et al, 2010; WHITED; WU, 2006; LAMONT et al., 2001; KAPLAN; ZINGALES, 1997). Lamont et al. (2001) interpret the use of the financial constraint index as a co-movement of stocks. Using the KZ index, they determine that if the constraint factor is negative, it is possible that the investors are irrational, cannot adequately estimate the risk of the stock or an anomaly of unexpected shocks in the cash flow. Lamont et al. (2001) find a co-movement of stock returns over time which indicates the financial constraint may be affected by a common shock for firms' stock returns.

In addition, Whited and Wu (2006, p. 557) indicate that “stock returns on constrained firms positively covary with the returns of other constrained firms”, which is a type of co-movement.

Lastly, Kogan and Papanikolaou (2013) also suggest there is co-movement on stock returns of firms with similar characteristics, even in different industries. They relate the growth opportunities of the firm to financial characteristics and suggest that “exposure to the same common risk factor accounts for a substantial fraction of co-movement among all characteristic-sorted portfolios” (KOGAN; PAPANIKOLAOU, 2013, p. 2724). Moreover, they propose a relationship between stock of growth opportunities and the investment by a firm that could lead to a co-movement in stock returns.

These co-movements in stock return are seen as responses for peer effects. Evidences suggest that the co-movement and the peer effects seems like a mutual learning of different individuals into the same group. If stock returns can co-move among firms, how do we separate the effects of one company from another? Some authors understood the importance of peer effects mechanism and the co-movement from the financial markets. The next section explores this relationship empirically and presents some points for our peer groups.

2.4 The peer groups in international stock market

The country and a wide range of attributes may influence the performance of a firm and its stock return, since economic factors like internal commerce, internal financing and the investors’ preference for shares are related to different national institutional environments. Aghabozorgi and Teh (2014, p.1302) affirm that “assessment of the stock market co-movement between companies in a stock market can be very helpful for predicting the stock price, based on the similarity of a company to other companies in the same cluster”.

Fan et al. (2012) suggest that knowing the country in which a firm is located helps identify the changes in financial decisions because the legal environment and market conditions are similar in the same country. Following this understanding, Francis et al. (2016, p.366) propose that “firms from countries with larger equity markets are more likely to follow their peers, since they can gain access to lower cost financing if they learn and build reputation”.

In this context, firms from the same country can face similar institutional environments, political instabilities and investment opportunities and can be sensible to macroeconomic decisions that can interfere in the stock market. Gong and Weng (2016), using spatial econometrics’ analysis in the Chinese market, affirm that firms located in the same country tend

to have similar behavior because they are exposed to the same institutional, economic and social conditions.

Moreover, an individual investor does not know how to reduce the stock risk through international diversification and, thus, focus on a home-bias because national factors impact on security returns in a similar way. This means that some individual investors may have limited knowledge about the stock market and, therefore, companies listed on the domestic stock exchange are the better option for them since local information for local companies is easier to find (FRENCH; POTERBA, 1991; BENA, et al., 2017). Moreover, "portfolio choice is driven by a logic of diversification but due to the presence of frictions, holding a portfolio biased towards domestic equities is optimal" (COEURDACIER; GUIBAUD, 2011).

For Bekaert et al (2017), most investors' equity portfolios are home-country related (or a home-bias phenomenon, as they refer to it) which imply that investors forfeit the international diversification benefits for the safety of investing in the same their home country. To invest in the equity market of other countries, the investor must consider transaction costs, real exchange rate risks, stock market development and the lack of familiarity, complicating the international diversification for individual investors. Similarly, Grinblatt and Keloharju (2001) and Huberman (2001) suggest the investors' preference for local and familiar companies which can indicate a preference for home-bias phenomenon. Hence, the choice of this group is important and can provide insights about the preference of the investors in stock markets.

Following this macroeconomic context, some authors propose that, in the globalized world, the trade openness of an economy helps understand the degree to which a domestic economy is exposed to external shocks. Many international trade theories seek a combination of comparative advantages and the application of economies of scale and consumer preference[6]. Since countries rely on bilateral trade, there is a potential to transfer financial instability through import and export behavior (JING et al., 2017; FUJI, 2017). Ashraf (2018) provides some examples of studies that relate the trade openness to financial development since these two aspects "bring in foreign competition and reduce the power of incumbent groups who oppose financial development. An economy should open to both trade and capital flows simultaneously because one without the other would not give the desired results. Trade openness without financial openness is likely to result in more loan subsidies and financial repression" (ASHRAF, 2018, p. 435).

[6] For a brief discussion of these theories, consult Bernard et al. (2007), Feenstra (2015) and Helpman and Krugman (1985).

Moreover, Jing et al. (2017) affirm that the linkage across countries can transfer financial turbulences because, through bilateral trade, any devaluation of a country's currency can impact on a reduction of exports of a competitor country which, in turn, can lead to recession. Also, Baltagi et al. (2009) test the importance of trade and financial openness to explain the pace of financial development and its variation across countries. They use four different panel datasets from 1980 to 2003 to identify the effects in two dependent variables for the financial development: private credit and stock market capitalization. With a dynamic Generalized Method of Moments (GMM), they find that "while closed economies can benefit most by opening up both their trade and capital accounts, we do not find any evidence to suggest that opening up one without the other could have a negative impact on financial sector development" (BALTAGI et al., 2009, p. 286). Thus, we expect a positive effect from this group in the stock return.

The financial development is essential to an economy since the asymmetric information and transaction costs may affect the economic growth. Its development can reduce information and transaction costs as well as increase the allocation of resources which enhances economic growth. A well-developed stock market can enhance the economic and investment growths for some countries. In Diebold and Yilmaz (2015, p.101)'s book, they describe the macroeconomic connectedness and the importance for the stock market by indicating that "as the stock markets become more interdependent/interconnected, we would expect them to transmit more of the shocks to other markets".

The same authors also indicate that knowing the connectiveness of firms across countries may be an important factor for the investors and the policymakers since systemic risk is a great measure to worst-case scenario planning. Also, it is important to mention that stock returns within each market reflects either the individual condition (specifically to a business) or the environment effect (economy as a whole). Therefore, the stock prices are closely linked to expected cash flow which is related to economic activity (DIEBOLD; YILMAZ, 2015). Thus, the stock market size can be a measure of the co-movement of stock returns among firms.

For the micro level aspect, an important topic for the asset pricing theory is the relationship between industries and stock returns. It is possible that the investors select firms from the same industry because they have similar economic environment. Hou (2007) agrees with the existence of the industries effect for co-movement, diffusing from the larger to the smaller firms possibly because the larger ones must have more insights in the market competition.

Chen and Ma (2017, p. 168) affirm that “the more similarities a firm has with its peers, the more likely it is to mimic their investment decisions to reduce the potential failure risk”. Their idea is that each firm in a peer group will follow the investment action from all the other peers, especially if the firm does not know its market well. This should also be true for the stock return since financial decisions can influence the investor’s decision to buy or to sell a share when considering its fundamentals. Thus, firms with similar characteristics have comparable behavior within the same industries.

In summary, the empirical literature provides evidences of cross-section determinants of the stock return, different approaches to validate the importance of this subject as well as new insights and applications of techniques that can be employed to comprehend the asset pricing models and the financial theory. To the best of our knowledge, it is growing the empirical literature on peer effects in corporate finance, but it is not a common use for the asset pricing models. Therefore, the next chapter presents the data and method procedure, as well as the empirical models we estimate in this work.

3 DATA AND METHODOLOGICAL PROCEDURE

In this chapter, we present the data and the method of the study. Section 3.1 disclosures the sample-selection procedure and the data sources while section 3.2 explains the construction of the variables. Section 3.3 describes the peer effect approach for our analysis and discusses endogeneity concerns. Finally, in Section 3.4, we propose the empirical models, the 2SLS for panel data estimator and the fixed effect panel data.

3.1 Sample

Our sample comprises 6,989 unique publicly trade companies with valid data over the 2006 to 2016 period from fourteen countries. This sample concentrates more than 70% of the world GDP from 2016 accordingly the World Bank database. We use the Morgan Stanley Capital International (MSCI) classification for market development to divide the countries in emerging and developed economies as listed on appendix. Mainly we collect data from the annual Orbis database from the Bureau van Dijk for the companies' financial characteristics and stock return information. Our macroeconomic data is from the World Bank Dataset and helps create the peer groups and the variables correlated to stock return like trade openness, Gross Domestic Product (GDP) growth, stock market capitalization to GDP and real interest rate.

For each year, we require at least 30 observations per country and at least two firms per industry following Francis et al. (2016). We exclude financial and insurance companies. Firms with missing information for any variable of the study are also dropped. To avoid the effects of outliers, we winsorize the 1% top and bottom of all variables. Also, to follow the peer effects literature, we opt to use four macroeconomic variables as our reference group. We select country, industry per country, stock market capitalization to GDP (stock market size) and trade openness as our peer groups. The approach for the construction of our variables is presented in the next section as well as the variables of the study.

3.2 Measuring the stock return and the variables of the study

Our dependent variable is the annual stock return measure as the geometrical mean of the monthly stock returns of the companies as proposed by Adhikari and Agrawal (2018). We adopt this approach by considering that the investor will buy and hold the stocks due to

compounding at the end of each year. To construct the annual measure of the stock return from the monthly data, we use expression (2)

$$R_{\mathrm{it}} = \left(\prod_{m,t}^{N} (1 + r_{i,mt}) \right)^{1/12} - 1 \qquad (2)$$

in which R_{it} is the annual stock return for company i in year t, $r_{i,mt}$ is the stock return for company i in month m in year t. The result from this expression indicates the earnings of the sequence of rates period by period.

For Gharbi et al. (2014), stock returns vary across firms and over time with changes not only in dividend or profit fluctuations. As such, the influence of omitted variables – such as the impact of the financial characteristics and stock returns of peer firms – must be the cause of the changes in stock returns. For this reason, we consider a traditional set of financial attributes for the firms like return on equity (ROE), dividend yield, market-to-book ratio and price earnings ratio. These variables are applied in Fama and French (1992), Campbell and Shiller (1988a, 1988b), Ang and Bekaert (2007), and Fan et al. (2012).

ROE is the ratio of net earnings and the owners' equity and represents the firm's capacity to incorporate value to itself using internal funding. To test the effect of dividend on stock return, we use the dividend yield which is the ratio between the dollar value of dividends paid per share in a year. The price-earnings ratio indicates how much an investor expect to obtain in earnings if invests in a firm and is constructed as the ratio of price per share and earnings per share. To capture the investment opportunity, we select the market-to-book ratio as the ratio of the company's market value and its book value. Fama and French (1992, 1993) indicate a relationship between this measure to economic fundamentals, and a positive effect of high market-to-book ratio in high earnings. They also employ these economic fundamentals as relevant determinants of stock return. Leary and Roberts (2014), and Cullen et al. (2014) also use them to understand the effects of peer companies' financial policies and to test for the stock return models.

Financial constraint presents itself as a common factor influencing stock returns (CHAN et al, 2010). To validate this effect, we use three different indexes: the KZ, the WW and the SA index. For all of them, the higher the value of the index, the higher the financial constraint of the firm. We classified the firms in ascending order for each financial constraint variable and divided the sample into quantiles. The last quantile corresponds to the firms classified as

financial constrained, while the first one has the financial unconstrained ones. Lamont et al. (2001) implement the KZ index following equation (3)

$$KZ = -1{,}00191\left(\frac{CF}{K_{t-1}}\right)_{\text{it}} + 0{,}28264Q + 3{,}1392\left(\frac{Debt}{TC}\right)_{\text{it}} - 39{,}3678\left(\frac{Div}{K_{t-1}}\right)_{\text{it}} - 1{,}31476\left(\frac{Cash}{K_{t-1}}\right)_{\text{it}} \quad (3)$$

where *i* is the firm and *t* is the year; *CF* is the cash flow; *K* is the fixed assets; *Q* is the Tobin's Q; *Debt* is the debt variable; *TC* is the total capital defined as the sum of debt and stockholders' equity; *Div* is the dividends and *Cash* is the cash, defined as cash plus short-term investments.

The second financial constraints measure is the WW index from Whited and Wu (2006). Its equation follows (4)

$$\mathrm{WW}_{\text{it}} = -0.091\left(\frac{\mathrm{CF}}{\mathrm{TA}}\right)_{\text{it}} - 0.062\mathrm{Div}_{\text{it}} + 0.021\left(\frac{\mathrm{LTD}}{\mathrm{TA}}\right)_{\text{it}} - 0.044\mathrm{Size}_{\text{it}} + 0.102\mathrm{ISG}_{\text{it}} - 0.035\mathrm{SG}_{\text{it}} \quad (4)$$

where *i* is the firm and *t* is the year; CF is the cash flow; TA is the total assets; Div is a dummy for the dividend payment; LTD is the long-term debt; Size is the logarithm of the firm's total assets; ISG is the three-digit industry's sales growth and SG is firm's sales growth.

The third financial constraint index is the SA index (size and age) from Hadlock and Pierce (2010) which is firm-specific and follows equation (5)

$$SA_{it} = -0{,}737Size_{it} + 0{,}043{Size_{it}}^{2} - 0{,}040Age_{it} \quad (5)$$

where *Size* is the logarithm of book assets and *Age* is the number of years in activity.

The next section provides the peer effect strategy we apply in this study and the description of the peer groups considered here.

3.3 Peer effect strategy and the peer groups

The peer theory proposes the influence of characteristics and behavior of peers in the performance of a person. For our purpose, we consider two companies as peers if they are from

the same peer group such as country, industry, stock market size and trade openness. Companies in the same country undergo the same institutional condition as demand shocks, exchange rate changes, purchasing power, interest rate and their spread to equity market. Arranging the companies by country can provide evidences to recognize, for example, differences between being in Brazilian' stock market or being in the Japanese' stock market since they present contrasting economic and institutional fundamentals. Also, in emerging markets, the country portfolio is an effect of the imperfect diversification problem since the investor does not have the knowledge to choose the international diversification as a risk reduction strategy.

We also follow Chen and Ma (2017), Leary and Roberts (2014), and Adhikari and Agrawal (2018) by considering the same industry as a socio-economic network measure. Since we require at least two firms per industry, we use the two-digit NAICS (North American Industry Classification System) classification to create the peer group for the industry. As discussed before, industry can affect the results of the companies and their stock returns, and it can also be used by individual investors as a reference group.

Also, as discussed in the literature chapter, trade linkage can transfer financial disturbances among firms. Heathcote and Perri (2013) show that openness to trade increases diversification for stock returns which indicates that countries relatively closed have a large negative covariance between relative earnings and relative dividends. Moreover, they suggest that, "if domestic stocks pay a relatively high return in states of the world in which domestic goods are expensive, then since domestic residents may prefer to hold mostly domestic stocks" (HEATHCOTE; PERRI, 2013, p. 1127).

Consequently, we consider the trade openness as a trade linkage and we create the average ratio of total export and import to GDP per country from 2006 to 2016. Then, we divide this average ratio in quantiles to separate the countries. The first group has countries with lower trade openness like Brazil, Japan and United States while the higher trade openness group has Canada, Germany, Mexico and United Kingdom. Note that these groups are not formed only by emerging or developed markets.

Moreover, we select a proxy of the stock market size to identify the impact of the peer firms from similar financial markets. The stock market capitalization to GDP is the ratio of the stock market capitalization to the economic income for each year. We collect the data in the World Bank Database and, to stablish a point of comparation for the peer groups, we construct the average stock market size per country and separate the countries in quantiles. The smallest average size has also the biggest number of countries for stock markets as well as it has either developed or emerging countries like Brazil, China, Germany, Indonesia, Italy, Mexico,

Russian Federation and Turkey. On the other hand, the biggest stock markets' size group has firms from Canada and United States, two developed countries.

Table 1 below illustrates our peer groups by country, indicating the number of firms and industries, as well as the other peer groups. Note that the countries with the most companies are Japan and India and the smallest ones are Mexico and Russian Federation. This is important because we consider all firms in each market as part of the peer group that is its country. This means, for example, that Brazilian companies have more than 100 firms that experience the same macroeconomic environment.

