Impact of Dividend Stability on Car Manufacturers and Spare Part Manufacturers of Europe

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Submitted to the
Institute of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Master of Science
in
Banking and Finance

Eastern Mediterranean University
February 2021
Gazimağusa, North Cyprus

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ABSTRACT

Dividend policy is an important part of the financial policy of modern companies and is one of the tools that ensures the investment attractiveness of the company. The mechanism of distribution of net profit has a special influence on the value of the company. In practice, the adoption of management decisions are carried out within the framework of the dividend policy. The implementation of an optimal dividend policy is one of the important areas of activity of a financial manager and requires a deep understanding of the impact on its factors as well as its relationships with other management decisions. The question of how to have an optimal dividend policy is one of the most discursive topic for researchers. This research will show how stable the dividend policy is for European car manufacturing and spare part manufacturing companies. These countries include Austria, Finland, France, Germany, Italy, Netherlands, Portugal, Spain and Sweden.

In this study, we examine the dividend policies of 24 European automotive industry companies from 1998 to 2018. To understand the dividend distribution policy, we used the prominent Lintner's model in a panel data setting. The results showed that the auto industry has a stable dividend policy. This finding is in line with the findings in developed and developing countries that companies use dividend smoothing. The main factors influencing the changes in the payment of cash dividends are past dividends and current earnings, and the most influential determinant is the level of lagged dividends.

Keywords: Dividend Policy, Dividend Stability, Lintner's Model

ÖZ

Temettü politikası, şirketlerin finans politikasının önemli bir parçası olup, şirketin yatırım çekiciliğini sağlayan araçlardan birisidir. Temettü dağıtım mekanizmasının şirket değeri üzerinde özel bir etkisi vardır. Optimal bir temettü politikasının uygulanması, bir finans yöneticisinin önemli kararlarından birisidir. Temettü politikası kararının diğer yönetim kararlarıyla olan ilişkilerinin derinlemesine anlaşılmasını gerektirmektedir. Optimal bir temettü politikasına nasıl sahip olunacağı sorusu, araştırmacılar tarafından tam olarak cevaplandırılmış bir soru değildir. Bu araştırma, Avrupalı otomobil ve yedek parçası üreten şirketlerin temettü politikalarının ne kadar istikrarlı olduğunu incelemektedir. Bu ülkeler arasında Avusturya, Finlandiya, Fransa, Almanya, İtalya, Hollanda, Portekiz, İspanya ve İsveç bulunmaktadır.

Bu çalışmada, 1998'den 2018'e kadar 24 Avrupa otomotiv endüstrisi şirketinin temettü politikalarını inceliyoruz. Temettü dağıtım politikasını anlamak için, panel veri ortamında Lintner modeli kullanılmıştır. Sonuçlar, otomobil endüstrisinin istikrarlı bir temettü politikasına sahip olduğunu göstermektedir. Bu bulgu, gelişmiş ve gelişmekte olan ülkelerdeki bulgularla uyumludur. Nakit temettü ödemelerindeki değişiklikleri etkileyen ana faktörler geçmiş temettüler ve cari kazançlardır. En etkili belirleyici, geçmiş temettü seviyesidir.

Anahtar Kelimeler: temettü politikası, temettü istikrarı, Lintner modeli

To my future

ACKNOWLEDGMENT

I want to express my deep gratitude to my supervisor, Prof. Dr. Cahit Adaoğlu, for the help, guidance and support throughout the research process. I would like to thank and appreciate jury members for their suggestions and positive assessment of the research. I want to further appreciate all the professors at the Department of Banking and Finance, who have not only given us knowledge, but have also instilled a love for what we study.

In addition, I want to thank my father for giving me an opportunity to study in Eastern Mediterranean University and for support throughout my life.

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INTRODUCTION

1.1 Background

Many studies conducted research on dividend policy, and researchers still could not fully explain how financial managers decide on the dividend policy. Dividend policy is important for corporation due to its influence on capital structure and financing of the company and eventually, on the value. Dividend payout affects many aspects of financial management such as liquidity, capital structure, and stock prices. No dominant theories requiring an explanation of the dividend policy are indicated in the academic communities. Each theory has both evidence and rebuttal (Frankfurter, 2002). Therefore, the dividend policy of companies has always been an interesting topic for researchers. The relevance of the topic is due to the question of how much of the profit should be paid to shareholders, in what form, and moreover, why it is important for investors.

The main theoretical developments in the framework of influence of dividend policy on the value of corporations were implemented by Miller and Modigliani (1961). They put forward the theory that value of the company is not affected by firms' financial operations. Hence, they built this theorem on "perfect market" idea, where all investors have the same information, the information is costless and most importantly, no taxes exist. Modigliani and Miller also proposed an idea of the existence of so-called "clientele effect", according to which certain group of shareholders prefer stability of

the dividend policy to a greater extent than receiving any irregular significant income. This section provides a quick overview of academic research in the field of dividend policy.

In 1934, Graham and his colleagues expressed the idea that the only reason for the existence of companies was to pay dividends to shareholders (Graham et al., 1934). Modigliani and Miller (1961) argue that dividend policy does not affect the value of the company. Therefore, a company does not need to pay attention to the dividend policy (Modigliani and Miller, 1961). However, in the presence of market imperfections, there are other theories explaining the dividend distributions and their effects on firm value such as “signal theory”, “dividend irrelevance theory”, “relevance theory”, “agency theory”, and so on (Priya, 2016). However, the large quantity of contradictory theorems has created a term “dividend puzzle”. Black (1976) and ensuing Feldstein and Green (1983) noted: ‘‘The nearly universal policy of paying substantial dividends is the primary puzzle in the economics of corporate finance.’’

1.2 Objectives

According to European Commission, automotive industry is one of the most important industries influencing the prosperity of the European economy. This industry accounts for 6.1% of total employment. The European companies are one of the world's biggest automobile and spare parts manufacturers. This research explores how major listed car manufacturers and spare part manufacturers in Europe decide on their dividend policy. To examine the dividend payouts and the dividend stability in the European automotive industry, this study uses the prominent Lintner’s model (1956). Additionally, we will see how changes in cash dividend distribution as well as earnings per share affect the cash dividend payouts in car manufacturing and spare part

manufacturing companies. The use of Lintner's Model will show whether previous divided payment and present incomes can predict the cash dividend payments and whether they adopt a stable dividend policy.

1.3 Data and Methodology

Data collection was performed by utilizing Thomson Reuters Eikon database. The period selected for this research starts in 1998 and finishes in 2018. The list of companies contains 24 public companies of 9 EU countries, such as Austria, Finland, France, Germany, Italy, Netherlands, Portugal, Spain and Sweden. For the empirical analysis, the econometric and forecasting software *Eviews 9* is used. To understand the impact of dividend policy on the firm, we used several regression models, namely the Ordinary Least Square (OLS) Model, the Fixed Effects (FE) Model and the Random Effects (RE) Model.

1.4 Thesis Structure

The objectives of the study predetermined the structure and the general flow. In Chapter 2, the thesis research examines an overview of dividend policy in general and its types, firm-specific and non-firm specific factors affecting dividend distribution and the differences between the theories of dividend policy. We also consider research conducted by other academicians on similar topics. In Chapter 3, we analyse the stability of dividend payments, as well as empirical and statistical research in order to identify the level of dividend distribution of European companies in the automotive industry. This is followed by a conclusion of our findings.

Chapter 2

LITERATURE REVIEW

2.1 Dividend Policy Description and its Types

This chapter will provide an overview of researches on previous studies examining dividend policy. Dividend policy refers to the strategy of paying a share of profits to the shareholders (Bhat, 2014). It involves the following. Dividend policy involves deciding about the 'type' of dividends to be paid (Berk & DeMarzo, 2016). There are mainly two types of dividends i.e., cash dividends and stock dividends (Brealey, Allen, & Myers, 2016). Cash dividends refers to money paid out to investors out of profits (Hania, Westerfield, & Jordan, 2014). Cash dividends are also divided into two groups: preferred stock dividend and ordinary share dividends (Hankin, Seidner, & Zietlow, 2018). On one hand, common stock dividends are usually paid only when the company makes a profit as the company has discretion regarding its payment (Berk, 2016). On the other hand, preferred stock dividends have to be paid out regardless of whether the company makes a profit or not i.e., it is like an obligatory payment to preferred stockholders just like interest is an obligatory payment to debtholders (Pizzey, 2018); (Kim, 2011). Stock dividends refers to issuing stocks to investors instead of money (Ferran & Ho, 2014).

Moreover, it includes deciding about the 'amount' of the dividends i.e., whether to pay a constant amount of money as dividends in each period (i.e., stable dividend policy), whether to distribute dividends as an constant part of the revenue (i.e., constant

dividend policy), or whether to pay dividends equal to what is left over from profits after paying for capital expenditures and working capital (i.e., residual dividend policy) (Ahuja & Dawar, 2015).

Furthermore, it includes deciding about the 'timing' of dividends (Clayman, Fridson, & Troughton, 2012). That is, whether to pay dividends on an annual basis, quarterly basis, or monthly basis (Ehrhardt & Brigham, 2016). This also includes deciding upon whether to pay dividends on regular intervals or on a discretionary basis (Eckbo, 2008).

2.2 Dividend Policy's Impact on the Firm

Dividend policy is important for corporations due to its influence on capital structure and financing of the company. Some empirical studies asserted that paying dividends has a positive impact on the firm while some other empirical studies asserted that paying dividends has a negative impact on the firm. Following empirical studies from the previous literature asserted that dividend payouts negatively affect firm's value. Khan, et al. (2016) analysed the impact of dividend payout ratio on firm's return on equity in case of Pakistani companies. It concluded that paying higher dividends leads to a fall in return on equity in case of firms in Pakistan. Moreover, Lumapow, Arthur, & Tumiwa (2017) analysed the impact of dividends on firm's value in case of Indonesian companies. It concluded that paying higher dividends leads to a fall in firm's value in case of firms in Indonesia. Furthermore, Oliver, Iniviei, & Daniel (2016) analysed the impact of dividend per share on firm's value per share in case of Nigerian companies. It also concluded that paying higher dividends leads to a fall in firm's value in case of firms in Nigeria (Oliver, Iniviei, & Daniel, 2016).

Following empirical studies from the previous literature asserting that paying dividends has a positive impact on the firm, Budagaga (2017) studied the impact of dividends on firm's value in case of Istanbul stock exchange. It concluded that paying higher dividends leads to a rise in firm's value in case of firms in Istanbul. Moreover, Anton (2016) studied the impact of dividends on firm's value in case of Bucharest stock exchange. It concluded that paying higher dividends leads to a rise in firm's value in case of firms in Romania. More detailed information about these studies will be below in following sections.

2.3 Internal and External Determinants of Dividend Policy

A firm's dividend policy is decided by both, management and the Board of Directors and it is a key corporate finance decision since it also has an impact on the firm's value in addition to determining shareholder wealth. Corporates follow a specific strategy to arrive at the right number of dividends to be purchased at the timing of the payments. Various internal and external factors are considered as part of this strategy.

2.3.1 External Determinants

2.3.1.1 Economic Situation

Economic condition may have a positive relationship with dividends in the following case. If the management has tied dividends to firm's profits then economic condition would have a positive relationship with dividends i.e., good economic condition would mean high sales and profits for the company which would mean high dividends while poor economic condition would mean low sales and profits for the company which would mean low dividends (Pizzey, 2018). Management may decide to hold surplus cash and income when the economy is in strain and/or expected to deteriorate in the short - medium term in order to create reserves and absorb any future shocks. In a recession, management may even choose to temporarily suspend dividends in order to

retain the company's liquidity. The situation reverses when the economic growth propels where management may be more liberal by paying more dividends. This is proved by the results of the following empirical study. The paper by Sarwar, Ming, & Husnain (2020) studied the impact of economic uncertainty on dividends payments in case of China. It revealed that during times of high economic uncertainty, companies tend to discontinue paying dividends.