Table 1 – The description of the peer groups for 2006-2016

Country	Firms	Firm-year	Industry	Average peer industry	Trade openness	SMC/GDP
Brazil	109	1,199	13	8.38	1	1
Canada	220	2,420	14	15.71	5	5
China	822	9,042	17	48.35	4	1
France	431	4,741	20	21.55	4	2
Germany	387	4,257	19	20.37	5	1
India	1,138	12,518	21	54.19	3	2
Indonesia	157	1,727	15	10.47	3	1
Italy	153	1,683	14	10.93	4	1
Japan	2,207	24,277	22	100.32	1	3
Mexico	34	374	10	3.4	5	1
Russian Federation	39	429	8	4.88	4	1
Turkey	82	902	11	7.45	4	1
United Kingdom	662	7,282	22	30.09	5	4
United States of America	548	6,028	21	26.09	1	5
Overall	6,989	76,879	23			

Note: the data represents the BvD's universe from 2006 to 2016, considering the number of firms with all the required data. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. The trade openness and the stock market size (SMC/GDP) are from the World Bank Database in which 1 indicates the quantile with smaller values and 5 has the biggest values for each variable.

Alternatively, to differentiate the response of industries in the stock market, we use the industry-country peer group to create the similarity between the firms. Varying from 8 to 22 different industries, we capture more precise results on the industry's effect and can attribute it to the category view of the co-movement theory from Barberis et al. (2005).

3.4 Empirical models and econometric strategy

As mention in the literature section, the peer effect is marked by mainly the endogenous (the stock return of the peer group) and the exogenous effect (the characteristics of the peer group) in empirical models. First, we seek the effect of financial aspects of the peer groups on stock return of firm *i* that belongs to the peer group, contemplating the exogenous effect. Then, we focus the analysis on the endogenous effect of the stock return from the peer group on the stock return of firm *i*.

For this approach, we need to construct the peer group variables, denoted $\bar{X}_{-ijt}$, as the average of all the firms in the peer group (denotate as *j*) *except* the firm *i* in year *t* like proposed by Chen and Ma (2017), Adhikari and Agrawal (2018) and Leary and Roberts (2014). We apply the equation (8) for all peer variables in this analysis.

$$\bar{\mathrm{X}}_{-\mathrm{ijt}} = \left(\frac{1}{N_j} \sum_{j=1}^{N} X_{jt} \right) - X_{it} \tag{8}$$

where $\frac{1}{N_j}\sum_{j=1}^{N} X_{jt}$ is the average financial variable from all companies in each peer group to each year and X_{it} is the financial variables from company *i* for each year. For each peer group *j* (country, industry, stock market size and trade openness), we use the dividend yield, market-to-book and price earnings ratios to create each variable of the peer groups.

Our empirical models estimate the relationship between stock return from firm *i*, its financial aspects and these lag variables for the peer group. Initially, we estimate equation (9), considering the average financial aspects of all the peers *except* that of firm *i*[7].

$$\begin{aligned} R_{it} = \alpha_i + \beta_1 DY_{it} + \beta_2 MTB_{it} + \beta_3 PE_{it} + \beta_4 ROE_{it} + \beta_5 \overline{DY}_{-ijt-1} + \beta_6 \overline{PE}_{-ijt-1} \\ + \beta_7 \overline{MTB}_{-ijt-1} + \beta_8 Macro_t + \varepsilon_{it} \end{aligned} \tag{9}$$

where R_{it} represents the stock returns for firm *i* over year *t*; the dividend yield (DY_{it}); market-to-book ratio (MTB_{it}); price-earnings ratio (PE_{it}) are the financial variables of the firm *i* over year t; $\overline{DY}_{-ijt}$; $\overline{PE}_{-ijt}$; $\overline{MTB}_{-ijt}$ are the previous financial variables for the peer firm *j* over year

[7] All variables with a subscript $-ijt-1$ denote the peer variables for all estimated models in which *i* represents the firms, *j* is the peer groups (country, industry, stock market size and trade openness) and *t-1* is the previous year.

$t-1$; $Macro_t$ are the variables dealing with macroeconomic aspects like GDP growth (GDP_t) and real interest rate (RIR_t) over year *t*.

We follow this path because we believe that if a peer group has an increase in the investment opportunity, for example, it can convey information for a firm' stock return. Also, some individual investors do not have all the information in the stock market and end up comparing it with peer-to-peer information. Chen and Ma (2017) use the rival-based theory to indicate that if a firm imitates others, it can alleviate the competitive pressure and reflect in its stock return. Thus, if there is a change in a financial characteristic of a peer firm that impacts on the same financial characteristic of the firm *i*, it can feedback in the stock return of the firm. Lieberman and Asaba (2006) also suggest that this imitation preserve the status quo in competition as an additional information.

For this part of the analysis, we apply fixed effects models which helps us understand the effects from financial characteristics from firm *i* and its peers on stock return of firm *i*. We also include each financial constraint index (KZ, WW, and SA indexes) and report them in appendix. We separate the results in developed and emerging countries and select models using the AIC information criteria.

The second part of our estimations focus on the relationship between stock return from firm *i* and the stock return from the peer firm *j* over year *t-1*. This is the main point of our analysis of peer effects and co-movement in stock return, also known as the endogenous effect in the reflection problem. As pointed by Manski (1993), Leary and Roberts (2014) and many other authors, if we simply apply equation (8) to construct the stock return of the peers, we will create an endogeneity bias for the stock return.

One could believe that the reflection problem is not applied to asset pricing models since it depends on the market interactions and any financial and economic news from firms and their countries. However, since the stock return from the peer firm is, by construction, dependent from the stock return of firm *i*, the endogenous problem must be considered in the regression models. When there is an endogenous variable, the parameters estimate by fixed effect are inconsistent, and the instrumental variable approach from the two-stage least square (2SLS) is the appropriate tool after the seminal work of Leary and Roberts (2014).

For the IV model, consider equation (10) which allows for both endogenous peer effect (due to stock return of the peer group) as well as exogenous peer effect (due to characteristics of the peers) (CAMERON; TRIVEDI, 2005; WOOLDRIDGE, 2010; LEARY; ROBERTS, 2014; CHEN; MA, 2017). The stock return of peer firms' parameter is β_8 and measures the

influence of peer firms' actions on the stock return. Notwithstanding, the parameters $\beta_5, \beta_6, \beta_7$ correspond to the characteristics of the peer groups that indirectly provides a mechanism to identify the feedback effect in the firms' characteristics and the stock return.

$$R_{it} = \alpha + \beta_1 DY_{it} + \beta_2 MTB_{it} + \beta_3 PE_{it} + \beta_4 ROE_{it} + \beta_5 \overline{DY}_{-ijt-1} + \beta_6 \overline{PE}_{-ijt-1} + \beta_7 \overline{MTB}_{-ijt-1} + \beta_8 \bar{R}_{-ijt-1} + \varepsilon_{it} \quad (10)$$

where R_{it} represents the stock returns for firm *i* over year *t*; the dividend yield (DY_{it}); market-to-book ratio (MTB_{it}); price-earnings ratio (PE_{it}) are the fundamentals of the firm *i*; $\overline{DY}_{-ijt}$; $\overline{PE}_{-ijt}$; $\overline{MTB}_{-ijt}$ are the fundamentals for the peer firm *j* over year $t-1$; $Macro_t$ are the variables dealing with macroeconomic aspects like GDP growth (GDP_t) and real interest rate (RIR_t) in year *t*; and $\bar{R}_{-ijt-1}$ is the stock return for the peer firm *j* over year $t-1$.

Our identification problem lies in the fact that $\bar{R}_{-ijt-1}$, the stock return of the peer firms, depends on the stock return of a firm. Manski (1993, 2000) and Leary and Roberts (2014) describe the identification problem for all parameters in which there is an instantaneous feedback from R_{it} and, therefore, jointly dependence among R_{it} and $\bar{R}_{-ijt-1}$. Thus, the structural parameters on equation (10) are not identified because of the simultaneity problem. The solution we find is to follow Leary and Roberts (2014) and any other author that applied the peer effect theory in financial data.

With an augmented asset pricing model like Leary and Roberts (2014), we compute the idiosyncratic return of this model as our instrumental variable for the stock return of the peer groups. To construct the instrumental variable for the annual stock return of peer firms, our first stage consists in using monthly stock prices from 2006 to 2016 to compute the idiosyncratic stock return from equation (11) for each firm on a rolling annual basis.

$$\hat{R}_{ijt} = \hat{\alpha}_{ijt} + \hat{\beta}_{ijt}^{Peer}(\bar{R}_{-ijt} - Rf_t) + \hat{\beta}_{ijt}^{M}(Rm_t - Rf_t)$$
$$\hat{u}_{ijt} = R_{ijt} - \hat{R}_{ijt} \quad (11)$$

where $\hat{R}_{ijt}$ is the expected return from firm *i* in peer group *j* from month *t*; $(Rm_t - Rf_t)$ is the excess market return and $(\bar{R}_{-ijt} - Rf_t)$ is the excess return on an industry portfolio excluding firm *i*'s return; $\hat{u}_{ijt}$ is the idiosyncratic return from firm *i* in peer group *j* from month *t*.

The first part of equation (11), $\hat{R}_{ijt}$, is the expected return for firm *i* in the peer group *j* over the month *t*, while the second part is the idiosyncratic return, $\hat{u}_{ijt}$, for firm *i* in the peer group *j* over the month *t*. Leary and Roberts (2014) suggest this approach controls for the reflection problems by removing known source of systematic variation and the correlation among the firms in the same peer group.

We estimate equation (11) for each firm-year, considering each peer group, and collect the residual from these models. To maintain the consistency with the accounting data, we compound the monthly idiosyncratic returns (the residuals) to obtain an annual idiosyncratic return measure for each peer group. Then, we use equation (8) to create the stock return of each peer group as the difference between the annual compounded idiosyncratic return of the peer groups and the stock return of firm *i*. Considering this instrument for the peer firms' stock return, our second stage is to use the first lag of the instrumental variable, $\bar{r}_{-ijt-1}$, as proxy for the $\bar{R}_{-ijt-1}$ in equation (10). Note that, stock returns are connected by their peer group and the stock return co-movement occurs as an effect of the peer' stock return on the dependent variable. That is, if the coefficient of the stock return of the peer firms is significant, we tend to indicate that there is a co-movement in stock returns due to peer effect[8].

For all models, we perform tests to provide weak-instrument robust inference by using the Anderson-Rubin (1949) test and the Stock and Wright (2000) test. In both cases, we test if the coefficients of the stock return of the peers in the structural equation is equal to zero for all the peer groups and if the overidentifying restrictions are also valid. The results for all models are presented on table B1 in appendix and indicate that our model is not weakly identified. Using the Staiger and Stock (1997)'s rule of thumb[9], we do not identify the weak instrument problem and, also, we reject the hypothesis of underidentification with the LM test. Likewise, the tests suggest that, for our peer groups, the instrument is valid and since our purpose is to test the instrument proposed by Leary and Roberts (2014) as a determinant of the stock return, we procced to the analysis.

To corroborate our results, we exclude India, China, Japan and USA from our analysis and re-estimating equation (10), since these countries have the highest number of firms and have many peer firms per industry. This approach reduces the sample to better understand if

[8] See Acemoglu and Autor (2011) to a review of other applications of peer effect and the different econometric approach.

[9] Staiger and Stock's rule of thumb for one endogenous variable is that the researcher can reject that the instruments are weak if the F-statistic is equal or higher than 10 and, therefore, the instrument is "weak" if F<10.

the results are related to these countries. Secondly, we explore the importance of these four countries for the determinants of the asset price models with peer effect from the industry group.

The next chapter summarizes the empirical results of the peer effects of the stock returns models considering the reflection problem. We describe the mainly effects and related them to the stock return theory and the peer effect theory. Also, we test for robustness in the next chapter.

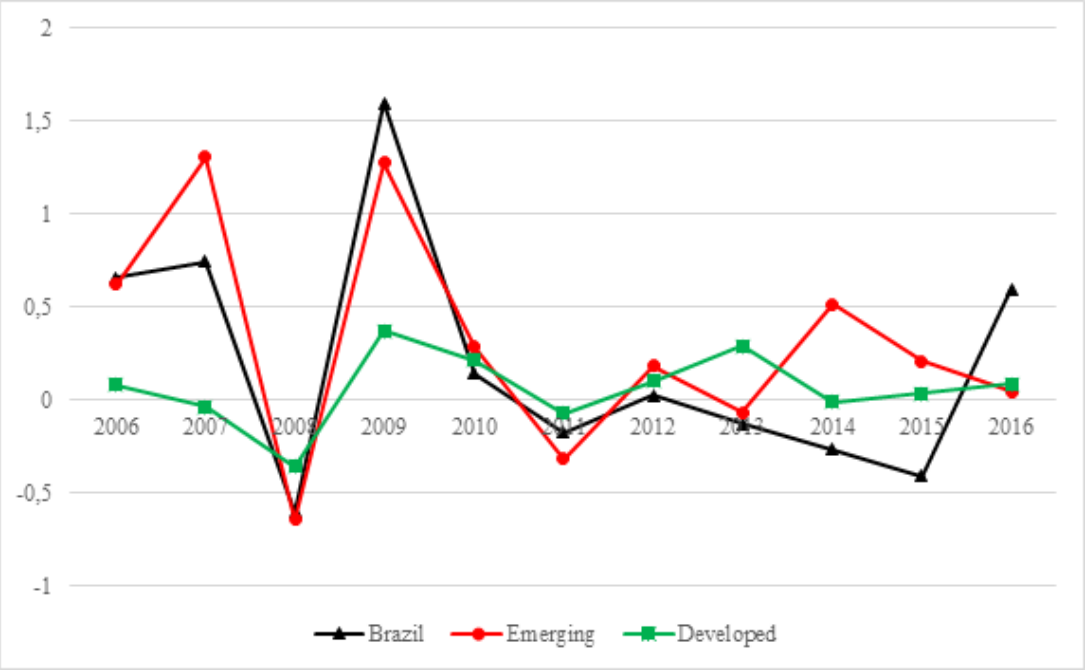
4 PEER EFFECTS IN STOCK RETURN: RESULTS

This chapter presents the empirical evidences for the peer effects in stock return. In Section 4.1, we analyze the descriptive statistics and estimate the peer effects from the financial characteristics and the stock return from firm *i* in Section 4.2. After that, section 4.3 checks the relationship between the stock return of firm *i* and the stock return from the peer firm, identifying the reflection problem and the instrumental variable. In Section 4.4, we provide the results of the robustness tests.

4.1 Peer effects and the sample analysis

The use of peer effect theory in corporate finance is recent and, to the best of our knowledge, there is no paper that analyze the peer effect on asset pricing models. In this section, we present the sample analysis separating it in developed and emerging economies.

Initially, graph 1 below illustrates the firms' average stock returns for the emerging and developed countries from 2006 to 2016 using data from Work Bank (2018). There is a clear difference between them since the developed countries present stock returns with smoothly peaks and valleys compared to the emerging ones. Before the Great Recession of 2008, the average stock returns in emerging markets offer more than seven times the returns in the developed ones, but the financial crisis brought their stock returns closer to a new lower level after 2010. Considering the Brazilian economy as an example for the emerging countries, it is interesting that, up until 2013, the Brazilian average stock returns had a similar behavior to the emerging markets. However, the political instability and subsequent economic crisis in Brazil from 2014 forward seems to have negatively impacted its stock market performance.



Source: World Bank (2018)

Graph 1 – Average stock return from 2006 to 2016

In this context, table 2 presents summary statistics from all the variables in three panels. Panel A outlines the average firm-specific characteristics, while panel B cover the average peer firm-specific attributes for all the peer groups. The average peer firm-specific attributes are constructed as the average of all firms in a peer group except for the firm *i* as illustrated in the previous chapter. Panel C focus on the two macroeconomic variables, real interest rate and GDP growth.