But economic condition may also have a negative relationship with dividends in some cases i.e., low dividends during good economic conditions and high dividends during poor economic conditions. Management may decide to reduce dividends during times of economic recovery if it wants to invest in new ventures. That is, there are many business expansion opportunities arising during times of economic boom and hence the management may decide to retain earnings, instead of paying them out to investors as dividends, in order to invest in these new ventures. Similarly, management may decide to increase dividends during economic meltdown if it wants to encourage shareholders to stop withdrawing their money out of the stock market. That is, many investors face cash flow issues during bad economic times and hence they sell their assets (including stocks) in order to meet day to day expenses. This bearish sentiment in the market causes a fall in firm’s share price. If management wants to stop its share price from falling, it decides to pay dividends to the shareholders (even if the company is making losses due to poor economic condition) because it does not want investors to backout from company’s shareholding. This is proved by the results of the following empirical studies. The paper by Lotto (2020) studied the impact of GDP on dividends payments in case of Tanzania. It revealed that GDP has a negative relationship with dividends i.e., a rise in GDP leads to a fall in dividends and a fall in GDP leads to a rise in dividends. Tawiah and Bogeh (2014) studied the impact of global crisis on

automobile and IT industry of India. They showed that profit after tax decreased in case of automobile industry, but dividend payouts stayed stable during and after the recession. However, the IT industry experienced an increase in profits but it decreased dividend payouts during the crisis.

Thus, economic condition has a positive relationship with dividends in some cases (e.g., when management wants to retain cash in order to maintain liquidity during recessions/low sales) while it may also have a negative relationship with dividends in some other cases (e.g., when management wants to spend cash flow generated from earnings on emerging business ventures instead of paying them out as dividends).

2.3.1.2 Capital Markets

Volatility in capital markets is another key reason driving management's dividend policies. Management usually tend to be liberal, when capital markets are stable with minimal volatility in indices and individual stock prices. Conversely with volatile market with significant volatility in price. This is proved by the results of the following empirical studies. The paper by Aivazian, Booth & Cleary (2003) reveals that companies operating in developing countries (where capital markets are poor) tend to pay low dividends as compared to companies operating in developed countries (where capital markets are good). Moreover, the paper by Jaara, Alashhab, & Jaara (2018) reveals that rise in capital market risk leads to a fall in dividends while a fall in capital marker risk leads to a rise in dividends paid to shareholders. Chakraborty, Shenoy & Kumar (2018) show that dividend policy is highly dependent on operating cashflow in case of spare part manufacturing companies of India.

2.3.1.3 Regulations

Regulations around corporate dividend payment policies differ across countries. While regulatory bodies in a few countries may demand firms to pay dividend from the profit

accumulated in the last fiscal year, regulations in a few other countries might be liberal that it allows for immediate dividend payments from the current fiscal year. A few regulatory bodies may even prevent firms in a specific sector from distributing dividends if the sector is going through or expected to go through strain in the forthcoming quarters. This is proved by the following empirical studies. The paper by Martins & Novaes (2012) reveals that it is mandatory for firms in Brazil to pay out dividends and hence average dividend yield in this country is higher than that in America where there is no such regulation. Moreover, the paper by Mahenthiran, Cademartori, & Gjerde (2020) also reveals that it is mandatory for firms in Chile to pay out dividends and hence average dividends paid in Chile are higher than that in other countries.

2.3.1.4 Contractual Restrictions

Lenders and other financial institutions may put forth contractual agreements with the borrowing corporate firms to restrict dividend Lenders and other financial institutions may put forth contractual agreements with the borrowing corporate firms to restrict dividend payouts, for instance due to liquidity problems as in was mentioned above This is proved by the following empirical studies. The paper by Jung, Lee, & Yang (2015) reveals that presence of some dividend related covenants may lower the amount of dividend paid by companies that are bound by those covenants as compared to those companies that are not bound by those covenants. Moreover, the paper by Tran (2019) also revealed that presence of some debt covenants may lower the amount of dividend paid by companies because the creditors want the companies to pay off their debt first before starting to pay money to equity holders in the form of dividends.

2.3.2 Internal Determinants

More than the external factors mentioned, dividend policies are driven more by the factors internal to a company such as profit posted by the company, firm size, and so on.

2.3.2.1 Earnings

The dividend paid by any firm is in positive correlation with the company's reported earnings. Studies conducted around this topic reinforce the thought. E.F. Fama and K.F. French also researched and conducted studies which confirm that the dividend policy depends on the retained profits (Fama & French, 2015). Furthermore, it has also been researched and inferred that firms tend to alter their dividend policies only when they report substantially volatile financial results in consecutive fiscals and tend to ignore any small variations in the financials. This is proved by the following empirical studies. The paper by Humanika (2019) analysed the impact of earnings on dividends paid in case of firms in Pakistan. It was found that earnings have a positive relationship with dividends i.e., rise in earnings leads to a rise in dividends while a fall in earnings leads to a fall in dividends. Moreover, the paper by Ahmed, Advani, & Kanwal (2018) also analysed the impact of earnings on dividends paid in case of major sectors in Pakistan. It was again found that earnings have a positive relationship with dividends. Furthermore, the paper by Krishnamorthi (2016) analysed the impact of earnings on dividends paid in case of steel firms in India. It was found that earnings have a positive relationship with dividends.

2.3.2.2 Cash Flow

The operating cash flow recognized from profits also plays an important role in determining the dividend policy of a firm. Higher fluctuation in cash flow results in reduction of dividends. Furthermore, the companies which generate stable cash flow

from their operating activity pay out dividends more frequently. This is proved by the following empirical study. The paper by (Mirza & Afza, 2014)studied the impact of operating cash flow on dividends paid in case of firms in South Asia. It was found that a rise in operating cash flow leads to a rise in dividends paid in case of firms in India, Pakistan and other countries in South Asia.

The free cash flow of firms also has an impact on dividend policy. If the free cash flow is high then the firm may consider investing in new projects and hence it would abstain from paying dividends. This is proved by the following empirical studies. The paper by Parsian & Koloukhi (2014) studied the impact of free cash flow on dividend pay-out ratio in case of firms in Tehran. It was found that a rise in free cash flow leads to a fall in dividend payout ratio in case of firms in Tehran. Moreover, the paper by Hejazi & Moshtaghin (2014) studied the impact of free cash flow on dividend paid in case of firms in Iran. It was found that a rise in free cash flow leads to a fall in dividend paid in case of firms in Iran as well. Furthermore, the paper by Al-Fasfus (2020) studied the impact of free cash flow on dividend paid in case of firms in Jordan. It was found that a rise in free cash flow leads to a fall in dividend paid in case of firms in Jordan as well. Moreover, the paper by Hee-Jung Yeo (2018) studied the impact of free cash flow on dividend paid in case of firms in shipping industry. It was found that a rise in free cash flow leads to a fall in dividend paid in case of firms in shipping industry as well.

2.3.2.3 Firm Size

Size and scale of a firm is another important factor impacting its dividend policy. A big firm with multiple capex and investment needs would prefer to retain earnings and invest in building its fixed assets and thus lower the dividend pay-out numbers while small firms have limited capital requirements and are prone to paying higher

dividends. That is, firms distribute assets (i.e., dividends) only upon reaching an efficient size. This is proved by the following empirical studies. The paper by Ramachandran & Veeramuthu (2010) studied the impact of firm size on dividend paid in case of firms in India. It was found that firm size is a statistically significant determinant of dividends paid in case of firms in India. Moreover, the paper by S. Redding (1997) studied the impact of firm size on dividend paid in case of large firms. It was found that firm size is a statistically significant determinant of dividends paid in case of large firms as well. Other auxiliary factors include availability of better investment opportunities, tax considerations, financial flexibility, flotation costs etc. that may affect a company's dividend policy (Ahuja & Dawar, 2015).

2.4 Dividend Theories

Over the past few decades, several researchers and academicians have researched different dividend policies and have commented on the impact of dividend on the firm's value and shareholder's wealth. A few of such theories are discussed in detail below.

2.4.1 Signal Theory

In 1977, Stephen Ross researched and opined that there is a strong relationship among dividend distribution and market value of the share prices of presented stocks (Ahuja & Dawar, 2015). According to this theory, investors consider dividend announcement and distribution as signs of management's forecast of future earnings in the forthcoming quarters (Brealey, Allen, & Myers, 2016). A rise in dividend amount would generally mean that the company is expecting its earnings to raise in the near future since managers usually jack dividends up only when the expected profit is high. This will also be met usually with a rise in stock prices and vice versa, reduction in dividend increase causes reduction of price. Due to the behaviour of investors in the

event of changes in dividend payments, it can be assumed that dividends in the form of retained payments do not attract the attention of investors much. In addition, variations in securities prices are more indicative of the need to pay attention to dividend announcements.

2.4.2 Dividend Irrelevance Theory

The authors, Modigliani and Miller (M&M), state that market value of the firm and shareholders wealth for any period, depends on generated profit and not on chosen dividend policy or distributed profit (Modigliani and Miller, 1961). Theory determines that the price of shares of an enterprise does not depend on dividend policy (Brealey, Allen, & Myers, 2016). In other words, it doesn't matter to the investor in what way income is going to be received, whether as received as a dividend payment or generated by increase in the share price. According to this theory, the value of an enterprise depends on the ability to make a profit with a low degree of risk. The value of the enterprise is more dependent on investment policy.

The arguments are mainly based upon some “idealistic assumptions” of the capital markets being “perfect” and investors being “rational”. Summary of such assumptions are as follows:

A) Tax incurred by firms on dividends and capital gains are not different
B) Firms don’t incur any additional transaction or flotation costs when securities are traded
C) There is no information asymmetry across market participants as they have free and equal access to all information related to firms listed
D) There is no agency problem as managers and security holders have no conflicts of interests and
E) All participants in the market are price takers.

Modigliani and Miller showed that the payment of high dividends entails the issuance of a larger number of new shares. Moreover, the share of the value of the enterprise proposed by the new investor should be equal to the amount of dividends paid, and dividends are irrelevant. The assumptions used by Modigliani and Miller were far from reality, and the conclusion that dividend policy does not affect the price of shares is not too realistic.

2.4.3 Bird in Hand Theory

This was put forth by the famous researchers Gordon and Lintner in 1963. Their research helped to infer that investors usually prefer dividend payments over capital gains (Brealey, Allen, & Myers, 2016). Their argument was mainly based on the fact that dividend payments are immediate and instant gratification for investors from a firm for owning the respective shares while capital appreciation is unwarranted. For investors, the payment of dividends gives more confidence in the future of the company, which is important because investors are generally risk averse. Increase in dividend payments indicates the certainty of future cash flows, that is, the higher the payout ratio, the lower the cost of capital, which leads to an increase in the value of shares. The bird-in-hand theory states that, firm's value is in positive correlation with its dividend payout ratios.

On the other hand, M&M (1961) criticized the BIHH and argued that the firm's risk is determined more by the risks inherent in its operating cash flows than the way it distributes its earnings. Similarly, Bhattacharya (1979) raised concerns about the underlying assumptions of the bird-in-hand theory suggesting that a company's risk nature affects its dividend policy and not the other way around (Ehrhardt & Brigham, 2016).

2.4.4 Tax Effect Hypothesis

Other dividend policy theories do not consider the impact of taxes on dividends and capital gains. For example, as we read above, per the MM theory, impact of tax incurred by firms remain same on capital gains and dividend income. But implications in the real world are different and play a key role in driving the dividend policy decision of a corporate (Brealey, Allen, & Myers, 2016). According to the tax effect hypothesis and the results from the researcher Brennan in 1970, it was observed that there exists a differential in tax treatment between dividends and capital gains from the perspective of both investors and corporate firms. Since investors most of the times are interested in after-tax return, the influence of taxes might affect their demand for dividends. Investors that fall in the maximum tax-paying bracket of a country tend to incur higher tax rates for the dividend income and hence they would prefer to hold stocks with high-dividend yield. Since not all firms guarantee high dividend yield, they may prefer the benefits from capital appreciation than to hold onto high dividend stocks and also incur higher tax rates.