In general, the average firm-specific characteristics are higher in emerging markets compared to developed countries. This happens primarily in the positive annual stock returns in the emerging markets which corroborates the findings from graph 1: developed countries have smoothly and lower stock returns while the emerging markets have almost four times greater stock returns. The average stock return for the emerging economies is 0,45%, while the developed countries have a negative one (-0,23%).

Traditionally, the researchers use the market-to-book (MTB), the price-earnings (P/E) ratios and the dividend yield (DY) as determinants for the valuation of stock returns (FAMA; FRENCH, 1992, 2015; AVRAMOV, 2004). The MTB ratio shows the market's perception of the stock's value, the P/E ratio reflects the expected earnings growth and the DY expresses the dividend-only return of a stock. The typical emerging stock market has higher average ratios than the developed ones possibly for the prospect of diversification in international markets.

Table 2 – Summary statistics for the emerging and develop countries

	Emerging			Developed		
	Obs.	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**
Panel A: Firm-specific characteristics						
Stock return (%)	24,804	0.450	5.728	49,396	-0.231	3.904
MTB ratio	23,020	2.132	3.314	41,006	1.705	2.782
PE ratio	16,259	38.014	68.895	28,346	25.815	43.115
Dividend Yield (%)	11,723	3.479	4.779	27,597	2.839	2.735
ROE	19,368	4.919	28.567	38,802	0.155	35.005
Financial constraint (KZ)	16,005	0.538	0.498	30,163	0.558	0.497
Financial constraint (WW)	8,597	0.292	0.455	21,537	0.295	0.456
Financial constraint (SA)	14,103	0.271	0.444	33,156	0.163	0.369
Panel B: Peer-firm characteristics						
Peer: Country						
MTB ratio	26,118	0.324	2.546	50,688	0.320	2.002
PE ratio	21,429	9.184	50.800	41,472	8.199	31.874
DY	25,688	1.866	2.925	50,468	1.658	2.456
Stock return (%)	24,804	-0.443	5.728	49,396	0.232	3.903
Peer: Industry						
MTB ratio	25,359	0.296	2.535	49,278	0.353	2.057
PE ratio	21,335	9.224	50.536	41,410	9.390	32.229
DY	24,248	1.692	2.917	47,390	1.425	2.360
Stock return (%)	24,804	-0.478	5.720	49,396	0.185	3.886
Peer: Trade openness						
MTB ratio	26,191	0.162	2.527	50,688	0.376	1.990
PE ratio	21,429	5.906	51.191	41,472	10.342	32.851
DY	26,191	1.699	2.760	50,688	1.745	2.275
Stock return (%)	26,059	-0.150	5.401	50,402	0.428	3.845
Peer: SMC						
MTB ratio	26,191	0.183	2.489	50,688	0.342	1.990
PE ratio	21,429	6.778	51.671	41,472	9.845	32.647
DY	26,191	2.113	2.764	50,688	1.584	2.407
Stock return (%)	24,804	-0.468	5.717	49,396	0.195	3.888
Panel C: Macroeconomic Variables						
Real interest rate (%)	25,289	4.764	6.896	49,364	2.232	1.876
GDP growth (%)	26,191	7.536	2.956	50,688	0.922	2.143

Note: all the peer variables for company *i* are the mean of the financial characteristics of the peer group except for the firm *i* observation. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country.

In panel B, we identify the peer-specific characteristics for four peer groups and to help understand the summary statistics, some insights are provided. First, the country peer group aggregates the institutional environment and the macroeconomic factors like mentioned by Fan et al. (2012), and Francis et al. (2016). Also, it is a simple aggregation point for the individual

investor that does not understand the benefits of the international diversification portfolios. On the other hand, there is a potential of financial contagion through international trade which is the motivation for the trade openness' peer group (JING et al., 2017; FUJI, 2017) when considering that investors will opt for diversified portfolios. Moreover, the stock markets can transmit shocks from different financial markets depending on its size (DIEBOLD; YILMAZ, 2015). Notwithstanding these relevant situations, Leary and Roberts (2014) and Hou (2007) argue that the industry has an important on diffusion of market information, leading to clear insights in the market competition.

Considering this information and the construction of these variables, we interpret the presence of a positive average variable as a higher value for the peer group, while the negative average indicates that, on average, the results of the considered variable is higher in the company *i* than the peer group. We find similar average financial characteristics for country and industry peer groups in emerging markets, except for stock returns. That is, on average, the stock return for the peer groups is negative for emerging market but positive for developed ones.

Thus, the peer groups have higher average stock returns in emerging markets, while the opposite result occurs in developed countries. Moreover, the stock return of the peer firms is almost three times higher in the industry peer group and double in the country peer group. For all other variables, the mean values are similar for these peer groups. Alternatively, the trade openness and stock market size have higher market-to-book and P/E ratio for the developed economies as well as opposite average stock returns[10].

In panel C, we report the summary statistics for GDP growth and real interest rate. The average real interest rates in emerging economies are double the rates applied in developed countries as the first ones are riskier and, therefore, need to adequately remunerate their investors. In emerging countries, the GDP growth rate is more than eight times higher than the ones from the developed markets, especially led by the average GDP growth of China, India and Indonesia reported in table A.3 in appendix.

[10] Note that the average stock return of the peers shows, for example, the stock return of the companies that are in the same industry, except for one firm. By separating this variable in emerging and developed countries, the average stock return of the peers denotes that, on average, the companies in the same industry of an emerging market have a -0.48% stock return for the period.

4.2 Peer effects from the financial characteristics and the traditional econometrics

In the peer effects literature, the reflection problem has two different important effects: (i) the exogenous peer effect due to peer characteristics, and (ii) the endogenous peer effect due to stock return from peer firms. In this section, we present the results for the exogenous peer effect due to characteristics of the peer groups. We use fixed-effect models of stock return from firm *i*, the financial characteristics of the firm and their peers.

Here, the stock return of the firm is driven by a response to their peers' characteristics rather than stock return behavior since changes in the characteristics of their peers influence the imitation behavior of them. Lieberman and Asaba (2006) find evidences that firms use the imitation channel as useful information from the peers and, thus, create a spillover effect in the decision process of other. For all models in this section, we apply equation (9) for the four peer groups reproduced here

$$R_{it} = \alpha_i + \beta_1 DY_{it} + \beta_2 MTB_{it} + \beta_3 PE_{it} + \beta_4 ROE_{it} + \beta_5 \overline{DY}_{-ijt-1} + \beta_6 \overline{PE}_{-ijt-1} + \beta_7 \overline{MTB}_{-ijt-1} + \beta_8 Macro_t + \varepsilon_{it} \quad (9)$$

We use the lagged financial peer variables and the contemporaneous financial variables for the firm *i* to address the imitation concern and the possible effect that changes in the lagged peers' characteristics have in the contemporaneous firm-specific variables. Note that each peer variable is the average from all the firms in the peer groups minus the information from firm *i* per year. It is important to emphasize that the idea is to verify if changes in the characteristics of the peers can affect the stock return of company *i*, which could lead to an imitation strategy between firms in the same peer group.

Initially, table 3 presents the results for the stock return and the firm-specific characteristics regression using fixed effect models, without the peer groups. In general, we find a positive and statistically significance effect from market-to-book (MTB) ratio, price-earning (P/E) ratio and the return on equity (ROE). The difference between emerging and developed countries is the magnitude of the effect that is greater for the former markets. Fama and French (1988, 1992, 2017), Leary and Roberts (2014) and Phan et al. (2015) argue that there are evidences of the importance of these financial ratios for the prediction of stock returns because they have information content that is useful in the stock market. Maio and Santa-Clara (2015) also agree that these financial ratios can help predict stock return and it cannot occur exclusively with one financial ratio. Moreover, we find a weakly and negatively correlation

among dividend yield and stock return that shows a decrease in stock return if the company increase the dividend distribution[11].

Table 3 – Stock return and the firm-specific factors using fixed effect models

	(1) E	(2) D
MTB ratio	0.010***	0.004***
	(0.001)	(0.001)
P/E ratio	6.6e-05***	1.1e-05
	(1.5e-05)	(7.2e-06)
DY	-0.003***	-0.003***
	(0.0002)	(0.0003)
ROE	0.001***	0.0002***
	(0.0001)	(6.3e-05)
Constant	-0.0197***	0.004***
	(0.002)	(0.001)
Observations	9,620	22,371
R-squared	0.142	0.075
Number of firms	1,791	3,285

Note: The dependent variable is the geometric mean for the annual stock return, using the monthly returns. E and D represent, respectively, emerging and develop countries. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively and the standard errors in parentheses are robust for heteroskedasticity and within firm dependence.

We expand the econometric analysis by incorporating the financial characteristics of the peer groups and the macroeconomic variables. For all estimations in this section, we consider the full models to identify the first reflection problem due to peer characteristics. Table 4 shows the fixed effect estimations for the stock return from firm *i*, its financial characteristics and the financial characteristics of the peer group. In this table, we consider that the firms from the same country and the same industry-country are peers because they act in the same structural environment and suffer the same challenges from the macro- and micro-economic factors like interest rate, demand-supply markets, exchange rate effects (HOU, 2007).

[11] With less profit retention by firms (high dividend yield), their stock price can fall because the firms have fewer financial resources to future opportunities (FAMA; FRENCH, 1992).

Table 4 – Estimated fixed effect models for stock return using Country and Industry as peer groups (2006-2016)

	(1) E	(2) D	(3) E	(4) D
Firm-specific factors				
MTB ratio	0.007***	0.006***	0.007***	0.005***
	(0.0007)	(0.009)	(0.0007)	(0.0007)
P/E ratio	3.3e-05**	1.9e-05***	3.9e-05***	1.6e-05**
	(1.3e-05)	(7.2e-06)	(1.3e-05)	(7.3e-06)
DY	-0.0007***	-0.002***	-0.0007***	-0.002***
	(0.0002)	(0.0003)	(0.0002)	(0.0003)
ROE	0.0014***	0.0008***	0.0014***	0.0007***
	(0.0001)	(6.7e-05)	(0.0001)	(6.5e-05)
Real interest	0.724***	0.25***	0.725***	0.23***
	(0.023)	(0.013)	(0.022)	(0.013)
GDP growth	0.763***	-0.058***	0.79***	-0.06***
	(0.04)	(0.009)	(0.04)	(0.009)
Peer factors				
Coun MTB_{t-1}	0.01***	0.008***		
	(0.0007)	(0.0009)		
Coun PE_{t-1}	-9.5e-06	-3.6e-06		
	(1.4e-05)	(7.3e-06)		
Coun DY_{t-1}	9.7e-05	-0.0004*		
	(0.0002)	(0.0002)		
Ind: MTB_{t-1}			0.01***	0.006***
			(0.0007)	(0.0007)
Ind: PE_{t-1}			-7.5e-06	1.9e-06
			(1.4e-05)	(7.3e-06)
Ind: DY_{t-1}			0.0002	-0.0002
			(0.0002)	(0.0002)
Constant	-0.11***	-0.008***	-0.106***	-0.006***
	(0.004)	(0.002)	(0.004)	(0.002)
Obs.	8,392	19,802	8,373	19,788
R-squared	0.342	0.122	0.333	0.099
N. firms	1,727	3,229	1,723	3,227
AIC	-33395	-97453	-33214	-96877

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence.

Models (1) and (2) show the relationship between stock return of firm *i* and the financial variables for the peers in the same country for emerging and developed countries, respectively. In general, the models provide a small positive impact of these variables in stock return for emerging and developed countries. To illustrate, an increase in the market-to-book ratio from

the peers that are in the same industry will increase the stock return from firm *i* in 1% and 0.6%, respectively for emerging and developed countries. For the companies in the same country, we can say that if the investment opportunity increases in one point, the stock return of company *i* is 1% higher for the emerging markets and 0.8% higher for the developed countries. Thus, for either emerging or developed economies, only the investment opportunity is statistically significant for the analysis of the country and industry peer groups.

By analyzing the firm-specific factors for these two peer groups, we find the impact of the firm's own characteristics and imitation of the peers' attributes on stock return from firm *i*. Despite the small coefficients, in emerging markets, we find similar effects of firms' own future opportunities (MTB ratio, 0.7% higher) on the stock return for emerging and developed countries. That is, if the opportunities for a specific industry increase, all the companies in it will benefit if they imitate the industry by reduce the uncertainty of their environment (LIEBERMAN; ASABA, 2006). This imitation can increase the stock return of a firm and can suggest a co-movement of the characteristics that can lead to a spillover from the peer firms to the stock return of the firm *i* as proposed by Leary and Roberts (2014) and Gong and Weng (2016)[12].

We assume that characteristics of the peers are observable and will prompt the decisions of firm *i* since the firms extract information from the observation of the chosen characteristics of peer firms. Moreover, these results indicate that firms pay attention to their peers' financial characteristics to reduce the decision's risk and to increase their stock return (CHEN; MA, 2017). Contrarily, the listed companies of the emerging economies have a negative correlation with their own dividend yield (-0.07%) which suggests that a change in the dividend policy can indicate to the market that, overall, the firm will have lower future returns through the decline in existing investment resources. For the developed economies, this dividend yield effect is higher (-0.2%), indicating that this variable has different effects in stock return.

Lastly, for the real interest rate and the GPD growth, the results show that firms with better investment opportunities in the past influence the increase of the stock return of company *i* in the same country as well as the same industry. In summary, real interest rate and GPD growth present a strongly positive effect on stock return from firm *i* when in emerging economies which can relate to the impact of institutional environment on financial indicators and the stock return.

[12] Also, the stock returns within each market reflect the individual condition (business) or an economic effect.

We analyze two more peer groups, the stock market size which provides some insights about the possible effect of similarities of stock market size (SMC) and trade openness which associates the effect of international relationships in stock return. The SMC indicator comprehends that regulatory and institutional factors help the functioning of the stock market by instilling in the investor some level of confidence to trade in stock markets. Dellas and Hess (2005) and Diebold and Yilmaz (2015) suggest that this amplifies the real income growth of a country through stock market by promoting the development and creation of a better environment for business. For the trade openness indicator, Jing et al. (2017) and Heathcote and Perri (2013) suggest that a strong linkage between two countries can influence the effects of changes in the financial markets. Also, "if financial turbulence is due to interdependence, trade diversification could be effective to reduce propagation of financial turbulence" (JING et al., 2017, p.2).

In this context, table 5 shows primarily the effects of some financial characteristics from the peer firms on stock return using fixed effect models for trade openness and stock market size as peer groups. As mentioned before, we create the stock market size group (the trade openness group) by sorting the countries accordingly to the quintile of the average stock market capitalization do GDP (average trade openness). There are more countries with small stock market size (more trade openness) than the contrary which could affect the estimations. In general, models (1) and (2) show the trade openness effect, while models (3) and (4) focus on the stock market size group.

Mainly, as the previous models, the previous investment opportunity from the peer firms have a positive effect on the stock return of the firm *i* with slightly greater values in MTB ratio for the stock market size group. Furthermore, if the firms in the same stock market size (trade openness) have an increase of one point of their investment opportunity, there is an increase of 1.1% (1.2%) in the stock return of the firm *i* from emerging markets and 0.7% (0.8%) for the developed countries. Also, table 5 provides 57% (50%) higher effects to the peers' investment opportunity in emerging and developed economies. Thus, as described in Fama and French (1992, 1993), profitability and investment opportunity are common variation factors for stock returns which explains the positive relationship between MTB and stock returns.

Table 5 – Estimated fixed effect models for stock market and financial characteristic using trade openness and stock market size as the peer groups – 2006 to 2016

	(1) E	(2) D	(3) E	(4) D
Firm-specific factors				
MTB ratio	0.008***	0.006***	0.008***	0.006***
	(0.0007)	(0.0008)	(0.0007)	(0.0008)
P/E ratio	3.2e-05**	1.8e-05**	3.0e-05**	1.8e-05**
	(1.3e-05)	(7.3e-06)	(1.3e-05)	(7.2e-06)
DY	-0.0007***	-0.002***	-0.0007***	-0.002***
	(0.0002)	(0.0003)	(0.0002)	(0.0003)
ROE	0.0014***	0.0008***	0.0014***	0.0008***
	(0.0001)	(6.6e-05)	(0.0001)	(6.7e-05)
Real interest	0.694***	0.237***	0.679***	0.249***
	(0.021)	(0.0128)	(0.022)	(0.013)
GDP growth	0.78***	-0.065***	0.749***	-0.067***
	(0.04)	(0.009)	(0.039)	(0.009)
Peer factors				
Trade: MTB_{t-1}	0.011***	0.007***		
	(0.0008)	(0.0009)		
Trade: PE_{t-1}	-2.2e-06	-4.3e-06		
	(1.4e-05)	(7.2e-06)		
Trade: DY_{t-1}	-5.9e-05	-0.00034		
	(0.0002)	(0.0002)		
SMC: MTB_{t-1}			0.012***	0.008***
			(0.0007)	(0.0009)
SMC: PE_{t-1}			-1.1e-05	-4.7e-07
			(1.4e-05)	(7.2e-06)
SMC: DY_{t-1}			-1.8e-05	-0.0005**
			(0.0002)	(0.0002)
Constant	-0.104***	-0.008***	-0.102***	-0.008***
	(0.003)	(0.002)	(0.004)	(0.002)
Obs.	8,392	19,802	8,392	19,802
R-squared	0.367	0.112	0.367	0.118
N. firms	1,727	3,229	1,727	3,229
AIC	-33720	-97220	-33723	-97344

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence.

Note that the firm-specific factors maintain the same structure as the industry and country peers with a positive future opportunity to invest, while the dividend yield is negative correlated to stock returns. It should also be noted that the values of the firm-specific characteristics in table 5 are like those found in table 4, for both emerging and developed

countries. In this case, knowing the size of the stock market (or the trade openness) is a tool for deciding which stocks should compose an international portfolio based on stock market size (or real international interaction). We believe that the stock market size allows investors to understand that smaller markets can grow faster although the larger markets bring more stability to the investor (AGHION et al., 2004).

Depending on the stock market, the investor must consider the peer effects of the financial characteristics on the stock return to increase its gains by a spillover effect. A spillover effect shows the importance of the co-movement in characteristics to the stock return as Barberis et al. (2005) suggest for the categorization of the equities. By separating the peers in stock market size, the investor follows the category view of Barberis et al. (2005) since it does not have a relationship with fundamentals information of the peers. Thus, since the size of the stock market does not relate to the individual characteristics of the firms, it can lead to a mimicking strategy to have better gains in the stock market. Moreover, for stock market size, we find that the individual characteristics have an important role as a determinant of the stock return. Additionally, since "trade can transfer financial turbulence through competition and bilateral trade", we suggest that this is an important linkage between countries and can easily be made by the individual investors (JING et al., 2017, p.4). Incorporating the macroeconomic factors do not bristly change the effects already provided by the country and industry peer groups.

Lastly, we also test for all the financial constraint indexes to see if there is a difference between the firms with problems obtaining external resources in emerging markets and developed countries. In appendix A, we report tables A.3, A.4 and A.5 with the results for the fixed effect models with the peer characteristics considering the KZ index, the WW index and the SA index, respectively. For these tables, we show the full model for all the peer groups and the results do not deviate from the previous ones. It seems the estimations are consistent for financial constrained firms and a co-movement between stock returns and financial characteristics. Moreover, there is a negative effect from the KZ and the SA indexes and a positive one from the WW index in emerging markets.

In summary, we identify the exogenous effect for the investment opportunity from the peer firms, mainly for the emerging markets. Thus, it is important to understand the nuances of the peer firms in order to achieve better stock returns and to also determine if the imitation of the peer's characteristics improves the quality of the firms. In the next section, we describe the endogenous peer effect from the stock return of the peers by using an instrumented 2SLS estimation to surpass the reflection problem.

4.3 Peer effects from the stock returns and the instrumental variable estimation

The motivation for this section is to analyze the second part of the reflection problem: the peer effect due to endogenous variable (the stock return of the peer firms). Since the peer stock return is the average of the stock return of the peer group minus the stock return from firm *i*, by construction, our model has an endogenous variable. This was discussed extensively by Manski (1993, 2000) as well as Leary and Roberts (2014), Francis et al. (2016), Chen and Ma (2017), Adhikari and Agrawal (2018). For our estimation purpose, the instrumental variable provides a general solution by requiring a relationship between the instrument and the endogenous variable (WOOLDRIGDE, 2010; CAMERON; TRIVEDI, 2005).

Clearly, the endogeneity problem arises from use of the average stock return from the peers except for the firm i as an explanatory variable (the $\beta_8\bar{R}_{-ijt}$) in the equation (10) reproduced again here

$$R_{it} = \beta_1 DY_{it} + \beta_2 MTB_{it} + \beta_3 PE_{it} + \beta_4 ROE_{it} + \beta_5 \overline{DY}_{-ijt-1} + \beta_6 \overline{PE}_{-ijt-1} + \beta_7 \overline{MTB}_{-ijt-1} + \beta_8 \bar{R}_{-ijt-1} + \varepsilon_{it} \quad (10)$$

For each firm in a peer group, the stock return of firm *i* depends on the stock return of the peer firms, creating a simultaneity problem that requires this instrumental variable approach. To follow the pattern in literature, we apply the procedure from Leary and Roberts (2014) to our analysis and estimate the 2SLS version of the peer stock return model. The construction of the instrumental variable is described in the methodological chapter. As Leary and Roberts (2014), we require a non-zero average peer firm stock return from the equation (11).

Our main goal is to examine if the interaction among firms and their peers has any impact on the stock return since valuing the stock price of peer firms can capture useful information that can reduce the uncertainty for the investor. Examining a peer group involves the inclusion of firms with similar characteristics that will behave in the same manner within their markets. Moreover, the peer effect theory advises that the peer group creates a linkage among individual financial decisions that can lead to a "keeping up with the Joneses" effect as Bursztyn et al. (2014) proposed. Therefore, this section differentiates from the former by incorporating the endogeneity problem from not know how the stock return of the peer groups will affect the outcome of the firm (MANSKI, 1993).

The endogeneity due to the stock return of the peer firms can shed some light in the imitation behavior as a strategy to reduce uncertainties for the investor and the firm. We follow

the same approach as the section before by using the first lag of the instrumental variable for the stock return of the peers. Maintaining the pattern in the previous section, we analyze country and industry first and then trade openness and stock market size as the peer groups.

Table 6 presents the estimated 2SLS models for stock return from firm *i* with the country and industry as the peer groups. These models offer evidences of both reflection problems: the endogenous and the exogenous effects. Initially, the financial characteristics of the firms in the same country or industry has an important role in the stock return of the emerging markets' companies, especially for the lagged market-to-book ratio of the peers which enhances between 0.2% to 0.6% the stock return. For the dividend yield, the results indicate that emerging and developed countries have the same impact for the two peer groups. This variable is frequently used as an instrument for price- and time-risk since many applications in asset pricing assume that the dividend yield represents the expected stock returns and is linked to stock return predictability like proposed by Maio and Santa-Clara (2015), Campbell and Shiller (1988a, b), Cochrane (2011).

Also, we identify that MTB and P/E ratios in emerging markets have the same sign from, but higher values than, its counterparts from the firm specific variables for developed economies. Apparently, knowing the characteristics of the industry in these countries offers useful information for the firm's decisions and can help identify if mimicking the characteristics will reduce the firm's risk like proposed by Chen and Ma (2017). Also, it seems that the MTB ratio can reflect an institutional aspect for the firms and the co-movement of characteristics like Daniel and Titman (1997) proposed which can be related to the firms in the same country.

Similarly, since the MTB ratio allows identifying the future perspectives for the industry or the country, it is not surprisingly that an increase of one point in it can lead to an increase that varies from 0.5% to 0.8% on the stock return. In this aspect, the firm specific MTB ratio has an even higher effect on the stock return than the peers' counterpart especially for the emerging markets.

Moreover, when analyzing the peer factors and their effects on the stock return, we find some interesting facts. First, the stock return of the peer firms from the same industry has a positive and significant effect in emerging and developed economies. Note that the peer effect of the stock return in emerging markets (1.15%) are triple the developed countries (0.41%). Firms in the same industry have a significantly influential to stock return, especially in emerging markets.

Table 6 – Estimations of the IV models for stock return and the peer factors for emerging and developed countries using Country and Industry as the peer groups – 2006 to 2016

	(1) E	(2) D	(3) E	(4) D
Firm-specific factor				
MTB ratio	0.008***	0.006***	0.007***	0.005***
	(0.0006)	(0.0007)	(0.0007)	(0.0006)
P/E ratio	3.9e-05***	1.4e-05**	4.6e-05***	1.3e-05*
	(1.4e-05)	(7.0e-06)	(1.6e-05)	(7.1e-06)
DY	-0.001***	-0.002***	-0.001***	-0.002***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
ROE	0.002***	0.001***	0.002***	0.00094***
	(0.0001)	(6.2e-05)	(0.0002)	(6.1e-05)
Real interest	0.685***	0.28***	0.695***	0.256***
	(0.02)	(0.014)	(0.025)	(0.013)
GDP growth	0.83***	-0.091***	0.764***	-0.087***
	(0.04)	(0.008)	(0.046)	(0.008)
Peer factors				
Coun SR_{t-1}	0.954***	0.369***		
	(0.03)	(0.012)		
Coun MTB_{t-1}	0.003***	0.006***		
	(0.0007)	(0.0007)		
Coun PE_{t-1}	-4.1e-06	-1.1e-05		
	(1.6e-05)	(6.9e-06)		
Coun DY_{t-1}	0.0008***	0.0007***		
	(0.0002)	(0.0002)		
Ind: SR_{t-1}			1.153***	0.413***
			(0.04)	(0.013)
Ind: MTB_{t-1}			0.0018**	0.004***
			(0.0008)	(0.0005)
Ind: PE_{t-1}			-1.6e-06	-5.8e-06
			(1.8e-05)	(6.9e-06)
Ind: DY_{t-1}			0.0011***	0.0008***
			(0.0002)	(0.0002)
Obs.	8,230	19,646	8,211	19,630
R-squared	0.123	0.131	-0.036	0.102
N. firms	1,566	3,074	1,562	3,070
AIC	-30229	-96718	-28798	-95997

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence.

These results demonstrate the fact that the peer' stock return act as a critical factor to one's asset pricing model. Thus, as Leary and Roberts (2014) and Chen and Ma (2017) suggested, the changes in the financial outcome of the peers positively spill over the outcomes of a firm. By identifying the changes in stock returns of a peer firm, the investor can choose how to proceed to benefit from the co-movement of the returns in the stock market. Therefore, the results show that the applications from Leary and Roberts (2014), Francis et al. (2016) and Chen and Ma (2017) also find evidences for the asset pricing model with peer effect.

This effect also happens for the country group but is smaller than the industry one for either economies. This indicates that the investors can use this peer group to create the portfolio with shares focused on the same country and gain higher returns. These results are in line with Leary and Roberts (2014)'s consideration about the primary channel of influence from the peer firms is via policy choices – in our case, the stock return of the peer firms.

Hence, the peer firms' stock return as well as its financial status take on a significant role in the stock return of firm *i* and the possible changes it may suffer. Leary and Roberts (2014), Francis et al. (2016) and Park et al. (2017) suggest that the imitation behavior from the peer's decision has an impact on the firm's financial decision. Our results seem to align with these results, and, in contrast, we believe this is also the result of the co-movement as suggested by Barberis et al. (2005), since the dependence can be originated by an investor arranging the stocks into categories based on characteristics.

The other peer groups are the stock market size that is a proxy for financial development like proposed by Durham (2004) and the trade openness that provides insights in the real and the financial economies. Since efficient financial markets can stimulate higher economic growth, we seek to identify if the stock return of firm *i* can change accordingly to the size of the stock market and the trade openness. Table 7 displays these results for the instrumented 2SLS regressor.

Some authors explain the interaction between financial sector and economy growth (SOUMARÉ; TCHANA, 2015; BOWMAN, LONDONO; SAPRIZA, 2014) and we find this an important point to our analysis. Valickova et al. (2015) suggest that financial development have different impacts on economic growth due to the region, time and economic stage of the countries. A developed financial sector is critical to support the development in emerging economies since provides access to financial services as well as new sources of financing. In developed countries, the financial sector efficiently intervenes in the capital' supply and demand which eventually leads to economic growth and the useful information for the market.

Table 7 – Estimations of the IV models for stock return and the peer factors for emerging and developed countries using Trade openness and Stock Market Size as the peer groups – 2006 to 2016

	(1) E	(2) D	(3) E	(4) D
Firm-specific factor				
MTB ratio	0.009***	0.006***	0.009***	0.006***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
P/E ratio	4.7e-05***	1.4e-05**	5.1e-05***	1.4e-05**
	(1.3e-05)	(7.0e-06)	(1.3e-05)	(7.0e-06)
DY	-0.0009***	-0.002***	-0.001***	-0.002***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
ROE	0.0018***	0.0009***	0.0018***	0.00095***
	(0.0001)	(6.3e-05)	(0.0001)	(6.3e-05)
Real interest	0.65***	0.23***	0.601***	0.28***
	(0.021)	(0.013)	(0.022)	(0.014)
GDP growth	0.989***	-0.128***	0.906***	-0.107***
	(0.041)	(0.009)	(0.041)	(0.0085)
Peer factors				
Trade: SR_{t-1}	0.05***	0.03***		
	(0.002)	(0.001)		
Trade: MTB_{t-1}	0.006***	0.005***		
	(0.0007)	(0.0006)		
Trade: PE_{t-1}	1.2e-05	-1.6e-05**		
	(1.6e-05)	(6.8e-06)		
Trade: DY_{t-1}	0.0004*	0.0005***		
	(0.0002)	(0.0002)		
SMC: SR_{t-1}			0.048***	0.027***
			(0.002)	(0.0009)
SMC: MTB_{t-1}			0.006***	0.005***
			(0.0007)	(0.0006)
SMC: PE_{t-1}			1.8e-06	-1.2e-05*
			(1.5e-05)	(6.8e-06)
SMC: DY_{t-1}			0.0003*	0.0006***
			(0.0002)	(0.0002)
Obs.	8,231	19,647	8,230	19,646
R-squared	0.233	0.130	0.255	0.099
N. firms	1,566	3,074	1,566	3,074
AIC	-31339	-96702	-31573	-96022

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence.

Thus, the stock return of the peer group differs from the industry and the country peer groups in magnitude with smaller effects. In general, there still is a positive effect of the stock return of the peers in the emerging and developed markets, whereas the former has a stronger effect on the stock return of firm *i*. The effect of all the peer firm factors is smaller than before, which could be related to the way we construct the stock market size variable. As stock market size aggregates different countries into five subgroups, countries with different economic development paths, but with similar equity markets size, are considered as reference groups and affect the magnitude of the coefficients for the peers.

For example, Brazil, China, Germany, Indonesia, Italy, Mexico, Russia, and Turkey are aggregated in the group with the smaller stock market (SMC) size. Note that this group includes both developed countries – like Germany that is a highly developed economy in Europe – as countries experiencing political and social instability like Brazil and Turkey. Thus, the concentration of countries in the smaller SMC size may be one of the reasons that explains, in part, the different magnitudes of the coefficients. Another explanation may be that the investor does not choose one country over another simplify for the size of its stock market but pondering the country's macroeconomic conditions and the possible diversification benefits of this choice. This seems to happen in trade openness peer group since nine countries have the highest trade openness and seem to explore the benefits from more trading. Note that opening a country up to both international trade and financial flow can promote financial development.

Therefore, our results suggest that an increase in 1% in the stock return of the peer firms for either these peer groups enhances the stock return in 5% in emerging markets, whereas in developed ones the increase is of 3% in the stock return of firm *i*. In a way, we can say that the investors must analyze the country's financial sector development to identify co-movements on stock returns of peer firms, as well as understand the impact on the portfolio selection.