The study also highlighted the key role of supply-side tax implications. Due to the fact that increasing wealth of the firm is the main goal of managers, it can be done by increasing the profit retention rate. Thus, such managers push investors to prefer capital appreciation over higher dividend income. With the given assumption that capital gains are subjects to lower tax rates than dividends. We also infer from the hypothesis that low dividend pay-out ratios help to mitigate the cost of capital for any corporate firm and thus contributing to increase the firm's overall value. In addition, tax regulations demand immediate taxation of dividend income while taxes on capital gains are deferred until the stock is actually sold by the investor. These tax advantages of capital gains over dividends also tend to push investors, to prefer companies that

retain most of their earnings rather than pay them out as dividends. This essentially means that investors would be willing to pay premium for low dividend payout companies. Thus, the cost of capital, reduced by a low dividend payout ratio, will have a positive effect on the value of shares. Keep in mind that tax effect hypothesis completely refutes bird in hand theory.

2.4.5 Clientele Effects

In the investigation of Miller and Modigliani (1961) it was noticed that the pre-existing dividend clientele effect hypothesis (hereafter DCH) has the effective rule in sharing the policy under confident situations (Brealey, Allen, & Myers, 2016). They highlighted the collection choices of separated stakeholders that could be influenced by confident marketplace limitations such as transaction charges and differential tax ranges to prefer different combinations of investment gains and incomes. Also M&M maintained these inadequacies that can cause stakeholders to select securities that decrease these charges. M&M described the inclination of stakeholders to be involved to a confident kind of dividend-paying frameworks as “dividend clientele effect”. On the other hand, M&M preserved that the customer conclusion could change a company’s dividend rule to attract confident customers, in a complete marketplace each customer is “as good as another”; henceforth the company estimation is not got affected; that is, dividend policy stays inappropriate. In practice, stakeholders frequently face various tax behaviours for dividend revenue and capital improvements, and suffer from the costs when they trade securities in the shape of deal-costs and obstacle (changing portfolios). For these explanations and relayed on various stakeholders’ conditions, taxes and deal-costs may make stakeholder and customers, such as tax-reduction induced customers and transaction cost minimization induced customer respectively. These customers will be involved to companies that track

dividend rules that best suit their specific conditions. Likewise, companies may incline to attract various customers by their dividend rules. As an example, companies working in high development businesses that typically pay low (or no) dividends attract a customer that desires value appreciation (in the form of principal gains) to dividends. On the other side, companies that give a high quantity of their incomes as dividends attract a customer that desires high dividends.

Allen, Bernardo and Welch (2000) proposed that customers such as official stakeholders incline to be involved to devote in dividend-paying stocks since they have qualified tax compensations over separated stockholders. These organisations are also often focus to limitations in official licences (such as the "prudent man rule"), which avoid them from participating in non-paying or low-dividend stocks. Likewise, perfect value companies tend to attract official customers (by giving dividends) since organisations are well informed than retail stakeholders and have more skill to form or detect company's quality. Allen et al. summarised the plan that, "…these clientele effects are the very reason for the presence of dividends…" (2000, p. 2531).

2.5 Lintner's Model and Dividend Stability

Firms usually start giving dividends only after they start reporting sustainable earnings. Existing research work clearly identifies variations in dividend policy followed by firms across countries, time and type of dividend. However, there are evidences that support 'stable dividend policy' to be the preferred choice among most firms.

Most companies that pay dividends try to follow the policy of stable dividend per share for four reasons (Baker & Powell, 2000):

a) Many managers consider a stable dividend policy as a positive sign to attract more investors and thus boost the share prices in case of listed firms
b) Shareholders frequently consider dividends as a stable source of income (like a fixed income security that pays coupons periodically)
c) Stable dividend policy helps to mitigate information asymmetry between management and investors
d) Distributing consistent amount of dividend is a sign of stability of the firm and hence helps firms to drive interest among new investors while going public.

According to Lintner (1956), earnings are the key factor driving a firm's dividend policy. Fama et al. (1968) later reviewed Lintner's theory and reinforced the latter's views that managers prefer paying a stable dividend. Fama et al. (1968) found that changes in a firm's dividend per share are largely a function of the firm's target dividend pay-out ratio, current or lagged earnings, and the last period's dividends. Based on the findings of such researchers and academicians, we dive deeper to understand the existing dividend policy theories put forth by various key personalities.

The basic proposition of Lintner's model was that 'dividend stability' matters. Numerous empirical studies support it while there are also various empirical studies that do not support it. Both types of cases are discussed as follows.

The following cases conclude that 'dividend stability' matters: Johannesburg firms adhere to a stable dividend policy. A study on the impact of dividend stability on firm' valuation in the case of companies listed on the Johannesburg Stock Exchange by Erasmus (2018) showed dividend stability positively affects firm valuation i.e.,

investors highly value those firms that pay constant and streamlined dividends in case of Johannesburg.

Indian firms indeed adopt Lintner's model in terms of paying dividends. Another research conducted by Pinto & Rastogi (2019) explores the impact of dividend stability on value of the firm in emerging market of India shows a positive impact of dividend stability on company's value in case of India as well. Rane & AnjanaRaju (2016) studied dividend smoothing for the Indian auto industry and found the existence of dividend smoothing. Their empirical analysis confirms the Lintner's findings.

Omani firms have embraced Lintner's suggestions regarding dividend policy. The paper by Al-Yahyaee, Pham, & Walter (2010) studied the impact of dividend stability on firm's valuation in case of firms in Omani market. It was found that there is affirmative effect of dividend stability on company's valuation in case of Oman as well.

Jordanian firms indeed adopt Lintner's model in terms of paying dividends. The paper by Jaara, Alashhab, & Jaara (2018) studied the impact of dividend stability on company's valuation in case of firms in Jordan market. It was found that dividend stability has an affirmative impact on company's valuation in case of Jordan as well.

Pakistani banks know the importance of paying stable dividends to the investors. The paper by Nadeem, Bashir, & Usman (2018) studied the impact of dividend stability on firm's valuation of firms in Pakistan's banking industry. It was found that dividend stability has an affirmative effect on company's valuation in case of banks in Pakistan as well. Similarly, the paper by Batool & Javid (2014) conducted a research on the

impact of dividend stability on firm's valuation in case of firms in Pakistan's manufacturing sector. It was found that dividend stability has a positive effect on company's valuation in case of manufacturing firms in Pakistan as well. In the same vein, the paper by Hunjra, Faisal, & Khan (2017) applied Lintner's model to various sectors in Pakistan. It was found that Lintner's model is indeed proven i.e., dividend stability has a beneficial effect on company's valuation in various sectors of Pakistan.

Nigerian firms have embraced Lintner's suggestions regarding dividend policy. The paper by Odion, Idewele, & Murad (2019) made a research about the influence of dividend stability on the value of the firm in case of firms in Nigeria's financial sector. It was found that dividend stability has a beneficial effect on company's value in case of Nigeria as well.

Central Eastern and European (CEE) firms tend to follow stable dividend policy. The paper by Bistrova & Lace (2012) studied the impact of dividend stability on valuation of the company in case of firms in CEE market. It was found that dividend stability has a positive impact on organization's valuation in case of CEE region as well.

UK firms indeed adopt Lintner's model in terms of paying dividends. A research conducted by Gwilym, Morgan, & Thomas (2003) explores the influence of dividend stability on firm's value in case of listed firms in UK. It was found beneficial influence of dividend stability on company's value in case of UK as well.

Small country firms have embraced Lintner's suggestions regarding dividend policy. The paper by Dzidic (2014) conducted research on effect of dividend stability on company's valuation in case of firms in Bosnia and Herzegovina. It was found that

there is beneficial impact of dividend stability on company's valuation in case of Bosnia and Herzegovina as well.

The following studies focus on industry specific dividend policies in India. Banking firms in India tend to follow stable dividend policy. The paper by Sura (2007) tested the validity of Lintner's model in case of banking industry in India. It was found that Lintner's model is indeed proven i.e., there is beneficial impact of dividend stability on company's valuation in banking sector of India. Metal firms in India indeed adopt Lintner's model in terms of paying dividends. The paper by Raju & Rane (2018) tested the validity of Lintner's model in case of metal industry in India. It was found that Lintner's model is indeed proven i.e., there is beneficial impact of dividend stability on company's valuation in metal sector of India as well. Multinationals in India know the importance of paying stable dividends to the investors. The paper by Majumdar (2016) tested the validity of Lintner's model in case of fast-moving consumer goods industry in India. It was found that Lintner's model is indeed proven i.e., there is positive effect of dividend stability company's valuation in FMCG sector of India as well. Consumer goods firms in India have embraced Lintner's suggestions regarding dividend policy. The paper by Anjali & Raju (2018) tested the validity of Lintner's model in case of consumer goods industry in India. It was found that Lintner's model is indeed proven i.e., there is a positive effect of dividend stability on company's valuation in consumer goods sector of India as well.

After reviewing these diverse empirical studies about dividend stability, it would be interesting to study whether dividend stability (as proposed by Lintner's model) exists in the case of automotive industry in Europe. Thus, the next chapter will empirically analyse whether dividend stability exists in case of automobile industry.

Chapter 3

EMPIRICAL ANALYSIS AND RESULTS

3.1 Data Collection

The data for statistically analysing the research question of this study has been retrieved from Thomson Eikon database. It is a renowned and well-established database for financial data. As the research question is related to dividend policy (i.e., in the domain of finance), this database was an appropriate one to collect data. Many peer reviewed research studies such as Shafai et al. (2019) have used Thomson Eikon database in order to collect panel data to study dividend policy. Thus, this proves to be an appropriate database.

A panel data of 24 automobile companies for 21 years (i.e., from 1998 to 2018) has been collected. The panel data is not strongly balanced because some companies were listed on the stock exchange just recently and hence, their data for initial years is not available. The total number of observations in the panel data is 504. This sample size is higher than the minimum theoretical threshold of 30 and hence we can assume the data to be normally distributed as per the 'central limit theorem' (Kennedy, 2017).

Each of the 24 automobile companies selected for this study have been chosen due to some specific reasons which are explained in detail as follows.

- Volkswagen has been chosen because it is the world's largest automobile company in terms of global sales (BBC News, 2017). Moreover, it is sustaining its top position due to various tactics e.g., recently opening the world's largest plant to beat Tesla (Rauwald, 2020).
- Daimler has been chosen because it has 19th rank (i.e., it is in top 20) in Forbes Global 2020 list in terms of sales; it has 48th rank (i.e., it is in top 50) in Forbes Top Regarded Companies 2019 list; and it has 190th rank (i.e., it is in top 200) in Forbes Top Multinational Performers 2017 list (Forbes, 2020).
- BMW has been chosen because it is a very popular automobile company in the luxury car niche and it is in the 2021 wish list of consumers (Automotive News, 2021). Moreover, it has been in the list of companies that have been prospering despite the pandemic (Financial times, 2021).
- Porsche has been chosen because it has been in the list of automobile companies that have performed really well in the year 2020 (Elliott, 2020). It is in the top of consumer reports and hence investors are confident about its future (Kominek, 2020).
- Akwel has been chosen because it reported phenomenal sales in the recent year (John, 2019). It made news due to these massive sales. Thus, investors are very confident about its dividend paying ability due to this.
- Renault-Regie and Burelle have been chosen because they have many promising plans for the automobile future (English, 2020). Thus, investors are very confident about their foreseeable future in terms of driving business.
- Delfingen has been chosen because it is becoming an automobile giant through the acquisition of Schlemmer (James, 2020). Thus, investors are very confident about its size in the automobile industry.

- Peugeot car company and Fiat Chrysler both have been chosen because they have merged and hence became automotive giant (Guillaume, 2021). This collaboration deal has allowed these companies to further expand their business to new heights (Isaac & Davies, 2019). Thus, investors are very confident about its stature in the automobile industry.
- Valeo automotive is chosen because it is considered as the global leader in terms of automotive electrification (Automotive World, 2020). For example, it has contributed great efforts in the work towards e-bike drive trains.
- Faurecia automobile company is chosen because it is one of the companies that has a massive market share of the global automobile industry (Deepak, 2021). That is, it has an important place in the automotive market.
- Freni Brembo auto company is chosen because it has won worldwide motorsport championships almost 500 times (Vai, 2020). Due to this exemplary milestone, it holds a special place in the automobile industry.
- Sogefi automobile company is chosen because it is one of the companies that has a large customer base of the worldwide car market (Hussain, 2020). That is, it has a strong positioning in the automobile industry.
- Pirelli automotive company is chosen because it has stood the test of time. That is, firstly it has been able to fight against climate change and bring appropriate car solutions which were relevant in this context (Anthony, 2020). Moreover, it has also been able to fight against coronavirus through sustenance of its business operations (Apex, 2020).
- Mekonomen has been chosen because it is becoming an automobile giant through the acquisition of Hella (AMN, 2018). Thus, the investors are very confident about its size in the automobile industry.