The same principal is applied to trade openness since companies in countries more open to trade undergo the effects of economic fluctuations from foreign markets. Dellas and Hess (2005) suggest that the development of financial sector is an important determinant to the stock return performance since the financial system operation and their effects on macroeconomic fundamentals can lead to economic growth and less volatility on stock returns. Although the peer firms' stock returns are higher for industry/country than for the stock market size, investment opportunity and dividend yield of the peers can influence these financial features for the firm *i* and lead to imitation behavior that can impact on its stock return.

Lastly, as mentioned in the methodological chapter, we perform weak instrument tests for these models and do not find evidences of the presence of the weak problem. Since our

purpose is to test Leary and Roberts (2014), we proceed our analysis but caution the reader to understand that these evidences are specifically for this sample. Table B1 presents the results for the tests and reject the null hypothesis of the structural equation is weakly identified as well as the weak-instrument-robust inference.

In summary, the results show an important role of the peer effects on the stock return of a firm which can help the investor in the diversification process in the international stock market. Comparing these four peer groups, the effect of industry and country for emerging markets are more intense than stock market' size and trade openness, indicating that investors can have better gains from these two groups when they do not understand the financial market diversification principal. In next section, we re-estimate the models using two samples as a robustness test.

4.4 Robustness test for the determinants of the stock return with peer effects

As a robustness test, we re-estimate the models from section 4.3 for two subsamples. In the first one, we exclude companies from China, India, Japan and US because they comprise almost 70% of the firms in our analysis. We aim to verify if the results are the same or if the number of companies from these countries can influence the previous results. Secondly, we re-estimate the models for only these four countries to capture any potential difference contemplating only the industry as a peer group.

The first subsample has 2,274 companies for each year (25,014 firm-year) separated into emerging (421 firms) and developed countries (1,853 firms). Note that China and India are important players in our study and, by excluding them, our sample of companies in emerging markets drastically reduces from more than two thousand companies to little over four hundred firms per year. Table 11 shows the results for this sample considering country and industry as the peer groups. Initially, the most striking differences are the effects of the macroeconomic characteristics on the stock return. Comparing to the complete sample, by excluding China and India, the economic growth has a negative influence in stock return, contrary to the effect of full models. This tend to indicate that these two countries may be responsible for the positive effect of economic growth in the stock return. Conversely, the results for the macroeconomic variables for the developed countries are the same as before, only differentiating in the magnitude.

By considering the peer firm factors, there still is a positive effect between the stock return of the peer firms from the same country, as well as the investment opportunity and

dividend yield but in different magnitudes from the previous ones. In these estimations, the return of companies that belong to the same country is 32% lower than the results of the full sample for emerging countries and 42% lower for the developed countries. Therefore, China, India, USA and Japan are important markets for the peer effect theory, mainly because of their size.

For a smaller sample, a 1% increase in the stock return of the peer group enhances a 0.65% in the stock return of the firm from emerging markets (0.95% previously). In developed countries, the peer effect of the stock return of companies in the same country increase in 0.21% the stock return of the firm. Companies in the same industry have a 0.87% increase in their stock return if there is a 1% increase in the return of the peers which, compared to the earlier results, corresponds to a 24% lower impact in emerging markets and a 41% lower effect for developed ones.

Therefore, by identifying the dependence between firms as peer effect or co-movement in stock returns, the investor can earn higher returns. Foucault and Fresard (2014) suggest the best course of action for an investor that wants to increase its earnings is to interpret the information conveyed in the peer stock prices. Moreover, this results also indicates a homogenous pattern of movement on asset returns like proposed by Barberis et al. (2005) considering either the category or the habitat view. Furthermore, the arguments of Chen and Ma (2017) and many authors of peer effect are also applied to asset pricing models since there is a learning process from the peers' decisions and their performance in the stock market. Also, even with the sample reduction, the peer-return proxy maintains the co-movement between stock returns even to a lesser extent.

Table 11 – Estimations of the determinants of the stock return with IV models for peer effects from Country and Industry – from 2006 to 2016 (10 countries sample)

	(1) E	(2) D	(3) E	(4) D
Firm-specific factors				
MTB ratio	0.011***	0.0042***	0.006**	0.004***
	(0.003)	(0.0007)	(0.003)	(0.0007)
P/E ratio	-0.00001	0.00003*	0.00006	0.00002
	(0.0001)	(0.00002)	(0.0001)	(0.00002)
DY	-0.002***	-0.002***	-0.0013**	-0.002***
	(0.0006)	(0.0003)	(0.0006)	(0.0003)
ROE	0.002***	0.001***	0.0018***	0.0006***
	(0.0004)	(0.0001)	(0.0004)	(0.0001)
Macro factors				
Real int. rate	-0.002	0.162***	0.028	0.098*
	(0.037)	(0.055)	(0.043)	(0.056)
GDP growth	-0.334***	-0.461***	-0.269***	-0.47***
	(0.070)	(0.020)	(0.079)	(0.021)
Peer factor: country				
SR_{t-1}	0.648***	0.213***		
	(0.082)	(0.026)		
MTB_{t-1}	0.019***	0.005***		
	(0.002)	(0.001)		
PE_{t-1}	-0.0001	0.00002		
	(0.0001)	(0.00001)		
DY_{t-1}	0.003***	-0.0002		
	(0.0007)	(0.0002)		
Peer factor: industry				
SR_{t-1}			0.872***	0.245***
			(0.117)	(0.028)
MTB_{t-1}			0.011***	0.003***
			(0.002)	(0.0006)
PE_{t-1}			0.0001	0.00002
			(0.0001)	(0.00001)
DY_{t-1}			0.003***	0.0001
			(0.0007)	(0.0002)
Observations	859	5,216	842	5,201
R-squared	0.241	0.239	0.05	0.225
N. firms	193	945	189	941
AIC	-3260	-25388	-3010	-25221

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. We apply the 2SLS panel data estimator and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively.

We also re-estimate the models for the sample without China, India, Japan and US using the trade openness and the stock market size as the peer groups, reporting the results in table 12. Initially, there is no change in the direction of the peer effects for trade openness and stock market size groups compared to the earlier results, but their intensity tends to reduce in the smaller sample. There still is a co-movement between stock returns of firms and their peers, but robustness estimations are 58% lower for emerging markets with the trade openness as peer group and 56% lower for developed countries in the same level of financial development.
Thus, increases in stock returns as a result of co-movement from these peer groups range from 0.01% to 0.05%, and in emerging countries the intensity of the peer returns is always greater than that of developed markets. Here, Babenko, Boguth and Tserlukevich's (2016) explanation holds it seems that the profitability shocks have a bearing on determining stock returns. With respect to these same effects for the industry and country groups, one can say that the co-movement is surprisingly smaller for a sample with just over 2,000 companies per year.

Table 12 – Estimations of the determinants of the stock return with IV models for peer effects from Trade openness and stock market size – from 2006 to 2016 (10 countries sample)

	(1) E	(2) D	(3) E	(4) D
Firm-specific factors				
MTB ratio	0.011***	0.004***	0.011***	0.0043***
	(0.003)	(0.0007)	(0.004)	(0.0008)
P/E ratio	-0.00005	0.00003	-0.00002	0.00003*
	(0.00007)	(0.00002)	(0.0001)	(0.00002)
DY	-0.0014**	-0.0016***	-0.0015**	-0.002***
	(0.0006)	(0.0003)	(0.0006)	(0.0003)
ROE	0.002***	0.001***	0.002***	0.0007***
	(0.0004)	(0.0001)	(0.0004)	(0.0001)
Macro factors				
Real int. rate	0.136***	0.132**	0.069*	0.075
	(0.037)	(0.06)	(0.042)	(0.054)
GDP growth	0.045	-0.507***	-0.057	-0.534***
	(0.089)	(0.021)	(0.089)	(0.023)
Peer factor: trade				
SR_{t-1}	0.021***	0.016***		
	(0.004)	(0.002)		
MTB_{t-1}	0.022***	0.004***		
	(0.003)	(0.0008)		
PE_{t-1}	-0.0001	0.00002*		
	(0.0001)	(0.00001)		
DY_{t-1}	0.002***	-0.0003		
	(0.0007)	(0.0002)		
Peer factor: SMC				
SR_{t-1}			0.038***	0.012***
			(0.005)	(0.002)
MTB_{t-1}			0.018***	0.005***
			(0.002)	(0.001)
PE_{t-1}			-0.0003***	0.00004***
			(0.0001)	(0.00001)
DY_{t-1}			0.002***	-0.001***
			(0.0007)	(0.0002)
Observations	859	5,217	859	5,216
R-squared	0.249	0.227	0.125	0.25
N. firms	193	945	193	945
AIC	-3269	-25311	-3138	-25461

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. We apply the 2SLS panel data estimator and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively.

Although the empirical asset pricing literature is rich in studies focusing on the linkages of stock markets, we propose here the study of important stock markets and the application for peer effects. The US stock markets are the world's largest followed by the Japanese and Chinese ones and understanding the peer effect on them can shed some light in the results presented in the section 4.3. Table 13 displays the estimations for the sample with the four major stock markets for 2006 to 2016 using the IV models for the peer effects analysis.

Table 13 – Estimations of the determinants of the stock return with IV models for peer effects from all peer groups – from 2006 to 2016 (4 countries sample)

	(1) China	(2) India	(3) Japan	(4) US
Peer factors: Industry				
Stock Return $_{t-1}$	0.713***	0.554***	0.979***	0.756***
	(0.018)	(0.016)	(0.03)	(0.017)
MTB_{t-1}	0.005***	0.004***	0.003***	0.004***
	(0.0005)	(0.0004)	(0.0005)	(0.0005)
PE_{t-1}	-0.00000	-0.00001*	-0.00001	-0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
DY_{t-1}	0.0015***	0.001***	0.0014***	0.0013***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Firm-specific factors				
MTB ratio	0.007***	0.007***	0.006***	0.008***
	(0.0006)	(0.0005)	(0.0006)	(0.0005)
P/E ratio	0.00002***	0.00002***	0.00003***	0.00003***
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Dividend yield	-0.002***	-0.0014***	-0.0013***	-0.0013***
	(0.0002)	(0.0001)	(0.0002)	(0.0001)
ROE	0.0014***	0.0012***	0.0014***	0.0016***
	(0.00007)	(0.00006)	(0.00009)	(0.00007)
Macro factors				
Real interest rate	0.332***	0.39***	0.527***	0.446***
	(0.014)	(0.013)	(0.021)	(0.013)
GDP growth	-0.039***	-0.065***	-0.017	0.0008
	(0.009)	(0.008)	(0.023)	(0.009)
Observations	23,935	24,378	14,515	26,738
R-squared	-0.013	0.105	-0.097	0.0335
N. firms	3,973	3,918	2,676	4,459
AIC	-103415	-111947	-54980	-113831

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. We apply the 2SLS panel data estimator and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively.

The results indicate a positive and significant co-movement of the stock return for the firms and their peers for all the countries. Although the Japanese stock market is the second largest, the co-movement with the peers' stock return is the largest of all these countries which leads us to believe that the companies and their industries are more aligned and dependent of each other than in other countries. An increase of the stock return of the industry in 1% enhances the stock return of the firm in approximately 1% for the Japanese stock market, while the largest stock market (the two US stock markets) has the second higher co-movement of the peer firms (0.8%).

Conversely, the Chinese stock market is the third largest stock market of the world with more than 2,400 firms listed and traded in the exchanges. In our models, these stock market responds to the following higher co-movement for the peer firms (0.71%) as well as the higher impact of the previous investment opportunity of the peers in the same industry (0.5% for each increase in one point for the peers' opportunity). Researches with the Indian stock market indicates that "the listed companies are mostly family controlled with majority holdings in shares and board positions" (SRIRAM, 2018, p.3) and this could be the reason for the smaller co-movement with the peer firms comparing to the other countries. In this context, we can suggest that the results are consistent with the findings of the models estimated with the complete sample.

5. FINAL REMARKS

We apply the peer effect and co-movement approach in stock returns for almost 7,000 listed companies of the top emerging and developed countries from 2006 to 2016. The peer effect theory is usually focused in the labor and education economy studies, as well as in situations that incorporate the social network as the main relation between the subjects. Leary and Roberts (2014) initiate the use of peer effects technique in corporate finance by understanding the effects on capital structure decisions of companies in the CRSP database from 1965 to 2008. Francis et al. (2016), Chen and Ma (2017), and Adhikari and Agrawal (2018) also use the peer effect to analyze corporate finance.

Some researchers apply the spatial econometrics procedures proposed by Jean H.P. Paelinck in the book with Leo H. Klaasen from 1979 to identify peer effects on stock return (ANSELIN, 1988). Fernandez (2011) and Gong and Weng (2016) are some examples of this application since they consider that stock returns experience effects of their own companies' characteristics as size, book-to-market ratio and trade volume, but also of the relative values of these factors in their industries and in their geographic regions[13]. They group companies accordingly social and economic distances and find the dependence between different companies from the same baseline group associated with the peer effect and the co-movement of the variables. For them, if an investor understands the dependence structure between companies, the choice for an adequately portfolio is more accurate due to the spillovers effects when there is a strong integration among companies.

We also group companies according to our references as many authors did. However, to the best of our knowledge, the peer effect theory is not directly applied to asset pricing models disregarding the investor or the analyst studies (BURSZTYN et al., 2014; FOUCAULT; FRESARD, 2014; CESPEDES; PARRA, 2016). To fill this gap, we analyze the peer effect in stock returns given two parts of the reflection problem from Manski (1993): the exogenous peer effect between the stock return from firm *i* and the financial indicators of the peer firms; and the endogenous peer effect between the stock return from firm *i* and the spillover effect from the stock return from the peer firms.

For the first part, we estimate fixed effect models with robust errors considering some financial characteristics as a catalyst of an imitation or spillover effect. For the second approach, the main problem is endogeneity that Manski (1993, 2000) and other authors discussed. Leary

[13] Asgharian, Hess and Liu (2013), Weng and Gong (2016) and Gong and Weng (2016) also apply a spatial procedure to identify peer effects and co-movement in financial markets.

and Roberts (2014) and Francis et al. (2016) argue the importance of the 2SLS estimator as an approach to estimate a model with endogenous variable. In the peer effect aspect, we follow Leary and Roberts (2014) and use the idiosyncratic return from the CAPM regression with the stock return of the peers as our instrumental variable.

In general, we provide evidences that the peer effects are important to international asset pricing models and that exists peer effects in the financial indicators and the stock return. To the best of our knowledge, this is the first attempt to find out when peer effects drive stock returns using international stock markets. There is strong exogenous peer effect from financial characteristics for the emerging markets like market-to-book ratio, while the develop ones have a lesser magnitude of this effect. In this context, Leary and Roberts (2014) suggest that this characteristic of the peer firm likely captures relevant changes in the firm' structure and it seems that our results are aligned with them. It is worth mentioning that these results are amplified in the emerging markets.

An alternative explanation is the lack of reliable information of the characteristics of firm *i* for the decision-process which would imply in the search for information of companies of the same branch. The information theory applied by Chen and Ma (2017) indicates that firms learn from peers' decisions because same firms capture information otherwise difficult to obtain. This also happens because firms do not want to fall behind peer firms and therefore choose to imitate each other (CHEN; MA, 2017).

For the co-movement of stock return of the peer groups, emerging and developed economies display positive and significant peer effects of the changes in the past stock return of the peers, attesting the co-movement between stock returns in the models. The stock returns are strongly higher in emerging countries which leads us to believe that, although these countries offer a high-risk, high-reward investment opportunity, they are rapidly growing but still have high political and currency risks.

Thus, understanding the co-movement of the stock return in the peer effect analysis is essential not only to help the investor achieve higher returns, but also to improve economic growth and reduce volatility. Dellas and Hess (2005) suggest that the development of financial sector is an important determinant to the stock return performance since the financial system operation and their effects on macroeconomic fundamentals can lead to economic growth and less volatility on stock returns.

The stock return of the peers reveals, then, the behavior of the local or international environment experienced by the firm and its investors. It is important to note that the emerging stock markets are smaller than the develop ones and, since these countries are dependable on

each other, they suffer rapidly the effects of international economic crisis, it is not a surprise that there is a positive co-movement between the stock prices.

Nevertheless, the co-movement of stock return occurs in emerging markets, especially for the industry and country peer groups. For the former, the stock return of the peers tends to increase between 0.41% to 1.15% respectively for developed and emerging economies, while the latter varies from 0.37% to 0.95%. Since trade openness and stock market size mix different countries in their groups, the results are smaller for both emerging and developed countries if compared to the previous ones, and the co-movement for the developed ones is half the emerging ones. We attribute this effect to the mix of countries in these variables that cannot explicitly indicate a better integration of real economy and the financial/stock market in the developed countries. When comparing trade and stock market size, an increase of 1% in the stock return of the peers create an increase of 0.05% for emerging countries and 0.03% for developed markets.

To test the robustness of our results, we analyze the effects of China, India, Japan and USA in the models. The first subsample does not consider these four countries and has 2,274 companies for each year. The main difference is the effects of the macroeconomic characteristics with a negative economic growth influence in stock return. For stock return of the peers, the effect is smaller for all peer groups, but we still find that investors and firms from emerging markets observe the decisions of the peers to obtain higher gains. Therefore, the peer effect result is persistent even though China, India, USA and Japan are important markets for this theory applied to stock markets, mainly because of their size. As Foucault and Fresard (2014) suggest that the investor must interpret the information conveyed in the peer stock prices. Also, when analyzing the second subsample that consists of companies in China, India, Japan and USA, we find evidences that an increase of 1% in stock return of peer firms create increases in the stock return varying from 0.55% (India) to 1% (Japan), which suggests that these two developed markets have evidences of peer effects on stock return.

We emphasize that the results obtained here are applied to this sample and may present distinct results in other situations. The main limitation of this work is, besides the computational dedication that the individual regressions for the instrumental variable, the selection of a restricted set of listed companies for fourteen countries. Therefore, this is an academic field that can be better explored by researchers, including the asset pricing analysis as the expanding corporate finance one. The next step for the peer effects in asset pricing models is to ascertain what drives the peer effects, whether they occur especially in emerging or developed countries and if there are mechanism that intensify the peer effects during instability periods.

REFERENCES

ACEMOGLU, D.; AUTOR, D. Lectures in labor economics. Available in https://economics.mit.edu/files/4689. 2011.

ADHIKARI, B.K.; AGRAWAL, A. Peer influence on payout policies. **Journal of Corporate Finance**, 48: 615-637, 2018.

AGHABOZORGI, S.; TEH, Y.W. Stock market co-movement assessment using a three-phase clustering method. **Expert Systems with Applications**, 41: 1301–1314, 2014.

AGHION, P.; et al.. Financial Development and The Instability of Open Economies. **NBER Working Paper Series 10246**, 2004.

ANDERSON, T.W.; RUBIN, H. Estimation of the parameters of a single equation in a complete system of stochastic equations. **Annals of Mathematical Statistics**, 20: 46-63, 1949.

ANGRIST, J.D. The perils of peer effects. **Labour Economics**, 30: 98-108, 2014.

ANG, A.; BEKAERT, G. Stock Return Predictability: Is it There? **The Review of Financial Studies**, 20 (3): 651-707, 2007.

ANSELIN, L. **Spatial Econometrics: methods and models.** Boston: Kluwer Academic, 1988

ASHRAF, B.N. Do trade and financial openness matter for financial development? Bank-level evidence from emerging market economies. **Research in International Business and Finance**, 44: 434–458, 2018.

ARNOLD, M.; et al. Modelling different kinds of spatial dependence in stock return. **Empirical Economics**, 44 (2): 761-774, 2013.

ASGHARIAN, H.; et al. A spatial analysis of international stock market linkages. **Journal of Banking & Finance**, 37 (12): 4738–4754, 2013.

ASGHARIAN, H.; LIU, L. Stock return dependence and product market linkages. In 2018 ASSA Annual Meeting, 2018.

AVRAMOV, D. Stock return predictability and asset pricing models. **The Review of Financial Studies**, 17 (3): 699-738, 2004.

BABENKO, I.; et al. Idiosyncratic cash flows and Systematic Risk. **The Journal of Finance**. 71 (1): 425-456, 2016

BALTAGI, B.H.; et al. Financial development and openness: evidence from panel data. **Journal of Development Economics**, 89 (2): 285-296, 2009.

BARBERIS, N.; et al. Comovement. **Journal of Financial Economics**, 75: 283-317, 2005.

BAUMÖHL, E.; et al. Networks of volatility spillovers among stock markets. **Physica A**, 490: 1555-1574, 2018.

BEKAERT, G.; el al. International stock return comovements. Working paper series n. 931, **European Central Bank**, 2008.

BEKAERT, G.; et al. Who is internationally diversified? Evidence from the 401(k) plans of 296 firms. **Journal of Financial Economics**, 124 (1): 86–112, 2017.

BENA, J.; et al. Are foreign investors locusts? The long-term effects of foreign institutional ownership. **Journal of Financial Economics**, 126: 122–146, 2017.

BERNARD, A.B.; et al. Firms in International Trade. **Journal of Economic Perspectives**. 21 (3): 105–130, 2007.

BOND, P.; et al. Real effects of financial markets. **Annual Review of Financial Economics**. 4 (1): 339–360, 2012.

BOWMAN, D.; et al. U.S. Unconventional Monetary Policy and Transmission to Emerging Market Economies. **International Finance Discussion Papers Number 1109**. Federal Reserve System, 2014.

BURSZTYN, L.; et al. Understanding Mechanisms Underlying Peer Effects: Evidence from a Field Experiment on Financial Decisions. **Econometrica**, 82 (4): 1273–1301, 2014.

CAMPBELL, J.Y.; et al. **The Econometrics of Financial Markets**. Princeton University Press. 611p, 1997.

CAMPBELL, J.Y.; SHILLER, R.J. The dividend-price ratio and expectations of future dividends and discount factors. **Review of Financial Studies**. 1 (3): 195-228, 1988a.

_____. Stock prices, earnings, and expected dividends. **The Journal of Finance**. 43 (3): 661-676, 1988b.

CAMPELLO, M.; GRAHAM, J.R. Do stock prices influence corporate decisions? Evidence from the technology bubble. **Journal of Financial Economics**, 107: 89–110, 2013.

CESPEDES, J.; PARRA, C. Peer Effects across Firms: Evidence from Security Analysts. 2016. **2017 ASSA Annual Meeting of American Economic Association**. Avaliable in <http://www.sole-jole.org/17230.pdf>. Access in Dec., 2017.

CHAN, H.; et al. Financial constraints and stock returns: evidence from Australia. **Pacific-Basin Finance Journal**, 18: 306-318, 2010.

CHEN, H.; et al. Comovement revisited. **Journal of Financial Economics**, 121: 624-644, 2016.

CHEN, S.; MA, H. Peer effects in decision-making: evidence from corporate investment. **China Journal of Accounting Research**, 10: 167-188, 2017.

CHEN, S.-S.; WANG, Y. Financial constraints and share repurchases. **Journal of Financial Economics**, 105: 311–331, 2012.

CHOWDHURY, E.K. Functioning of Fama-French Three Factor Model in Emerging Stock Markets: An Empirical Study on Chittagong Stock Exchange, Bangladesh. **Journal of Financial Risk Management**, 6: 352-363, 2017.

CLAEYS, P.; et al. Debt, interest rate, and integration of financial markets. **Economic Modelling**, 29: 48-59, 2012.

COCHRANE, J.H. Presidential address: discount rates. **The Journal of Finance**. 66 (4): 1047-1108, 2011.

COEURDACIER, N.; GUIBAUD, S. International portfolio diversification is better than you think. **Journal of International Money and Finance**, 30: 289–308, 2011.

CULLEN, G.; et al. R&D expenditure volatility and stock return: Earnings management, adjustment costs or overinvestment? **SSRN Discussion Paper** 2482827. Disponível em < http://ssrn.com/abstract=2482827>. Aug., 2014.

DANIEL, K.; TITMAN, S. Evidence on Characteristics of Cross-Sectional Variation in Stock Returns. **The Journal of Finance**, 52 (1): 1-33, 1997.

DELLAS, H.; HESS, M. Financial development and stock returns: A cross-country analysis. **Journal of International Money and Finance**. 24: 891-912, 2005.

DIEBOLD, F.X.; YILMAZ, K. **Financial and Macroeconomic connectedness**: a network approach to measurement and monitoring. Oxford University Press, 2015.

DURHAM, J.B. Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth. **European Economic Review**, 48, 285-306, 2004.

EDMANS, A., et al. The real effects of financial markets: the impact of prices on takeovers. **The Journal of Finance**. 67 (3), 933–971, 2012.

ENGELBERG, J. et al. Know Thy Neighbor: Industry Clusters, Information Spillovers, and Market Efficiency. **Journal of Financial and Quantitative Analysis.** 53 (5): 1937-1961, 2018.

FAMA, E.F.; FRENCH, K.R. The cross-section of expected stock returns. **The Journal of Finance**, 47 (2): 427-465, 1992.

_____. Common risk factors in the returns on stocks and bonds. **Journal of Financial Economics**, 33: 3-56, 1993.

_____. Size, Value, and Momentum in International Stock Returns. **Journal of Financial Economics**. 105: 457–472, 2012.

_____. A five-factor asset pricing model. **Journal of Financial Economics**, 116: 1-22, 2015.

_____. International tests of a five-factor asset pricing model. **Journal of Financial Economics**, 123: 441-463, 2017.

FAN, J.P.H.; et al. An International Comparison of Capital Structure and Debt Maturity Choices. **The Journal of Financial and Quantitative Analysis**, 47 (1): 23-56, 2012.

FEENSTRA, R.C. **Advanced International Trade**: Theory and Evidence. Princeton University Press, Second Edition. 496 pages, 2015.

FERNANDEZ, V. Spatial linkages in international financial markets. **Quantitative Finance**, 11 (2): 237-245, 2011.

FERNÁNDEZ-AVILÉS, G.; MONTERO, J.M. Spatio-temporal modeling of financial maps from the joint multidimensional scaling-geostatistical perspective. **Expert Systems with Applications**, 60: 280-293, 2016.

FOUCAULT, T.; FRESARD, L. Learning from peers' stock prices and corporate investment. **Journal of Financial Economics**, v. 111, pp. 554-577, 2014.

FRANCIS, B.B.; et al. When do peers matter?: A cross-country perspective. **Journal of International Money and Finance**, 69: 363-389, 2016.

FRENCH, K.R.; POTERBA, J.M. Investor diversification and international equity markets. **NBER Working Papers series.** Working paper n. 3609, 1991.

FUJII, E. What does trade openness measure? **CESifo Working Paper n. 6656**. Disponível em http://www.cesifo-group.de/DocDL/cesifo1_wp6656.pdf. Acesso em jan. 2018.

GHARBI, S.; et al. R&D investments and high-tech firms' stock return volatility. **Technological Forecasting & Social Change**. 88: 306–312, 2014.

GOLEZ, B. (2014). Expected Returns and Dividend Growth Rates Implied by Derivative Markets. **The Review of Financial Studies**. 27 (3): 790-822.

GONG, P. WENG, Y. Value-at-Risk forecasts by a spatiotemporal model in Chinese stock market. **Physica A**, 441: 173-191, 2016.

HADLOCK, C.J.; PIERCE, J.R. New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index. **The Review of Financial Studies**, 23 (5): 1909-1940, 2010.

HAMEED, A.; MIAN, G.M. Industries and Stock Return Reversals. **Journal of Financial and Quantitative Analysis**. 50 (1-2): 89-117, 2015.

HEATHCOTE, J.; PERRI, F. The International Diversification Puzzle Is Not as Bad as You Think. **Journal of Political Economy**, 121 (6): 1108-1159, 2013.

HELPMAN, E.; KRUGMAN, P.R. **Market Structure and Foreign Trade**: Increasing Returns, Imperfect Competition, and the International Economy. Cambridge: MIT Press, 1985.

JING, Z. et al. The propagation of financial turbulence: interdependence, spillovers, and direct and indirect effects. **Empirical Economics**, pp.1-24, < https://doi.org/10.1007/s00181-017-1249-y>, 2017.

KAPLAN, S., ZINGALES, L. Do investment-cash flow sensitivities provide useful measures of financing constraints? **Quarterly Journal of Economics**, 122:169–215, 1997.

KAUSTIA, M.; RANTALA, V. Social learning and corporate peer effects. Journal of Financial Economics. 117: 653–669, 2015.

KOGAN, L.; PAPANILOLAOU, D. Firm characteristics and stock returns: the role of investment-specific shocks. **The Review of Financial Studies**, 26 (11): 2718-2759, 2013.

LAMONT, O.; et al. Financial Constraints and Stock Returns. **The Review of Financial Studies**, 14 (2): 529-554, 2001.

LEARY, M.T.; ROBERTS, M.R. Do peer firms affect corporate financial policy? **The Journal of Finance**, v. LXIX, n.1, pp. 139-178, 2014.

LI, D. Financial Constraints, R&D Investment, and Stock Returns. **The Review of Financial Studies**. 24 (9): 2974-3007, 2011.

LIEBERMAN, M.B.; ASABA, S. Why do firms imitate each other? **Academy of Management Review**, 31 (2): 366-385, 2006.

LIN, Y-M., et al. The information content of unexpected stock returns: evidence from intellectual capital. **International Review of Economics and Finance**, <http://dx.doi.org/10.1016/j.iref.2014.11.024>, 2014.

LINTNER, J. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. **The Review of Economics and Statistics**, 47(1): 13–37, 1965.

LIU et al. A social-media-based approach to predicting stock comovement. **Expert Systems with Applications**, 42 (8): 3893-3901, 2015.

LO, A.; MACKINLAY, C. When are contrarian profits due to stock market overreaction? **Review of Financial Studies** 3:175–205, 1990.

MAIO, P.; SANTA-CLARA, P. Dividend Yields, Dividend Growth, and Return Predictability in the Cross Section of Stocks**. Journal of Financial and Quantitative Analysis**. 50 (1/2): 33–60, 2015.

MALCENIECE, L.; MALCENIEKS, K.; PUTNIŅŠ, T.J. High frequency trading and comovement in financial markets. **Journal of Financial Economics**, In Press. Available in https://doi.org/10.1016/j.jfineco.2018.02.015, 2019.

MANSKI, C.F. Identification of Endogenous Social Effects: The Reflection Problem. **The Review of Economic Studies**, 60 (3):531-542, 1993.

_____. Economic Analysis of Social Interactions. **The Journal of Economic Perspective**, 14 (3): 115-136, 2000.

MARKOWITZ, H.M. Portfolio Selection. **The Journal of Finance**. 7 (1):77-91, 1952.

MAS, A.; MORETTI, E. Peers at Work. **American Economic Review**, 99 (1), 112–145, 2009.

MERTON, R.C. Lifetime Portfolio Selection under Uncertainty: The Continuous-Time Case, **The Review of Economics and Statistics**. 51, 247–257, 1969.

MILLER, M., MODIGLIANI, F. Dividend policy, growth, and the valuation of shares. **Journal of Business**, 34: 411–432, 1961.

MUSSO, P.; SCHIAVO, S. The impact of financial constraints on firm survival and growth. **Journal of Evolutionary Economics**. 18:135–149, 2008.

PARK, K.; et al. The peer-firm effect on firm's investment decisions. **North American Journal of Economics and Finance**. 40: 178-199, 2017.

PETTENUZZO, D.; TIMMERMANN, A.; VALKANOV, R. Forecasting stock returns under economic constraints. **Journal of Financial Economics**, 114: 517–553, 2014.

PHAN, D.H.B.; et al. Stock return forecasting: some new evidence. **International Review of Financial Analysis**, 40: 38-51, 2015.

ROSS, S.A. The arbitrage theory of capital asset pricing. **Journal of Economic Theory**. 13 (3): 341-360, 1976.

SAMUELSON, P.A. Lifetime Portfolio Selection by Dynamic Stochastic Programming. **The Review of Economics and Statistics**. 51(3): 239–246, 1969.