- VBG group has been chosen because it has successfully completed 70 years in terms of car branding (Market Screener, 2021). It is known for its safety and high-performance value propositions (Moares, 2018).
- Nokian Tires has been chosen because it has increased its capacity (American Journal of Transportation AJOT, 2020). This has grabbed investors' attention and made this company a notable automotive company.
- Other companies such as Toyota Caetanopor have also been chosen because they have notable features and milestones in the automotive industry. Note that all the companies that have been included are in the top 100 automobile companies list (Statista, 2020).

Furthermore, all these companies are selected because they have been paying dividends over the years and it was necessary for such as study to include only those companies that pay dividends (Shafai, Nassir, Kamarudin, Rahim, & Ahmad, 2019).

Moreover, consider that the companies have been chosen from various countries so that the sample is a good representative of the overall population of automobile companies in order to avoid sampling bias (Wooldridge, 2015). That is, 4 automobile companies have been selected from German stock exchange, 9 automobile companies have been selected from France stock exchange; 4 automobile companies have been selected from Italy stock exchange; 2 automobile companies have been selected from Sweden stock exchange; 1 automobile company has been selected from Austria stock exchange; 1 automobile company has been selected from Finland stock exchange; 1 automobile company has been selected from Netherlands stock exchange; 1 automobile company has been selected from Portugal stock exchange, and 1 automobile company has been selected from Spain stock exchange.

3.2 Estimation Model: The Lintner's Model

Lintner's model has basically 3 interrelated equations (Lintner, 1956). They basically reveal that investors prefer those companies that pay a stable dividend and follow a stable dividend payout ratio growth policy. The elements of these equations are described as follows.

The first equation shows that targeted level of dividends at time t ($D_{i,t}^{*}$) is a function of net income in time t ($P_{i,t}$) where its coefficient is targeted dividend payout ratio ($r_{i,t}$).

$$D_{i,t}^{*} = r_i P_{i,t} \quad (1)$$

The second equation shows that the difference between actual dividends at time t and actual dividend at time t-1 ($D_{i,t} - D_{i,t-1}$) is a function of difference between targeted dividends at time t and actual dividend at time t-1 ($D_{i,t}^{*} - D_{i,t-1}$) where slope coefficient is $c_{i,t}$ and intercept is $a_{i,t}$. The intercept $a_{i,t}$ reveals about their preference to have a growth in their dividends i.e., if it is positive then it implies that firm will gradually increase the dividends while if it is negative then it implies that firm will gradually decrease the dividends. The intercept $c_{i,t}$ reveals about the stability of dividend policy. Higher values of $c_{i,t}$ (i.e., values close to 1) implies that there is less stability/smoothing in terms of paying dividends while lower values of $c_{i,t}$ (i.e., values close to 0) implies that there is high stability/smoothing in terms of paying dividends. Note that second equation use $D_{i,t}^{*}$ from the first equation.

$$D_{i,t} - D_{i,(t-1)} = a_i + c_i\left(D_{i,t}^{*} - D_{i,(t-1)}\right) + u_{i,t} \quad (2)$$

The third equation is a combination of first two equations. It shows that actual dividends at time t ($D_{i,t}$) is a function of net income at time t ($P_{i,t}$) and actual dividends at time t-1 ($D_{i,t-1}$) where $b_{i,t}$ is the slope coefficient of $P_{i,t}$ and $d_{i,t}$ is the slope

coefficient of $D_{i,t}$. Note that $a_{i,t}$ is the intercept like in second equation. The third equation is related to second equation's coefficients as follows: $b_{i,t} = c_{i,t} * r_{i,t}$ and $d_{i,t} = 1 - c_{i,t}$. The third equation, as the final model, would be estimated in this study using panel estimation methods; OLS, fixed effects and random effects model. The estimates would reveal whether there is dividend stability.

$$D_{i,t} = a_{i,t} + bP_{i,t} + dD_{i,(t-1)} + u_{i,t} \quad (3)$$

3.3 Descriptive Statistics

Figure 3.1 shows the mean dividend payout ratio over time.

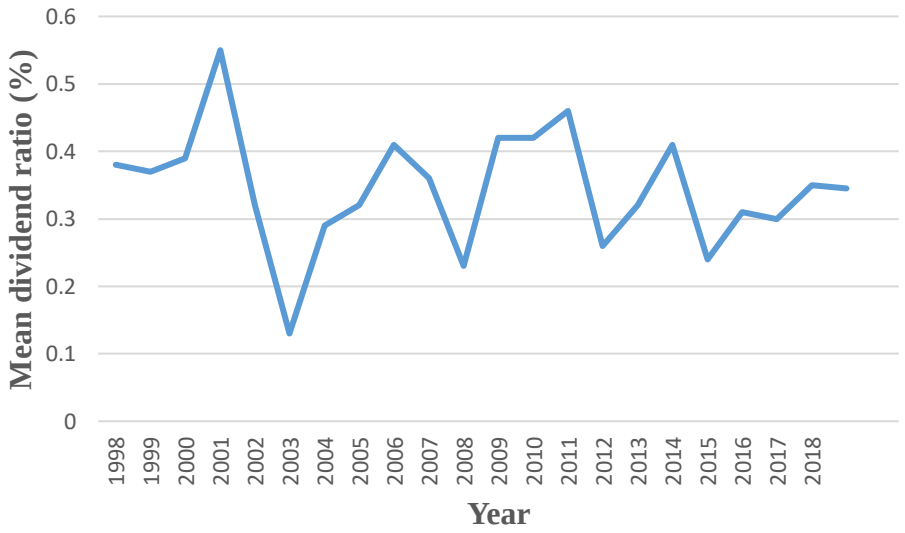

Figure 3.1: Trend in Mean Dividend Payout ratio (1998-2018)

Mean dividend payout ratio of automobile companies has been initially rising till the year 2001 when it reached its highest value of 0.55. Then after that, the mean dividend payout ratio of automobile companies has been falling till the year 2003 when it declined to 0.42 and reached its lowest value of 0.13. Subsequently, the mean dividend payout ratio has been relatively stable with slight fluctuations.

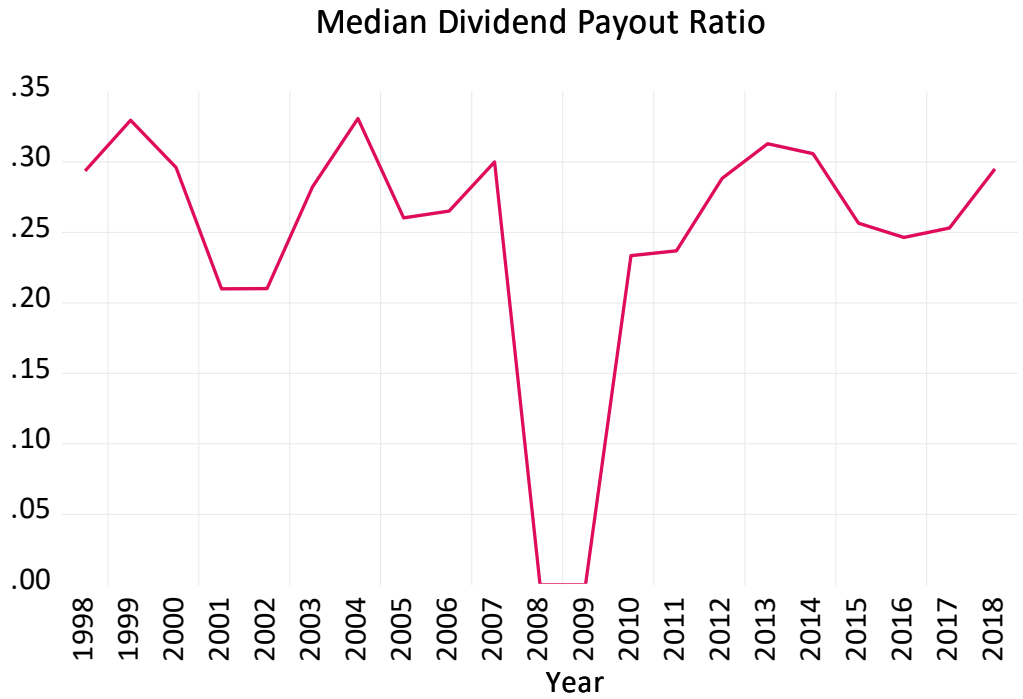

Figure 3.2: Trend in Median Dividend Payment ratio (1998-2018)

Median dividend payout ratio of automobile companies has been relatively stable with an outlier period in 2008 and 2009. As illustrated in Figure 3.2, the median dividend payout ratio had the lowest median dividend payout ratio of 0 in years 2008 and 2009. This is due to the global financial crisis that had started in the U.S. and had lasted from 2008 to 2009. This represents the effect of economic crisis periods on dividend stability. It is followed by a dramatic increase to a level of 23% between 2009-2010 and continues with a smooth upward trend where it fluctuates around the median value of 0.27. As both mean dividend payout ratio as well as median dividend payout ratios of automobile companies have been relatively stable most of the time, it can be asserted that Lintner's model is somewhat applicable.

The following table presents the mean, the median and the standard deviation of dividend payouts for each year.

Table 3.1: Descriptive statistics of dividend payout ratio (1998-2008)

Year	Mean	Median	Std. Dev.
1998	0.38	0.29	0.29
1999	0.37	0.33	0.22
2000	0.39	0.30	0.40
2001	0.55	0.21	2.39
2002	0.32	0.21	0.59
2003	0.13	0.28	1.30
2004	0.29	0.33	0.20
2005	0.32	0.26	0.26
2006	0.41	0.27	0.55
2007	0.36	0.30	0.24
2008	0.23	0.00	0.38
2009	0.42	0.00	0.80
2010	0.42	0.23	0.73
2011	0.46	0.24	1.17
2012	0.26	0.29	0.19
2013	0.32	0.31	0.27
2014	0.41	0.31	0.45
2015	0.24	0.26	0.38
2016	0.31	0.25	0.25
2017	0.30	0.25	0.24
2018	0.35	0.30	0.22

The most volatile years (i.e., the standard deviations) of the dividend payout ratio were from 2000 to 2004. The standard deviation has been highest in year 2001, and then, it increased to 1.99 and reached 2.39, which was also the highest increase between 1998-2018. This implies that dividend payout ratio of different automobile companies varied substantially in year 2001. Afterwards, there was a relatively high standard deviation of 0.80, which has resulted from the global financial crisis with the collapse of Lehman

Brothers investment bank in September 2008. It dropped back to the lowest standard deviation in 2012.

To understand how changes in earnings affect companies' dividend payout policies, specifically the relationship between earnings per share (EPS) and dividends per share (DPS). Table 3.2 provides an analysis showing the positive and negative changes in EPS. EPS<0 represents negative change in Earnings Per Share while EPS>0 when there is positive change in Earnings Per Share.

Table 3.2: Change in EPS and DPS

Current year	**Percentage of cases**	**Did not changed dividends**	**Increased dividends**	**Decreased dividends**	**Omitted dividends**
EPS>0	89.76%	21.48%	59.73%	11.41%	7.38%
EPS<0	10.24%	37.25%	5.88%	50.98%	5.88%

There were 89.76% positive EPS cases. In these positive EPS instances, 59.73% of these positive EPS were followed by a positive change in Dividends Per Share (DPS) (i.e., Increased dividends). This implies that when earnings are positive, majority of the automobile companies tend to increase dividends. Moreover, there were 10.24% negative EPS cases. In these negative EPS instances, only half of the companies (i.e., 50.98%) decreased their dividends (i.e., Decreased dividends).

3.4 Estimation Methodologies and Results

Our data is panel and hence, panel regression models will be used. Specifically, there are 3 panel regression models, namely ordinary least square (OLS) model, fixed effects

(FE) model and random effects (RE) model (Gujarati & Porter, 2019). Statistical software Eviews 9 will be used for running all these panel regressions.

3.4.1 Panel Ordinary Least Square (OLS) Model

OLS model is the simplest panel regression model (Kennedy, 2017). It finds the estimates that minimizes the sum of squared residuals (Wooldridge, 2015). There are certain assumptions of the OLS model which are described as follows. Firstly, it assumes that the intercept and slope coefficients remain constant over time (Gujarati & Porter, 2019). This implies that OLS model cannot be used in a situation in which intercept and slope coefficients are expected to change over time. Moreover, there must be no heteroskedasticity and/or serial correlation problems (Wooldridge, 2015).

3.4.2 Panel Fixed Effects (FE) Model

Fixed effects model solves the problem of OLS unrealistic assumptions by implicitly using dummy variables which makes the model time-invariant (Gujarati & Porter, 2019). Redundant fixed effects test (i.e., also known as the F-test) is used to determine whether fixed effects model is preferred over OLS model (Kennedy, 2017). The null hypothesis of the redundant fixed effects test is that the slope and/or intercept does/do not vary over time and hence, the OLS model is preferred over the fixed effects model (Wooldridge, 2015).

3.4.3 Panel Random Effects (RE) Model

Random effects model assumes that model is time variant as opposed to fixed effects model which assumes that model is time invariant (Gujarati & Porter, 2019). The Hausman test is used to determine whether random effects model is preferred over fixed effects model (Kennedy, 2017). The null hypothesis of the Hausman test is that model is time variant and hence, the random effects model is preferred over fixed effects model (Wooldridge, 2015).

3.5 Empirical Findings and Interpretations

This section presents the regression results and their interpretations. Table 3.3 shows the results below:

Table 3.3: Regression Results

Model	**OLS**	**FE model**	**RE model**
Constant	0.113187	0.246638	0.113187
	(0.0000)	(0.0004)	(0.0000)
EPS	0.040365	0.053127	0.040365
	(0.0000)	(0.0000)	(0.0000)
DPS	0.806213	0.616949	0.806213
	(0.0000)	(0.0000)	(0.0000)
Adjusted R^2	0.887894	0.909038	0.887894
F-statistic	1866.191	107.9766	1866.191
	(0.0000)	(0.0000)	(0.0000)
F-test	3.595635		
	(0.0000)		
Hausman test	14.656563		
	(0.0007)		

Note. The p-values are in parentheses.

The F-test's p-value is 0.0000. Therefore, we reject the null hypothesis of the redundant fixed effects test. We conclude that the fixed effects model is preferred over the OLS model. This is also proved by the fact that period effects are not constant over time (see Table 3.4 and Figure 3.3 below). The White test shows heteroskedasticity problem (see Appendix B6). All estimations are corrected for the heteroskedasticity problem by using the White cross-section standard errors and covariance.

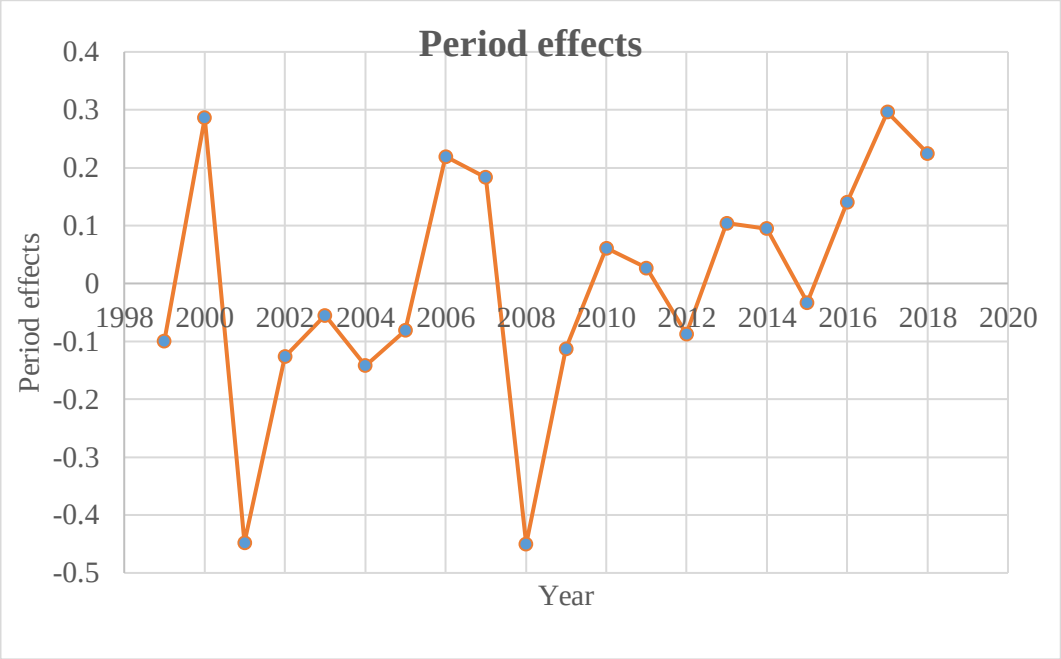

Figure 3.3: Period Effects

Table 3.4: Period Effects

Year	Period effect
1999	-0.099662
2000	0.286088
2001	-0.447616
2002	-0.12659
2003	-0.055291
2004	-0.141808
2005	-0.08101
2006	0.21894
2007	0.183364
2008	-0.45033
2009	-0.112621
2010	0.060866
2011	0.026528
2012	-0.086997
2013	0.103941
2014	0.094507
2015	-0.033244
2016	0.140183

2017	0.295884
2018	0.22487

The Hausman test's p-value is 0.0007 i.e., less than 0.01. That is, we reject the null hypothesis of the Hausman test. That is, we conclude that fixed effects model is preferred over the random effects model as well. This is also proved by the fact that cross-section effects are not constant over companies (see table 3.5 and figure 3.4 below).

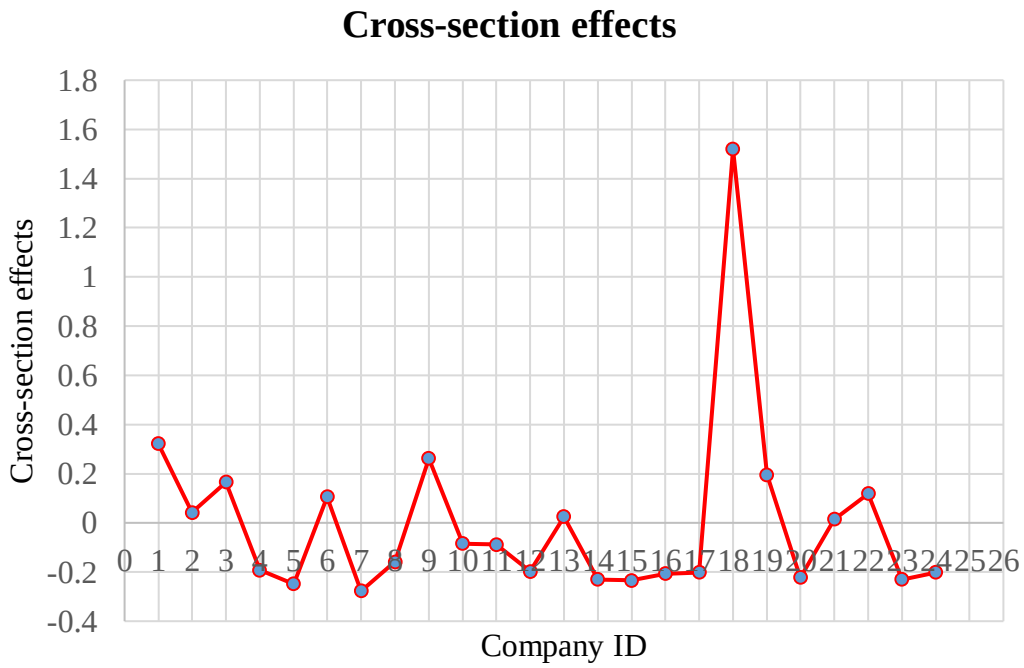

Figure 3.4: Cross-section Effects

Table 3.5: Cross-section Effects

Company ID	Cross-section effect
1	0.322035
2	0.041496
3	0.165767
4	-0.192959

5	-0.24814
6	0.106252
7	-0.277567
8	-0.158518
9	0.261497
10	-0.084597
11	-0.08859
12	-0.19752
13	0.024966
14	-0.22992
15	-0.234216
16	-0.206552
17	-0.201388
18	1.519291
19	0.195825
20	-0.221728
21	0.014015
22	0.118339
23	-0.230206
24	-0.201397

The adjusted R-squared of the fixed effects model is the highest (i.e., 0.909038). This implies that 90.9038% of the variation in the dependent variable of this model (i.e., current dividend per share) is explained by the independent variables of this model (i.e., current earnings per share and past year's dividend per share).

Thus, the final selected model is the fixed effects model. The Lintner model's parameters in case of European automobile and spare parts manufacturer companies are as follows (p-values in parentheses):

$$DPS_{i,t} = a_{i,t} + b_{i,t} * EPS_{i,t} + d_{i,t} * DPS_{i,t}$$

$$DPS_{i,t} = \underset{(0.0004)}{0.246638} + \underset{(0.0000)}{0.053127}{*}EPS_{i,t} + \underset{(0.0000)}{0.616949}{*}\ DPS_{i,t}$$

Thus,

$a_{i,t} = 0.246638$

$b_{i,t} = 0.053127$

$d_{i,t} = 0.616949$

$c_{i,t} = 1 - d_{i,t} = 1 - 0.616949 = 0.383051$

$r_{i,t} = \frac{b_{i,t}}{c_{i,t}} = \frac{0.053127}{0.383051} = 0.1386943$

$a_{i,t}$ is the dividend growth factor as per Lintner's model. The fact that it is positive implies that automobile firms' preference is to gradually increase the dividends. (Adaoglu, 2000). This factor is statistically significant at the 1% significance level as the p-value of this intercept is 0.0004.

$b_{i,t}$ is the slope coefficient of $EPS_{i,t}$. It is 0.053127 which implies that a 1 unit rise in current earnings per share leads to a 0.053127 unit rise in current dividend per share in case of automobile firms, ceteris paribus. This factor is statistically significant at the 1% significance level as the p-value of this slope coefficient is 0.0000.

$c_{i,t}$ is the stability factor as per Lintner's model. The fact that it is 0.383051 (i.e., close to 0) implies that there is stability/smoothing in terms of paying dividends in the case of European automobile and spare parts manufacturer companies.

$d_{i,t}$ is the slope coefficient of $DPS_{i,t-1}$. It is 0.616949 which implies that a 1 unit rise in previous year's dividend per share leads to a 0.616949 unit rise in current dividend

per share in case of automobile firms, ceteris paribus. This factor is statistically significant at the 1% significance level as the p-value of this slope coefficient is 0.0000 i.e., less than 0.01. The lagged dividend per share implies that current dividends are dependent on the level of dividends paid in the past. In the two independent factors, lagged DPS is the most influential determinant of current dividends by having the highest coefficient of 0.616949.

$r_{i,t}$ is the target payout ratio is 0.13 as per Lintner's model. That is, in the long run, the European automobile and spare parts manufacturer companies will gradually decrease their dividend payout ratio as the current cash dividend payout levels are higher than the target payout ratio. However, this does not necessarily mean that they will decrease the level of cash dividends. In the long run, their expected earnings will increase but will pay out less of their earnings considering the stability in the level of cash dividend payments. Consequently, having greater earnings with a stable level of cash dividends can result in a decrease in the long run target cash dividend payout ratio. Overall, we conclude that the Lintner's model explain the cash dividends in the case of European automobile and spare parts manufacturer companies.

Chapter 4

CONCLUSION

The purpose of the study was to develop theoretical aspects of dividend policy of largest European companies engaged in the manufacturing of cars and spare parts in the period of 1998-2018. Firms collected from 9 different stock exchanges of the European countries such as Germany, France, Spain, Austria, Finland, Italy, Sweden, Netherlands and Portugal. Within the framework of this study, we tested the validity of Lintner model in explaining the cash dividend payments (Lintner, 1956). It is recognized as one of the best models in the field of dividend policy (Benartzi, 1997).