SHARPE, W. Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk. **The Journal of Finance**, 19 (3): 425–442, 1964.

SOUMARÉ, I.; TCHANA, F.T. Causality between FDI and Financial Market Development: Evidence from Emerging Markets. **The World Bank Economic Review**, 29 (Supplement): S205–S216, 2015.

STOCK, J.H.; WRIGHT, J.H. GMM with weak identification. **Econometrica**, 68: 1055-1096, 2000.

SRIRAM, M. Do firm specific characteristics and industry classification corroborate voluntary disclosure of financial ratios: an empirical investigation of S&P CNX 500 companies. **Journal of Management and Governance**. Available in https://doi.org/10.1007/s10997-018-9414-z, 2018.

VALICKOVA, P.; et al. Financial Development and economic growth. **Journal of Economic Surveys**, 29 (3): 506–526, 2015.

WENG, Y.; GONG, P. Modeling spatial and temporal dependencies among global stock markets. **Expert Systems with applications**. 43: 175-185, 2016.

WHITED, T., WU, G. Financial Constraints Risk. **The Review of Financial Studies**, 19: 531–59, 2006.

WIED, D. CUSUM-type testing for changing parameters in a spatial autoregressive model for stock returns. **Journal of Time Series Analysis**, 34: 221–229, 2013.

APPENDIX A − Descriptive statistics and estimated models for stock returns

Table A.1 – Average stock return (%) by Country and Year

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Brazil	3.6	-0.1	-8.3	7.2	0.8	-2.2	-0.5	-1.8	-3.3	-5.7	3.2
Canada	1.3	0	-9.8	5.4	2.2	-3.4	-1.6	-1.9	-1.7	-3.4	2.5
China	4.6	7.8	-7.5	7.2	0.7	-3	0.2	1	2.4	2.7	-1.6
France	2.4	0.1	-6.3	2.7	0.1	-1.8	0.4	1.7	-1	-0.2	0.4
Germany	1.9	0.3	-5.3	1.7	1	-2	0.6	1.4	-1.1	-0.1	-0.1
India	1.2	4.5	-10.7	6.3	1.7	-5.3	1.3	-2.7	4	1.2	-0.3
Indonesia	2.7	3.4	-7.1	5.8	3.5	1	1	-1.8	0.9	-2.9	1.6
Italy	2	-0.6	-6.7	1.6	-1.3	-3.5	0	2.3	-1.3	0.2	-1.3
Japan	-1.8	-1.7	-2.5	0.6	1.4	-0.3	0.2	1.5	-0.2	0.5	0.5
Mexico	3.4	1.4	-5.6	3.2	1.6	-1.6	2.2	0.4	-0.1	-1	-0.6
Russian Federation		3.3	-11.2	7.5	2.7	-3.3	0.9	-1.5	-5.3	0	4
Turkey	-0.8	2.6	-8.5	6	2.6	-3.8	1.8	-3	1.9	-2.2	-0.6
United Kingdom	2	-1.3	-8.1	3.8	1.3	-1.7	1.1	1.9	-1.3	-0.9	-1.3
United States of America	1	-1.1	-5.3	3.3	1.5	-1.1	0.6	2.3	-0.1	-0.9	0.9

Note: stock return is measure as the geometric mean of the monthly stock return.

Table A.2 – Average stock return for the industry peer group (%) by Country and Year

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Brazil	-0.08	-0.13	-0.09	-0.11	-0.07	-0.14	-0.06	-0.04	-0.06	-0.09	-0.1
Canada	-0.06	-0.05	-0.08	-0.09	-0.05	-0.04	-0.06	-0.08	-0.05	-0.05	-0.05
China	-0.03	-0.04	-0.02	-0.02	-0.02	-0.02	-0.01	-0.02	-0.02	-0.03	-0.01
France	-0.02	-0.08	-0.03	-0.03	-0.01	-0.02	-0.06	-0.01	-0.02	-0.02	-0.01
Germany	-0.02	-0.02	-0.03	-0.04	-0.05	-0.04	-0.03	-0.03	-0.02	-0.02	-0.02
India	-0.04	-0.04	-0.02	-0.03	-0.02	-0.01	-0.02	-0.02	-0.03	-0.02	-0.02
Indonesia	-0.09	-0.1	-0.1	-0.1	-0.07	-0.05	-0.07	-0.07	-0.05	-0.03	-0.06
Italy	-0.02	-0.02	-0.05	-0.04	-0.02	-0.03	-0.05	-0.03	-0.04	-0.03	-0.03
Japan	-0.01	-0.07	-0.21	-0.03	-0.01	-0.02	-0.01	-0.03	-0.01	-0.01	-0.01
Mexico	-0.12	-0.07	-0.15	-0.14	-0.07	-0.06	-0.05	-0.07	-0.04	-0.04	-0.07
Russian Federation	0	-0.06	-0.24	-0.19	-0.1	-0.05	-0.05	-0.05	-0.1	-0.09	-0.08
Turkey	-0.07	-0.17	-0.08	-0.17	-0.08	-0.05	-0.04	-0.03	-0.04	-0.05	-0.06
United Kingdom	-0.02	-0.02	-0.05	-0.07	-0.02	-0.02	-0.01	-0.02	-0.02	-0.02	-0.24
United States of America	-0.02	-0.02	-0.29	-0.15	-0.14	-0.14	-0.09	-0.04	-0.06	-0.06	-0.09

Note: stock return of the peer group is measure as the geometric mean of the monthly stock return except for the firm *i*.

Table A.3 – GDP growth (%) for the countries from 2006 to 2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Mean
Brazil	3.96	6.07	5.09	-0.13	7.53	3.97	1.92	3	0.5	-3.77	-3.59	2.23
Canada	2.62	2.06	1	-2.95	3.08	3.14	1.75	2.48	2.57	0.94	1.47	1.65
China	12.72	14.23	9.65	9.4	10.64	9.54	7.86	7.76	7.3	6.9	6.7	9.34
France	2.37	2.36	0.2	-2.94	1.97	2.08	0.18	0.58	0.95	1.07	1.19	0.91
Germany	3.7	3.26	1.08	-5.62	4.08	3.66	0.49	0.49	1.6	1.72	1.87	1.48
India	9.26	9.8	3.89	8.48	10.26	6.64	5.46	6.39	7.51	8.01	7.11	7.53
Indonesia	5.5	6.35	6.01	4.63	6.22	6.17	6.03	5.56	5.01	4.88	5.02	5.58
Italy	2.01	1.47	-1.05	-5.48	1.69	0.58	-2.82	-1.73	0.11	0.78	0.88	-0.32
Japan	1.42	1.65	-1.09	-5.42	4.19	-0.12	1.5	2	0.34	1.22	1	0.61
Mexico	4.94	3.2	1.4	-4.7	5.11	4.04	4.02	1.36	2.27	2.63	2.3	2.42
Russian Federation	8.15	8.54	5.25	-7.82	4.5	4.26	3.52	1.28	0.73	-2.83	-0.22	2.31
Turkey	7.11	5.03	0.85	-4.7	8.49	11.11	4.79	8.49	5.17	6.06	2.88	5.03
United Kingdom	2.5	2.56	-0.63	-4.33	1.92	1.51	1.31	1.91	3.07	2.19	1.81	1.26
United States of America	2.67	1.78	-0.29	-2.78	2.53	1.6	2.22	1.68	2.37	2.6	1.62	1.45

Source: World Bank (2018).

Table A.6 – Estimated fixed effect models with financial constraint variable and the peer groups – KZ index

	(1) E	(2) D	(3) E	(4) D	(5) E	(6) D	(7) E	(8) D
Firm-specific factors								
MTB ratio	0.005***	-0.0017*	0.007***	0.0009	0.006**	-0.001	0.005**	-0.0012
	(0.002)	(0.001)	(0.002)	(0.0013)	(0.003)	(0.001)	(0.002)	(0.0009)
P/E ratio	0.0004***	0.0001***	0.0002***	8.7e-05*	0.0004***	0.0001***	0.0004***	3.7e-05
	(6.4e-05)	(3e-05)	(6.2e-05)	(4.9e-05)	(6.7e-05)	(3.3e-05)	(6.7e-05)	(3.1e-05)
DY	9.9e-05	0.0006*	-0.0002	-0.0009*	0.0006*	0.0006	-0.0006*	0.0008**
	(0.0003)	(0.0004)	(0.0007)	(0.0005)	(0.0003)	(0.0004)	(0.0003)	(0.0004)
ROE	0.001***	0.0005***	0.0012***	0.0005***	0.001***	0.0005***	0.0011***	0.0005***
	(0.0001)	(6.3e-05)	(0.0001)	(0.0001)	(0.0001)	(6.2e-05)	(0.0001)	(6.2e-05)
KZ constraint	-0.014***	-0.002*	-0.0142***	-0.0019**	-0.014***	-0.002**	-0.0143***	-0.002*
	(0.002)	(0.0009)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Real interest rate	0.685***	0.133***	0.706***	0.173***	0.689***	0.165***	0.683***	0.138***
	(0.024)	(0.02)	(0.073)	(0.035)	(0.024)	(0.013)	(0.024)	(0.014)
GDP growth	0.782***	-0.030***	0.772***	-0.037	0.768***	-0.031***	0.778***	-0.041***
	(0.047)	(0.01)	(0.117)	(0.032)	(0.044)	(0.01)	(0.043)	(0.01)
Peer factors								
MTB ratio: Country	0.0009	-0.007***						
	(0.002)	(0.001)						
P/E ratio: Country	0.0004***	0.0001***						
	(7.4e-05)	(3.7e-05)						
DY: Country	0.0012***	0.004***						
	(0.0005)	(0.0005)						
MTB ratio: Industry			0.0025	-0.004***				
			(0.002)	(0.001)				
P/E ratio: Industry			0.0002**	9.8e-05*				
			(7e-05)	(5.7e-05)				
DY: Industry			0.0008	0.002***				
			(0.001)	(0.0007)				
MTB ratio: Trade					0.0014	-0.006***		
					(0.003)	(0.001)		
P/E ratio: Trade					0.0004***	0.0001***		
					(7.9e-05)	(3.9e-05)		

DY: Trade					0.002***	0.004***		
					(0.0005)	(0.0005)		
MTB ratio: SMC							0.0002	-0.006***
							(0.003)	(0.001)
P/E ratio: SMC							0.0005***	3.3e-05
							(7.9e-05)	(3.7e-05)
DY: SMC							1.0e-05	0.005***
							(0.0005)	(0.0005)
Constant	-0.108***	-0.001	-0.103***	-0.00135	-0.108***	-0.002	-0.104***	-0.0007
	(0.005)	(0.002)	(0.012)	(0.004)	(0.005)	(0.003)	(0.005)	(0.002)
Observations	8,148	19,135	8,148	19,135	8,148	19,135	8,148	19,135
R-squared	0.304	0.081	0.302	0.073	0.304	0.078	0.304	0.081
Number of firms	1,694	3,145	1,694	3,145	1,694	3,145	1,694	3,145

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. We apply the fixed effect model for panel data using the traditional estimator and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively.

Table A.7 – Estimated fixed effect models with financial constraint and the peer groups – WW index

	(1) E	(2) D	(3) E	(4) D	(5) E	(6) D	(7) E	(8) D
Firm-specific factors								
MTB ratio	0.0043**	-0.0016*	0.0059**	0.0009	0.0051**	-0.0012	0.0046*	-0.0012
	(0.0018)	(0.0009)	(0.0023)	(0.0013)	(0.0024)	(0.001)	(0.002)	(0.0009)
P/E ratio	0.0004***	0.0001***	0.0002***	8.7e-05*	0.00041***	0.0001***	0.00045***	3.5e-05
	(6.3e-05)	(3e-05)	(6.3e-05)	(4. 8e-05)	(6.7e-05)	(3.3e-05)	(6.8e-05)	(3.1e-05)
DY	0.0002	0.0006*	-8.3e-05	-0.00088*	0.0007**	0.0006	-0.0005	0.00082**
	(0.0003)	(0.0004)	(0.0007)	(0.0005)	(0.0003)	(0.0004)	(0.0003)	(0.0004)
ROE	0.0012***	0.0005***	0.0013***	0.00053***	0.0012***	0.0005***	0.00114***	0.00054***
	(0.0001)	(6.3e-05)	(0.00013)	(0.00014)	(0.00014)	(6.2e-05)	(0.00014)	(6.2e-05)
Real interest rate	0.675***	0.135***	0.697***	0.173***	0.678***	0.166***	0.673***	0.139***
	(0.024)	(0.0144)	(0.07)	(0.0342)	(0.024)	(0.0132)	(0.024)	(0.0142)
GDP growth	0.765***	-0.03***	0.75***	-0.0368	0.743***	-0.031***	0.751***	-0.0407***
	(0.046)	(0.0095)	(0.12)	(0.0322)	(0.0436)	(0.01)	(0.0429)	(0.0096)
Peer factors								
MTB ratio: Country	-0.00043	-0.007***						
	(0.0018)	(0.001)						
P/E ratio: Country	0.00046***	0.00012***						
	(7.3e-05)	(3.6e-05)						
DY: Country	0.0014***	0.0042***						
	(0.00049)	(0.0005)						
MTB ratio: Industry			0.0017	-0.0035***				
			(0.0022)	(0.0012)				
P/E ratio: Industry			0.0002***	9.7e-05*				
			(7e-05)	(5.5e-05)				
DY: Industry			0.00092	0.00201***				
			(0.00123)	(0.0006)				
MTB ratio: Trade					0.0004	-0.006***		
					(0.0025)	(0.0011)		
P/E ratio: Trade					0.0005***	0.0001***		
					(7.89e-05)	(3.9e-05)		
DY: Trade					0.0022***	0.004***		
					(0.0005)	(0.0005)		

MTB ratio: SMC							-0.0005	-0.006***
							(0.003)	(0.001)
P/E ratio: SMC							0.0005***	3e-05
							(8e-05)	(3.7e-05)
DY: SMC							0.0002	0.005***
							(0.0005)	(0.0005)
WW constraint	0.026***	0.001	0.026***	0.0009	0.026***	0.0012	0.0255***	0.001
	(0.003)	(0.002)	(0.004)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
Constant	-0.121***	-0.002	-0.114***	-0.002	-0.120***	-0.003	-0.116***	-0.002
	(0.004)	(0.002)	(0.01)	(0.004)	(0.005)	(0.003)	(0.005)	(0.002)
Observations	8,194	19,221	8,194	19,221	8,194	19,221	8,194	19,221
R-squared	0.302	0.081	0.298	0.073	0.302	0.078	0.301	0.080
Number of firms	1,703	3,145	1,703	3,145	1,703	3,145	1,703	3,145

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. We apply the fixed effect model for panel data using the traditional estimator and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively.