Descriptive statistics were used to analyze empirical data. The findings show that dividend payments of listed companies are relatively stable. Additionally, the analysis shows the effect of economic uncertainty on dividend payouts. For instance, companies tend to decrease their dividend payment when there is a severe economic crisis. Then, analyzing the changes in earnings per share and dividends per share, it was found that majority of the companies tend to increase their dividends when earnings are positive.

Furthermore, empirical analysis was carried out by using panel regression. Results show that the fixed effects model was the most appropriate model to use. The outcome of chosen model shows that current dividend payments are highly depended on current earnings and previous dividend payments. Moreover, there is significant positive

relationship between past dividend payments and current earnings per share, meaning that increase in previous dividend payout results in an increase of current earnings of the company. Lintner's adjustment factor has shown that selected companies follow dividend smoothing. In general, the results has shown that Lintner's Model can be applied in case of European automobile and spare parts manufacturer companies.

The importance of this study for the managers of automotive industry in Europe is that the dividend policy has to be more stable over the time. Based on obtained results of this research, it can be implied that stability of dividend payments is an important factor for investors in terms of signalling confidence in future earnings. Considering the fact that dividends are considered as an indicator of the company's stability for investors, unstainable high dividend payments can result in problems regarding financing investments in the long run and can result in lower company values. Based on the finding of this study, it would be interesting to look more deeply into the determinants of dividend policy of automobile and spare parts manufacturing firms.

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APPENDICES

Appendix A: Car manufacturing and Spare Part Manufacturing Companies between 1998 and 2018 (DPS = Dividend per Share, EPS = Earnings per Share, Source: Thomson Reuters Worldscope and Datastream)

ID	Country	Company Name	Year	EPS	DPS
1	Germany	DAIMLER AG	1998	5.16	2.35
1	Germany	DAIMLER AG	1999	5.73	2.35
1	Germany	DAIMLER AG	2000	2.46	2.35
1	Germany	DAIMLER AG	2001	-0.66	1
1	Germany	DAIMLER AG	2002	4.68	1.5
1	Germany	DAIMLER AG	2003	-0.4	1.5
1	Germany	DAIMLER AG	2004	2.43	1.5
1	Germany	DAIMLER AG	2005	2.8	1.5
1	Germany	DAIMLER AG	2006	3.16	1.5
1	Germany	DAIMLER AG	2007	4.67	2
1	Germany	DAIMLER AG	2008	1.71	0.6
1	Germany	DAIMLER AG	2009	-2.63	0
1	Germany	DAIMLER AG	2010	4.28	1.85
1	Germany	DAIMLER AG	2011	5.32	2.2
1	Germany	DAIMLER AG	2012	5.71	2.2
1	Germany	DAIMLER AG	2013	6.402	2.25
1	Germany	DAIMLER AG	2014	6.508	2.45
1	Germany	DAIMLER AG	2015	7.874	3.25
1	Germany	DAIMLER AG	2016	7.97	3.25
1	Germany	DAIMLER AG	2017	9.838	3.65
1	Germany	DAIMLER AG	2018	6.776	3.25
1	Germany	VOLKSWAGEN AG	1998	2.708	0.762
1	Germany	VOLKSWAGEN AG	1999	1.96	0.765
1	Germany	VOLKSWAGEN AG	2000	5.428	1.193
1	Germany	VOLKSWAGEN AG	2001	7.639	1.292
1	Germany	VOLKSWAGEN AG	2002	6.701	1.292
1	Germany	VOLKSWAGEN AG	2003	2.836	1.044
1	Germany	VOLKSWAGEN AG	2004	1.753	1.044
1	Germany	VOLKSWAGEN AG	2005	2.896	1.143
1	Germany	VOLKSWAGEN AG	2006	5.009	1.243
1	Germany	VOLKSWAGEN AG	2007	10.385	1.789
1	Germany	VOLKSWAGEN AG	2008	11.868	1.918
1	Germany	VOLKSWAGEN AG	2009	2.386	1.6
1	Germany	VOLKSWAGEN AG	2010	15.19	2.2
1	Germany	VOLKSWAGEN AG	2011	33.12	3

1	Germany	VOLKSWAGEN AG	2012	46.45	3.56
1	Germany	VOLKSWAGEN AG	2013	18.651	4.06
1	Germany	VOLKSWAGEN AG	2014	21.844	4.86
1	Germany	VOLKSWAGEN AG	2015	-3.156	0.17
1	Germany	VOLKSWAGEN AG	2016	10.261	2.06
1	Germany	VOLKSWAGEN AG	2017	22.649	3.96
1	Germany	VOLKSWAGEN AG	2018	23.593	4.86
1	Germany	BAYER. MOTOREN	1998	0.69	0.393
1	Germany	BAYER. MOTOREN	1999	0.989	0.4
1	Germany	BAYER. MOTOREN	2000	1.527	0.46
1	Germany	BAYER. MOTOREN	2001	2.78	0.52
1	Germany	BAYER. MOTOREN	2002	3	0.52
1	Germany	BAYER. MOTOREN	2003	2.89	0.58
1	Germany	BAYER. MOTOREN	2004	3.3	0.62
1	Germany	BAYER. MOTOREN	2005	3.33	0.64
1	Germany	BAYER. MOTOREN	2006	4.38	0.7
1	Germany	BAYER. MOTOREN	2007	4.78	1.06
1	Germany	BAYER. MOTOREN	2008	0.49	0.3
1	Germany	BAYER. MOTOREN	2009	0.31	0.3
1	Germany	BAYER. MOTOREN	2010	4.91	1.3
1	Germany	BAYER. MOTOREN	2011	7.45	2.3
1	Germany	BAYER. MOTOREN	2012	7.774	2.5
1	Germany	BAYER. MOTOREN	2013	8.101	2.6
1	Germany	BAYER. MOTOREN	2014	8.835	2.9
1	Germany	BAYER. MOTOREN	2015	9.702	3.2
1	Germany	BAYER. MOTOREN	2016	10.449	3.5
1	Germany	BAYER. MOTOREN	2017	13.118	4
1	Germany	BAYER. MOTOREN	2018	10.823	3.5
1	Germany	PORSCHE AUTOMOBIL	1998	0.692	0.087
1	Germany	PORSCHE AUTOMOBIL	1999	0.932	0.109
1	Germany	PORSCHE AUTOMOBIL	2000	1.026	0.131
1	Germany	PORSCHE AUTOMOBIL	2001	1.321	0.217
1	Germany	PORSCHE AUTOMOBIL	2002	2.258	0.256
1	Germany	PORSCHE AUTOMOBIL	2003	2.758	0.291
1	Germany	PORSCHE AUTOMOBIL	2004	3.009	0.342
1	Germany	PORSCHE AUTOMOBIL	2005	3.822	0.427
1	Germany	PORSCHE AUTOMOBIL	2006	6.299	0.769
1	Germany	PORSCHE AUTOMOBIL	2007	20.398	1.881
1	Germany	PORSCHE AUTOMOBIL	2008	30.73	2.308
1	Germany	PORSCHE AUTOMOBIL	2009	-12.352	0.043
1	Germany	PORSCHE AUTOMOBIL	2010	16.976	0.5
1	Germany	PORSCHE AUTOMOBIL	2011	0.13	0.76
1	Germany	PORSCHE AUTOMOBIL	2012	25.52	2.01
1	Germany	PORSCHE AUTOMOBIL	2013	7.863	2.01
1	Germany	PORSCHE AUTOMOBIL	2014	9.887	2.01
1	Germany	PORSCHE AUTOMOBIL	2015	-0.891	1.01
1	Germany	PORSCHE AUTOMOBIL	2016	4.487	1.01
1	Germany	PORSCHE AUTOMOBIL	2017	10.88	1.76

1	Germany	PORSCHE AUTOMOBIL	2018	11.34	2.21
2	France	AKWEL SA	1998	0.396	0.224
2	France	AKWEL SA	1999	0.388	0.224
2	France	AKWEL SA	2000	0.125	0.224
2	France	AKWEL SA	2001	-0.564	0
2	France	AKWEL SA	2002	0.015	0
2	France	AKWEL SA	2003	0.375	0.2
2	France	AKWEL SA	2004	0.467	0.2
2	France	AKWEL SA	2005	0.256	0.2
2	France	AKWEL SA	2006	0.181	0.13
2	France	AKWEL SA	2007	0.332	0.08
2	France	AKWEL SA	2008	-0.352	0
2	France	AKWEL SA	2009	0.556	0.047
2	France	AKWEL SA	2010	0.824	0.05
2	France	AKWEL SA	2011	0.904	0.05
2	France	AKWEL SA	2012	1.062	0.05
2	France	AKWEL SA	2013	1.382	0.05
2	France	AKWEL SA	2014	1.26	0.05
2	France	AKWEL SA	2015	1.905	0.2
2	France	AKWEL SA	2016	3.232	0.3
2	France	AKWEL SA	2017	3.17	0.3
2	France	AKWEL SA	2018	2.29	0.3
2	France	RENAULT REGIE	1998	5.638	0.762
2	France	RENAULT REGIE	1999	2.229	0.762
2	France	RENAULT REGIE	2000	4.5	0.915
2	France	RENAULT REGIE	2001	4.38	0.92
2	France	RENAULT REGIE	2002	7.53	1.15
2	France	RENAULT REGIE	2003	9.32	1.4
2	France	RENAULT REGIE	2004	13.35	1.8
2	France	RENAULT REGIE	2005	13.19	2.4
2	France	RENAULT REGIE	2006	11.17	3.1
2	France	RENAULT REGIE	2007	10.32	3.8
2	France	RENAULT REGIE	2008	2.23	0
2	France	RENAULT REGIE	2009	-12.13	0
2	France	RENAULT REGIE	2010	12.7	0.45
2	France	RENAULT REGIE	2011	7.68	1.16
2	France	RENAULT REGIE	2012	6.51	1.72
2	France	RENAULT REGIE	2013	2.152	1.72
2	France	RENAULT REGIE	2014	6.922	1.9
2	France	RENAULT REGIE	2015	10.352	2.4
2	France	RENAULT REGIE	2016	12.571	3.15
2	France	RENAULT REGIE	2017	18.865	3.55
2	France	RENAULT REGIE	2018	12.236	3.55
2	France	BURELLE SA	1998	0.34	0.457
2	France	BURELLE SA	1999	29.49	0
2	France	BURELLE SA	2000	9.58	6.25
2	France	BURELLE SA	2001	1.6	0.6
2	France	BURELLE SA	2002	5.08	0.6

2	France	BURELLE SA	2003	7.09	0.6
2	France	BURELLE SA	2004	7.84	0.7
2	France	BURELLE SA	2005	19.66	0.7
2	France	BURELLE SA	2006	16.89	0.77
2	France	BURELLE SA	2007	12.71	0.85
2	France	BURELLE SA	2008	-24.87	0.5
2	France	BURELLE SA	2009	9.44	0.75
2	France	BURELLE SA	2010	43.05	1.5
2	France	BURELLE SA	2011	60.57	4
2	France	BURELLE SA	2012	61.865	4.4
2	France	BURELLE SA	2013	62.674	7
2	France	BURELLE SA	2014	76.54	8
2	France	BURELLE SA	2015	85.415	9.5
2	France	BURELLE SA	2016	107.243	11.5
2	France	BURELLE SA	2017	141.81	16
2	France	BURELLE SA	2018	180.628	20
2	France	DELFINGEN INDUSTRY	1998	2.265	0.449
2	France	DELFINGEN INDUSTRY	1999	3.373	0.674
2	France	DELFINGEN INDUSTRY	2000	2.561	0.511
2	France	DELFINGEN INDUSTRY	2001	0.373	0
2	France	DELFINGEN INDUSTRY	2002	0.304	0.687
2	France	DELFINGEN INDUSTRY	2003	0.226	0.687
2	France	DELFINGEN INDUSTRY	2004	-1.62	0
2	France	DELFINGEN INDUSTRY	2005	0.717	0.363
2	France	DELFINGEN INDUSTRY	2006	1.63	0.412
2	France	DELFINGEN INDUSTRY	2007	1.934	1.08
2	France	DELFINGEN INDUSTRY	2008	-2.553	0
2	France	DELFINGEN INDUSTRY	2009	-0.373	0
2	France	DELFINGEN INDUSTRY	2010	1.021	0.177
2	France	DELFINGEN INDUSTRY	2011	0.363	0.069
2	France	DELFINGEN INDUSTRY	2012	1.787	0.353
2	France	DELFINGEN INDUSTRY	2013	1.508	0.246
2	France	DELFINGEN INDUSTRY	2014	1.881	0.373
2	France	DELFINGEN INDUSTRY	2015	2.606	0.521
2	France	DELFINGEN INDUSTRY	2016	2.913	0.58
2	France	DELFINGEN INDUSTRY	2017	3.823	0.924
2	France	DELFINGEN INDUSTRY	2018	2.354	0.56
2	France	COMPAGNIE	1998	3.758	0.619
2	France	COMPAGNIE	1999	1.111	0.686
2	France	COMPAGNIE	2000	2.86	0.773
2	France	COMPAGNIE	2001	2.126	0.821
2	France	COMPAGNIE	2002	4.136	0.899
2	France	COMPAGNIE	2003	2.155	0.899
2	France	COMPAGNIE	2004	3.469	1.208
2	France	COMPAGNIE	2005	5.923	1.304
2	France	COMPAGNIE	2006	3.817	1.401
2	France	COMPAGNIE	2007	5.14	1.546
2	France	COMPAGNIE	2008	2.377	0.966

2	France	COMPAGNIE	2009	0.686	0.966
2	France	COMPAGNIE	2010	6.78	1.78
2	France	COMPAGNIE	2011	8.14	2.1
2	France	COMPAGNIE	2012	8.62	2.4
2	France	COMPAGNIE	2013	6.081	2.5
2	France	COMPAGNIE	2014	5.521	2.5
2	France	COMPAGNIE	2015	6.279	2.85
2	France	COMPAGNIE	2016	9.209	3.25
2	France	COMPAGNIE	2017	9.389	3.55
2	France	COMPAGNIE	2018	9.302	3.7
2	France	PEUGEOT SA	1998	1.203	0.18
2	France	PEUGEOT SA	1999	1.853	0.325
2	France	PEUGEOT SA	2000	3.621	0.602
2	France	PEUGEOT SA	2001	4.634	0.83
2	France	PEUGEOT SA	2002	4.8	0.974
2	France	PEUGEOT SA	2003	4.432	0.974
2	France	PEUGEOT SA	2004	4.071	0.974
2	France	PEUGEOT SA	2005	3.227	0.974
2	France	PEUGEOT SA	2006	0.556	0.974
2	France	PEUGEOT SA	2007	2.801	1.083
2	France	PEUGEOT SA	2008	-1.09	0
2	France	PEUGEOT SA	2009	-3.696	0
2	France	PEUGEOT SA	2010	3.609	0.794
2	France	PEUGEOT SA	2011	1.906	0
2	France	PEUGEOT SA	2012	-14.83	0
2	France	PEUGEOT SA	2013	-5.603	0
2	France	PEUGEOT SA	2014	-1.155	0
2	France	PEUGEOT SA	2015	1.139	0
2	France	PEUGEOT SA	2016	2.156	0.48
2	France	PEUGEOT SA	2017	2.177	0.53
2	France	PEUGEOT SA	2018	3.164	0.78
2	France	VALEO SA	1998	1.15	0.333
2	France	VALEO SA	1999	2.27	0.5
2	France	VALEO SA	2000	1.48	0.45
2	France	VALEO SA	2001	-2.373	0.233
2	France	VALEO SA	2002	0.543	0.333
2	France	VALEO SA	2003	0.733	0.35
2	France	VALEO SA	2004	0.61	0.367
2	France	VALEO SA	2005	0.59	0.367
2	France	VALEO SA	2006	0.54	0.367
2	France	VALEO SA	2007	0.607	0.4
2	France	VALEO SA	2008	-0.91	0
2	France	VALEO SA	2009	-0.68	0
2	France	VALEO SA	2010	1.62	0.4
2	France	VALEO SA	2011	1.893	0.467
2	France	VALEO SA	2012	1.677	0.5
2	France	VALEO SA	2013	1.904	0.567
2	France	VALEO SA	2014	2.411	0.733

2	France	VALEO SA	2015	3.111	1
2	France	VALEO SA	2016	3.914	1.25
2	France	VALEO SA	2017	4.216	1.25
2	France	VALEO SA	2018	2.298	1.25
2	France	COMPAGNIE PLASTIC	1998	0.073	0.028
2	France	COMPAGNIE PLASTIC	1999	0.827	0.226
2	France	COMPAGNIE PLASTIC	2000	0.235	0.037
2	France	COMPAGNIE PLASTIC	2001	0.06	0.022
2	France	COMPAGNIE PLASTIC	2002	0.119	0.044
2	France	COMPAGNIE PLASTIC	2003	0.208	0.056
2	France	COMPAGNIE PLASTIC	2004	0.296	0.064
2	France	COMPAGNIE PLASTIC	2005	0.35	0.067
2	France	COMPAGNIE PLASTIC	2006	0.297	0.073
2	France	COMPAGNIE PLASTIC	2007	0.312	0.078
2	France	COMPAGNIE PLASTIC	2008	-0.429	0.039
2	France	COMPAGNIE PLASTIC	2009	0.206	0.078
2	France	COMPAGNIE PLASTIC	2010	0.964	0.156
2	France	COMPAGNIE PLASTIC	2011	1.147	0.23
2	France	COMPAGNIE PLASTIC	2012	1.214	0.253
2	France	COMPAGNIE PLASTIC	2013	1.318	0.33
2	France	COMPAGNIE PLASTIC	2014	1.522	0.37
2	France	COMPAGNIE PLASTIC	2015	1.746	0.41
2	France	COMPAGNIE PLASTIC	2016	2.111	0.49
2	France	COMPAGNIE PLASTIC	2017	2.88	0.67
2	France	COMPAGNIE PLASTIC	2018	3.627	0.74
2	France	FAURECIA SE	1998	6.108	0.466
2	France	FAURECIA SE	1999	3.051	0.703
2	France	FAURECIA SE	2000	-2.095	0.696
2	France	FAURECIA SE	2001	-2.179	0.696
2	France	FAURECIA SE	2002	-1.904	0.696
2	France	FAURECIA SE	2003	0.321	0.696
2	France	FAURECIA SE	2004	2.684	0.841
2	France	FAURECIA SE	2005	-5.842	0
2	France	FAURECIA SE	2006	-14.313	0
2	France	FAURECIA SE	2007	-7.547	0
2	France	FAURECIA SE	2008	-18.22	0
2	France	FAURECIA SE	2009	-6.85	0
2	France	FAURECIA SE	2010	1.87	0.25
2	France	FAURECIA SE	2011	3.37	0.35
2	France	FAURECIA SE	2012	1.29	0
2	France	FAURECIA SE	2013	0.79	0.3
2	France	FAURECIA SE	2014	1.344	0.35
2	France	FAURECIA SE	2015	2.978	0.65
2	France	FAURECIA SE	2016	4.65	0.9
2	France	FAURECIA SE	2017	4.447	1.1
2	France	FAURECIA SE	2018	5.111	1.25
3	Italy	FRENI BREMBO	1998	0.038	0.01
3	Italy	FRENI BREMBO	1999	0.053	0.017

3	Italy	FRENI BREMBO	2000	0.07	0.017
3	Italy	FRENI BREMBO	2001	0.072	0.018
3	Italy	FRENI BREMBO	2002	0.061	0.022
3	Italy	FRENI BREMBO	2003	0.088	0.026
3	Italy	FRENI BREMBO	2004	0.103	0.036
3	Italy	FRENI BREMBO	2005	0.122	0.025
3	Italy	FRENI BREMBO	2006	0.128	0.048
3	Italy	FRENI BREMBO	2007	0.182	0.056
3	Italy	FRENI BREMBO	2008	0.114	0.045
3	Italy	FRENI BREMBO	2009	0.032	0.045
3	Italy	FRENI BREMBO	2010	0.098	0.06
3	Italy	FRENI BREMBO	2011	0.132	0.06
3	Italy	FRENI BREMBO	2012	0.238	0.08
3	Italy	FRENI BREMBO	2013	0.273	0.1
3	Italy	FRENI BREMBO	2014	0.396	0.16
3	Italy	FRENI BREMBO	2015	0.566	0.16
3	Italy	FRENI BREMBO	2016	0.74	0.2
3	Italy	FRENI BREMBO	2017	0.81	0.22
3	Italy	FRENI BREMBO	2018	0.733	0.22
3	Italy	SOGEFI SPA	1998	0.127	0.114
3	Italy	SOGEFI SPA	1999	0.143	0.119
3	Italy	SOGEFI SPA	2000	0.202	0.124
3	Italy	SOGEFI SPA	2001	0.15	0.124
3	Italy	SOGEFI SPA	2002	0.219	0.13
3	Italy	SOGEFI SPA	2003	0.265	0.145
3	Italy	SOGEFI SPA	2004	0.348	0.16
3	Italy	SOGEFI SPA	2005	0.406	0.175
3	Italy	SOGEFI SPA	2006	0.457	0.2
3	Italy	SOGEFI SPA	2007	0.465	0.22
3	Italy	SOGEFI SPA	2008	0.25	0
3	Italy	SOGEFI SPA	2009	-0.067	0
3	Italy	SOGEFI SPA	2010	0.165	0.13
3	Italy	SOGEFI SPA	2011	0.216	0.13
3	Italy	SOGEFI SPA	2012	0.26	0.13
3	Italy	SOGEFI SPA	2013	0.187	0
3	Italy	SOGEFI SPA	2014	0.032	0
3	Italy	SOGEFI SPA	2015	0.01	0
3	Italy	SOGEFI SPA	2016	0.081	0
3	Italy	SOGEFI SPA	2017	0.228	0
3	Italy	SOGEFI SPA	2018	0.119	0
3	Italy	FIAT CHRYSLER	1998	1.026	0.57
3	Italy	FIAT CHRYSLER	1999	0.589	0.57
3	Italy	FIAT CHRYSLER	2000	1.09	0.57
3	Italy	FIAT CHRYSLER	2001	-0.797	0.289
3	Italy	FIAT CHRYSLER	2002	-6.213	0
3	Italy	FIAT CHRYSLER	2003	-2.412	0
3	Italy	FIAT CHRYSLER	2004	-1.62	0
3	Italy	FIAT CHRYSLER	2005	1.25	0