Table A.8 – Estimated fixed effect models with financial constraint and the peer groups – SA index

	(1) E	(2) D	(3) E	(4) D	(5) E	(6) D	(7) E	(8) D
Firm-specific factors								
MTB ratio	0.009***	0.0055***	0.007**	0.006***	0.0122***	0.009***	0.01***	0.0085***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)
P/E ratio	0.0007***	0.0003***	0.00036***	0.0002***	0.0006***	0.0003***	0.001***	0.0002***
	(0.0001)	(3.5e-05)	(0.0001)	(4.8e-05)	(0.0001)	(4e-05)	(0.0002)	(3.6e-05)
DY	-0.006***	-0.0045***	-0.0044***	-0.004***	-0.005***	-0.0058***	-0.0054***	-0.005***
	(0.0007)	(0.0008)	(0.0007)	(0.0009)	(0.0008)	(0.0009)	(0.0008)	(0.0008)
ROE	0.0008***	0.0002***	0.0008***	0.00028	0.0008***	0.0003***	0.0007***	0.0003***
	(0.0002)	(7.4e-05)	(0.0002)	(0.0002)	(0.0002)	(7.5e-05)	(0.0001)	(7.6e-05)
Real interest rate	0.551***	-0.01	0.61***	-0.002	0.563***	0.045**	0.525***	0.041
	(0.034)	(0.024)	(0.067)	(0.061)	(0.0345)	(0.022)	(0.034)	(0.025)
GDP growth	1.274***	0.042***	1.349***	0.0321	1.288***	0.0233**	1.291***	0.0275***
	(0.069)	(0.01)	(0.211)	(0.036)	(0.0683)	(0.011)	(0.062)	(0.01)
Peer factors: Country								
MTB ratio	0.0047*	-0.0013						
	(0.003)	(0.002)						
P/E ratio	0.0008***	0.00033***						
	(0.0001)	(4.2e-05)						
DY	-0.0047***	-0.002***						
	(0.0009)	(0.0008)						
Peer factors: Indust.								
MTB ratio			0.0029	-0.0002				
			(0.003)	(0.0016)				
P/E ratio			0.0004***	0.0002***				
			(0.0001)	(5.7e-05)				
DY			-0.003***	-0.002**				
			(0.0009)	(0.0009)				
Peer factors: Trade								
MTB ratio					0.009**	0.0033		
					(0.004)	(0.0022)		
P/E ratio					0.0008***	0.0003***		
					(0.0001)	(4.9e-05)		

DY					-0.0036***	-0.004***		
					(0.0009)	(0.0009)		
Peer factors: SMC								
MTB ratio							0.0058	0.0027
							(0.004)	(0.002)
P/E ratio							0.0014***	0.0002***
							(0.0002)	(4.4e-05)
DY							-0.0044***	-0.0032***
							(0.001)	(0.0009)
SA constraint	-0.014***	-0.0026*	-0.011***	-0.003**	-0.013***	-0.003**	-0.012***	-0.003**
	(0.004)	(0.001)	(0.0041)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)
Constant	-0.141***	-0.0009	-0.139***	-0.0004	-0.148***	-0.004	-0.155***	-0.003
	(0.007)	(0.004)	(0.013)	(0.0049)	(0.008)	(0.006)	(0.008)	(0.005)
Observations	5,695	19,252	5,695	19,252	5,695	19,252	5,695	19,252
R-squared	0.418	0.097	0.406	0.097	0.412	0.111	0.431	0.100
Number of firms	1,094	2,854	1,094	2,854	1,094	2,854	1,094	2,854

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. We apply the fixed effect model for panel data using the traditional estimator and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively.

Table A.9 – Instrumental variables models with financial constraint and the peer groups – KZ index

	(1) E	(2) D	(3) E	(4) D	(5) E	(6) D	(7) E	(8) D
Firm-specific factors								
MTB	0.008***	0.006***	0.008***	0.005***	0.009***	0.006***	0.009***	0.006***
	(0.0006)	(0.0007)	(0.0007)	(0.0006)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
PE raio	3.8e-05***	1.7e-05**	4.5e-05***	1.6e-05**	4.7e-05***	1.6e-05**	5.0e-05***	1.6e-05**
	(1.4e-05)	(7.3e-06)	(1.56e-05)	(7.4e-06)	(1.3e-05)	(7.3e-06)	(1.3e-05)	(7.3e-06)
DY	-0.001***	-0.002***	-0.0009***	-0.002***	-0.0009***	-0.002***	-0.001***	-0.002***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
ROE	0.002***	0.001***	0.002***	0.001***	0.002***	0.0009***	0.0017***	0.001***
	(0.0001)	(6.4e-05)	(0.0002)	(6.3e-05)	(0.0001)	(6.5e-05)	(0.0001)	(6.5e-05)
KZ constrained	-0.015***	-0.002**	-0.016***	-0.002**	-0.013***	-0.002*	-0.014***	-0.002*
	(0.002)	(0.0009)	(0.002)	(0.0009)	(0.002)	(0.0009)	(0.002)	(0.0009)
Real interest	0.690***	0.283***	0.7***	0.259***	0.654***	0.233***	0.61***	0.284***
	(0.02)	(0.014)	(0.03)	(0.014)	(0.02)	(0.014)	(0.022)	(0.014)
GDP growth	0.813***	-0.09***	0.745***	-0.087***	0.964***	-0.129***	0.88***	-0.108***
	(0.04)	(0.008)	(0.046)	(0.008)	(0.04)	(0.009)	(0.04)	(0.009)
Peer factors								
Country: SR_{t-1}	0.947***	0.368***						
	(0.03)	(0.012)						
Country: MTB_{t-1}	0.003***	0.007***						
	(0.0007)	(0.0007)						
Country: PE_{t-1}	-4.3e-06	-8.7e-06						
	(1.7e-05)	(7.1e-06)						
Country: DY_{t-1}	0.0008***	0.0007***						
	(0.0002)	(0.0002)						
Ind.: SR_{t-1}			1.142***	0.413***				
			(0.04)	(0.013)				
Ind.: MTB_{t-1}			0.002***	0.004***				
			(0.0007)	(0.0006)				
Ind.: PE_{t-1}			-2.1e-06	-2.6e-06				
			(1.8e-05)	(7.1e-06)				
Ind.: DY_{t-1}			0.001***	0.0009***				
			(0.0002)	(0.0002)				

Trade.: SR_{t-1}					0.049***	0.026***		
					(0.002)	(0.0008)		
Trade: MTB_{t-1}					0.006***	0.005***		
					(0.0007)	(0.0007)		
Trade: PE_{t-1}					1.2e-05	-1.4e-05*		
					(1.6e-05)	(6.97e-06)		
Trade: DY_{t-1}					0.0004**	0.0006***		
					(0.0002)	(0.0002)		
SMC.: SR_{t-1}							0.047***	0.028***
							(0.002)	(0.0009)
SMC: MTB_{t-1}							0.006***	0.006***
							(0.0007)	(0.0007)
SMC: PE_{t-1}							1.9e-06	-1.0e-05
							(1.5e-05)	(7.0e-06)
SMC: DY_{t-1}							0.0004**	0.0006***
							(0.0002)	(0.0002)
Obs.	7,981	18,973	7,963	18,958	7,982	18,974	7,981	18,973
R-squared	0.145	0.134	-0.003	0.103	0.252	0.131	0.273	0.100
N. firms	1,528	2,984	1,524	2,980	1,528	2,984	1,528	2,984
AIC	-29521	-93415	-28183	-92671	-30588	-93348	-30818	-92681

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. We apply the fixed effect model for panel data using the traditional estimator and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively.

Table A.10 – Instrumental variables models with financial constraint and the peer groups – WW index

	(1) E	(2) D	(3) E	(4) D	(5) E	(6) D	(7) E	(8) D
Firm-specific factors								
MTB	0.008***	0.006***	0.007***	0.005***	0.009***	0.006***	0.009***	0.006***
	(0.0007)	(0.0007)	(0.0007)	(0.0006)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
PE raio	3.8e-05***	1.6e-05**	4.6e-05***	1.6e-05**	4.6e-05***	1.6e-05**	5.0e-05***	1.6e-05**
	(1.4e-05)	(7.3e-06)	(1.5e-05)	(7.4e-06)	(1. 3e-05)	(7.3e-06)	(1.3e-05)	(7.3e-06)
DY	-0.0009***	-0.002***	-0.0009***	-0.002***	-0.0009***	-0.002***	-0.001***	-0.002***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
ROE	0.002***	0.001***	0.002***	0.0009***	0.002***	0.0009***	0.0018***	0.001***
	(0.0001)	(6.4e-05)	(0.0001)	(6.2e-05)	(0.0001)	(6.4e-05)	(0.0001)	(6.5e-05)
WW constrained	0.017***	-0.0005	0.018***	-0.0003	0.015***	-0.002	0.014***	-0.002
	(0.003)	(0.001)	(0.0037)	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)
Real interest	0.685***	0.284***	0.693***	0.259***	0.65***	0.232***	0.602***	0.283***
	(0.02)	(0.01)	(0.02)	(0.014)	(0.02)	(0.014)	(0.022)	(0.014)
GDP growth	0.804***	-0.091***	0.737***	-0.087***	0.956***	-0.129***	0.875***	-0.108***
	(0.04)	(0.008)	(0.05)	(0.008)	(0.04)	(0.009)	(0.042)	(0.009)
Peer factors								
Country: SR_{t-1}	0.93***	0.369***						
	(0.03)	(0.012)						
Country: MTB_{t-1}	0.003***	0.006***						
	(0.0007)	(0.0007)						
Country: PE_{t-1}	-2.6e-06	-7.96e-06						
	(1.6e-05)	(7.1e-06)						
Country: DY_{t-1}	0.0008***	0.0007***						
	(0.0002)	(0.0002)						
Ind.: SR_{t-1}			1.118***	0.415***				
			(0.04)	(0.013)				
Ind.: MTB_{t-1}			0.0016**	0.004***				
			(0.0007)	(0.0006)				
Ind.: PE_{t-1}			4.9e-07	-2.0e-06				
			(1.7e-05)	(7.1e-06)				
Ind.: DY_{t-1}			0.001***	0.0009***				
			(0.0002)	(0.0002)				

Trade.: SR_{t-1}					0.048***	0.026***		
					(0.002)	(0.0008)		
Trade: MTB_{t-1}					0.006***	0.005***		
					(0.0007)	(0.0007)		
Trade: PE_{t-1}					1.2e-05	-1.3e-05*		
					(1.6e-05)	(7.0e-06)		
Trade: DY_{t-1}					0.0004**	0.0006***		
					(0.0002)	(0.0002)		
SMC.: SR_{t-1}							0.047***	0.028***
							(0.002)	(0.0009)
SMC: MTB_{t-1}							0.006***	0.0054***
							(0.0007)	(0.0007)
SMC: PE_{t-1}							2.6e-06	-9.5e-06
							(1.5e-05)	(7.0e-06)
SMC: DY_{t-1}							0.0004*	0.0006***
							(0.0002)	(0.0002)
Obs.	8,027	19,068	8,009	19,053	8,028	19,069	8,027	19,068
R-squared	0.145	0.133	0.003	0.103	0.244	0.131	0.264	0.100
N. firms	1,537	2,993	1,533	2,989	1,537	2,993	1,537	2,993
AIC	-29727	-93878	-28435	-93157	-30726	-93835	-30938	-93162

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. We apply the fixed effect model for panel data using the traditional estimator and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively.

Table A.11 – Instrumental variables models with financial constraint and the peer groups – SA index

	(1) E	(2) D	(3) E	(4) D	(5) E	(6) D	(7) E	(8) D
Firm-specific factors								
MTB	0.009***	0.007***	0.008***	0.007***	0.009***	0.007***	0.009***	0.007***
	(0.001)	(0.0009)	(0.001)	(0.0008)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
PE raio	3.9e-06	1.7e-05**	7.4e-06	1.7e-05**	7.3e-06	1.5e-05**	1.1e-05	1.6e-05**
	(2.6e-05)	(7.2e-06)	(3.0e-05)	(7.2e-06)	(2.4e-05)	(7.1e-06)	(2.3e-05)	(7.2e-06)
DY	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.0003)	(0.0003)	(0.0004)	(0.0002)	(0.00034)	(0.0003)	(0.0003)	(0.0003)
ROE	0.002***	0.001***	0.002***	0.001***	0.002***	0.001***	0.0018***	0.0011***
	(0.0002)	(7.1e-05)	(0.0002)	(6.9e-05)	(0.0002)	(7.1e-05)	(0.0002)	(7.2e-05)
SA constrained	-0.022***	-0.0015	-0.02***	-0.002*	-0.011**	0.0002	-0.012***	-0.001
	(0.0044)	(0.0012)	(0.005)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)
Real interest	0.546***	0.276***	0.565***	0.253***	0.554***	0.229***	0.471***	0.281***
	(0.03)	(0.015)	(0.034)	(0.014)	(0.028)	(0.014)	(0.03)	(0.015)
GDP growth	0.768***	-0.08***	0.678***	-0.08***	1.07***	-0.126***	0.99***	-0.099***
	(0.054)	(0.008)	(0.059)	(0.008)	(0.056)	(0.0089)	(0.055)	(0.009)
Peer factors								
Country: SR_{t-1}	1.12***	0.384***						
	(0.041)	(0.012)						
Country: MTB_{t-1}	0.003***	0.006***						
	(0.001)	(0.0009)						
Country: PE_{t-1}	3.8e-05	-5.1e-06						
	(3.2e-05)	(7.0e-06)						
Country: DY_{t-1}	0.001***	0.0006***						
	(0.0004)	(0.0002)						
Ind.: SR_{t-1}			1.408***	0.43***				
			(0.059)	(0.013)				
Ind.: MTB_{t-1}			0.001	0.004***				
			(0.0012)	(0.0007)				
Ind.: PE_{t-1}			3.4e-05	4.3e-06				
			(3.6e-05)	(7.2e-06)				
Ind.: DY_{t-1}			0.0014***	0.0008***				
			(0.0004)	(0.0002)				

Trade.: SR_{t-1}					0.064***	0.028***		
					(0.002)	(0.0009)		
Trade: MTB_{t-1}					0.0045***	0.004***		
					(0.0009)	(0.0008)		
Trade: PE_{t-1}					7.4e-05**	-1.2e-05*		
					(2.95e-05)	(6.95e-06)		
Trade: DY_{t-1}					0.0003	0.0005**		
					(0.0003)	(0.0002)		
SMC.: SR_{t-1}							0.061***	0.029***
							(0.002)	(0.001)
SMC: MTB_{t-1}							0.0047***	0.0045***
							(0.0009)	(0.0008)
SMC: PE_{t-1}							4.4e-05	-7.6e-06
							(2.8e-05)	(7.0e-06)
SMC: DY_{t-1}							0.0003	0.0005**
							(0.0003)	(0.0002)
Obs.	4,828	17,308	4,813	17,300	4,829	17,309	4,828	17,308
R-squared	0.001	0.144	-0.295	0.114	0.081	0.134	0.140	0.100
N. firms	964	2,696	961	2,694	964	2,696	964	2,696
AIC	-16449	-85931	-15150	-85311	-16854	-85741	-17174	-85075

Note: the dependent variable is the geometric mean for the annual stock return, using the monthly returns. All the peer variables for company *i* are the mean of all the financial characteristics of the reference group except for the firm *i*. Financial firms are excluded from the sample and we require at least 2 firms per industry and at least 30 observations per country. We apply the fixed effect model for panel data using the traditional estimator and the standard errors in parentheses are robust for heteroskedasticity and within industry-country dependence. Statistical significance at 1%, 5% and 10% is denoted by ***, **, and *, respectively.

APPENDIX B – Instrumental tests for stock returns using the peer groups

Table B.1 – Instrumental tests for the estimated models for stock return for all the peer groups from tables 3 and 4 – 2006 to 2016.

	Ind.SR_{t-1}		Coun.SR_{t-1}		Trade SR_{t-1}		SMC SR_{t-1}	
	E.	D.	E.	D.	E.	D.	E.	D.
Shea's Partial R^2	0.2416	0.5869	0.313	0.6421	0.4044	0.6978	0.4405	0.5498
Underidentification test	869.15***	2393.16***	1033.15***	2547.31***	1219.33***	2576.97***	1301.19***	2103.14***
Weak identification test	1812.55	10576.63	2689.4	13248.63	3067.93	11442.04	3403.91	8448.89
Weak instrument?	No	No	No	No	No	No	No	No
Weak-instrument-robust inference	878.46***	808.46***	862.51***	775.25***	809.42***	837.19***	819.9***	788.7***
Stock-Yogo weak ID test critical values:								
10% maximal IV size	16.38							
15% maximal IV size	8.96							
20% maximal IV size	6.66							
25% maximal IV size	5.53							

Note: These are the results for the weak instrument tests for the models in tables 6 and 7. The Shea's Partial R^2 is reported because the models contain an endogenous regressors. The underidentification test is the Kleibergen-Paap rk LM statistic in which the null hypothesis is that matrix of reduced form coefficients is underidentified, and the weak instrument test is a Kleibergen-Paap Wald F statistic. The main results indicate that this instrument is a weak one, except for developed countries. We denote *** as the p-value = 0.000.