3	Italy	FIAT CHRYSLER	2006	0.838	0.155
3	Italy	FIAT CHRYSLER	2007	1.546	0.4
3	Italy	FIAT CHRYSLER	2008	1.3	0
3	Italy	FIAT CHRYSLER	2009	-0.677	0.17
3	Italy	FIAT CHRYSLER	2010	0.42	0.09
3	Italy	FIAT CHRYSLER	2011	1.078	0
3	Italy	FIAT CHRYSLER	2012	0.286	0
3	Italy	FIAT CHRYSLER	2013	0.743	0
3	Italy	FIAT CHRYSLER	2014	0.465	0
3	Italy	FIAT CHRYSLER	2015	0.221	0
3	Italy	FIAT CHRYSLER	2016	1.192	0
3	Italy	FIAT CHRYSLER	2017	2.33	0
3	Italy	FIAT CHRYSLER	2018	2.375	0.65
3	Italy	PIRELLI & C	1998	0.639	0.267
3	Italy	PIRELLI & C	1999	0.74	0.321
3	Italy	PIRELLI & C	2000	11.805	1.072
3	Italy	PIRELLI & C	2001	1.036	0.414
3	Italy	PIRELLI & C	2002	-0.466	0.414
3	Italy	PIRELLI & C	2003	-0.098	0.304
3	Italy	PIRELLI & C	2004	0.589	0.231
3	Italy	PIRELLI & C	2005	0.628	0.231
3	Italy	PIRELLI & C	2006	-2.467	0
3	Italy	PIRELLI & C	2007	0.277	0.176
3	Italy	PIRELLI & C	2008	-0.731	0
3	Italy	PIRELLI & C	2009	0.047	0.159
3	Italy	PIRELLI & C	2010	0.045	0.165
3	Italy	PIRELLI & C	2011	0.926	0.27
3	Italy	PIRELLI & C	2012	0.808	0.32
3	Italy	PIRELLI & C	2013	0.623	0.32
3	Italy	PIRELLI & C	2014	0.655	0.367
3	Italy	PIRELLI & C	2015	-0.803	0
3	Italy	PIRELLI & C	2016	0.651	0
3	Italy	PIRELLI & C	2017	0.207	0
3	Italy	PIRELLI & C	2018	0.432	0.177
4	Sweden	MEKONOMEN AB	1998	NA	NA
4	Sweden	MEKONOMEN AB	1999	NA	NA
4	Sweden	MEKONOMEN AB	2000	1.375	0.52
4	Sweden	MEKONOMEN AB	2001	1.545	0.624
4	Sweden	MEKONOMEN AB	2002	2.508	0.832
4	Sweden	MEKONOMEN AB	2003	2.841	0.957
4	Sweden	MEKONOMEN AB	2004	2.296	0.957
4	Sweden	MEKONOMEN AB	2005	3.003	2.703
4	Sweden	MEKONOMEN AB	2006	3.56	8.318
4	Sweden	MEKONOMEN AB	2007	9.175	9.15
4	Sweden	MEKONOMEN AB	2008	4.858	4.991
4	Sweden	MEKONOMEN AB	2009	6.114	5.823
4	Sweden	MEKONOMEN AB	2010	9.108	6.654
4	Sweden	MEKONOMEN AB	2011	9.491	6.654

4	Sweden	MEKONOMEN AB	2012	8.991	5.823
4	Sweden	MEKONOMEN AB	2013	7.113	5.823
4	Sweden	MEKONOMEN AB	2014	2.78	5.823
4	Sweden	MEKONOMEN AB	2015	9.8	5.823
4	Sweden	MEKONOMEN AB	2016	7.761	5.823
4	Sweden	MEKONOMEN AB	2017	8.364	5.823
4	Sweden	MEKONOMEN AB	2018	6.546	5.84
4	Sweden	VBG GROUP AB	1998	1.737	0.433
4	Sweden	VBG GROUP AB	1999	2.174	0.52
4	Sweden	VBG GROUP AB	2000	1.879	0.52
4	Sweden	VBG GROUP AB	2001	-0.404	0.52
4	Sweden	VBG GROUP AB	2002	0.837	0.52
4	Sweden	VBG GROUP AB	2003	1.294	0.52
4	Sweden	VBG GROUP AB	2004	1.429	0.693
4	Sweden	VBG GROUP AB	2005	3.718	0.953
4	Sweden	VBG GROUP AB	2006	6.2	1.386
4	Sweden	VBG GROUP AB	2007	7.371	1.732
4	Sweden	VBG GROUP AB	2008	4.053	0.693
4	Sweden	VBG GROUP AB	2009	-1.171	0.346
4	Sweden	VBG GROUP AB	2010	3.09	1.039
4	Sweden	VBG GROUP AB	2011	5.237	1.559
4	Sweden	VBG GROUP AB	2012	3.844	1.559
4	Sweden	VBG GROUP AB	2013	6.232	1.905
4	Sweden	VBG GROUP AB	2014	4.371	2.078
4	Sweden	VBG GROUP AB	2015	5.293	2.252
4	Sweden	VBG GROUP AB	2016	6.691	1.75
4	Sweden	VBG GROUP AB	2017	9.62	3.25
4	Sweden	VBG GROUP AB	2018	10.918	4.5
5	Austria	POLYTEC HOLDING AG	1998	NA	NA
5	Austria	POLYTEC HOLDING AG	1999	NA	NA
5	Austria	POLYTEC HOLDING AG	2000	NA	NA
5	Austria	POLYTEC HOLDING AG	2001	NA	NA
5	Austria	POLYTEC HOLDING AG	2002	0.21	NA
5	Austria	POLYTEC HOLDING AG	2003	0.97	NA
5	Austria	POLYTEC HOLDING AG	2004	0.72	NA
5	Austria	POLYTEC HOLDING AG	2005	0.75	0
5	Austria	POLYTEC HOLDING AG	2006	0.86	0
5	Austria	POLYTEC HOLDING AG	2007	1.66	0.3
5	Austria	POLYTEC HOLDING AG	2008	0.08	0
5	Austria	POLYTEC HOLDING AG	2009	-4.77	0
5	Austria	POLYTEC HOLDING AG	2010	1.12	0
5	Austria	POLYTEC HOLDING AG	2011	1.54	0.35
5	Austria	POLYTEC HOLDING AG	2012	0.974	0.35
5	Austria	POLYTEC HOLDING AG	2013	0.649	0.25
5	Austria	POLYTEC HOLDING AG	2014	0.616	0.25
5	Austria	POLYTEC HOLDING AG	2015	1.078	0.3
5	Austria	POLYTEC HOLDING AG	2016	1.65	0.4
5	Austria	POLYTEC HOLDING AG	2017	1.739	0.45

5	Austria	POLYTEC HOLDING AG	2018	1.324	0.4
6	Finland	NOKIAN TYRES PLC	1998	0.204	0.073
6	Finland	NOKIAN TYRES PLC	1999	0.251	0.085
6	Finland	NOKIAN TYRES PLC	2000	0.188	0.065
6	Finland	NOKIAN TYRES PLC	2001	0.238	0.083
6	Finland	NOKIAN TYRES PLC	2002	0.317	0.111
6	Finland	NOKIAN TYRES PLC	2003	0.448	0.156
6	Finland	NOKIAN TYRES PLC	2004	0.623	0.217
6	Finland	NOKIAN TYRES PLC	2005	0.695	0.23
6	Finland	NOKIAN TYRES PLC	2006	0.88	0.31
6	Finland	NOKIAN TYRES PLC	2007	1.37	0.5
6	Finland	NOKIAN TYRES PLC	2008	1.12	0.4
6	Finland	NOKIAN TYRES PLC	2009	0.47	0.4
6	Finland	NOKIAN TYRES PLC	2010	1.34	0.65
6	Finland	NOKIAN TYRES PLC	2011	2.39	1.2
6	Finland	NOKIAN TYRES PLC	2012	2.521	1.45
6	Finland	NOKIAN TYRES PLC	2013	1.385	1.45
6	Finland	NOKIAN TYRES PLC	2014	1.565	1.45
6	Finland	NOKIAN TYRES PLC	2015	1.801	1.5
6	Finland	NOKIAN TYRES PLC	2016	1.867	1.53
6	Finland	NOKIAN TYRES PLC	2017	1.625	1.56
6	Finland	NOKIAN TYRES PLC	2018	2.151	1.5
7	Netherlands	KENDRION NV	1998	9.092	2.707
7	Netherlands	KENDRION NV	1999	9.446	2.834
7	Netherlands	KENDRION NV	2000	11.584	3.43
7	Netherlands	KENDRION NV	2001	6.598	2.382
7	Netherlands	KENDRION NV	2002	3.235	1.363
7	Netherlands	KENDRION NV	2003	-52.605	0
7	Netherlands	KENDRION NV	2004	-1.3	0
7	Netherlands	KENDRION NV	2005	1	0
7	Netherlands	KENDRION NV	2006	1.4	0
7	Netherlands	KENDRION NV	2007	1.27	0.38
7	Netherlands	KENDRION NV	2008	1.25	0.97
7	Netherlands	KENDRION NV	2009	-1.11	0
7	Netherlands	KENDRION NV	2010	1.47	0.59
7	Netherlands	KENDRION NV	2011	-1.79	0.62
7	Netherlands	KENDRION NV	2012	1.55	0.58
7	Netherlands	KENDRION NV	2013	1.335	0.55
7	Netherlands	KENDRION NV	2014	1.554	0.78
7	Netherlands	KENDRION NV	2015	1.279	0.78
7	Netherlands	KENDRION NV	2016	1.118	0.78
7	Netherlands	KENDRION NV	2017	1.45	0.87
7	Netherlands	KENDRION NV	2018	1.03	0.87
8	Portugal	TOYOTA CAETANO POR	1998	10.631	2.619
8	Portugal	TOYOTA CAETANO POR	1999	8.759	2.494
8	Portugal	TOYOTA CAETANO POR	2000	4.176	2.619
8	Portugal	TOYOTA CAETANO POR	2001	0.135	0.06
8	Portugal	TOYOTA CAETANO POR	2002	0.032	0.048

8	Portugal	TOYOTA CAETANO POR	2003	-0.226	0.051
8	Portugal	TOYOTA CAETANO POR	2004	0.154	0.06
8	Portugal	TOYOTA CAETANO POR	2005	0.131	0.1
8	Portugal	TOYOTA CAETANO POR	2006	0.44	0.17
8	Portugal	TOYOTA CAETANO POR	2007	0.277	0.25
8	Portugal	TOYOTA CAETANO POR	2008	0.05	0.07
8	Portugal	TOYOTA CAETANO POR	2009	0.293	0.15
8	Portugal	TOYOTA CAETANO POR	2010	0.341	0.18
8	Portugal	TOYOTA CAETANO POR	2011	-0.062	0
8	Portugal	TOYOTA CAETANO POR	2012	-0.082	0
8	Portugal	TOYOTA CAETANO POR	2013	0.002	0
8	Portugal	TOYOTA CAETANO POR	2014	0.114	0.13
8	Portugal	TOYOTA CAETANO POR	2015	0.175	0.15
8	Portugal	TOYOTA CAETANO POR	2016	0.17	0.15
8	Portugal	TOYOTA CAETANO POR	2017	0.267	0.2
8	Portugal	TOYOTA CAETANO POR	2018	0.365	0.2
9	Spain	CIE AUTOMOTIVE SA	1998	0.244	0.078
9	Spain	CIE AUTOMOTIVE SA	1999	0.23	0.09
9	Spain	CIE AUTOMOTIVE SA	2000	0.14	0.09
9	Spain	CIE AUTOMOTIVE SA	2001	0.008	0.09
9	Spain	CIE AUTOMOTIVE SA	2002	0.026	0
9	Spain	CIE AUTOMOTIVE SA	2003	0.117	0.04
9	Spain	CIE AUTOMOTIVE SA	2004	0.16	0.048
9	Spain	CIE AUTOMOTIVE SA	2005	0.31	0.082
9	Spain	CIE AUTOMOTIVE SA	2006	0.37	0.11
9	Spain	CIE AUTOMOTIVE SA	2007	0.45	0.13
9	Spain	CIE AUTOMOTIVE SA	2008	0.47	0
9	Spain	CIE AUTOMOTIVE SA	2009	0.1	0
9	Spain	CIE AUTOMOTIVE SA	2010	0.37	0
9	Spain	CIE AUTOMOTIVE SA	2011	0.54	0.18
9	Spain	CIE AUTOMOTIVE SA	2012	0.574	0.18
9	Spain	CIE AUTOMOTIVE SA	2013	0.562	0.18
9	Spain	CIE AUTOMOTIVE SA	2014	0.65	0.2
9	Spain	CIE AUTOMOTIVE SA	2015	1	0.33
9	Spain	CIE AUTOMOTIVE SA	2016	1.259	0.41
9	Spain	CIE AUTOMOTIVE SA	2017	1.672	0.56
9	Spain	CIE AUTOMOTIVE SA	2018	3.078	0.62

Appendix B: EVIEWS 9 Output for 24 Car Manufacturing and Spare Part Manufacturing Companies between 1998-2018

B1. Pooled Ordinary Least Square Model

Dependent Variable: DPST
Method: Panel Least Squares
Date: 01/02/21 Time: 20:14
Sample (adjusted): 1999 2018
Periods included: 20
Cross-sections included: 24
Total panel (unbalanced) observations: 472
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.113187	0.024263	4.665010	0.0000
DPST_1	0.806213	0.077819	10.36006	0.0000
EPS	0.040365	0.006646	6.073838	0.0000

Root MSE	0.639007	R-squared	0.888370
Mean dependent var	1.104354	Adjusted R-squared	0.887894
S.D. dependent var	1.914591	S.E. of regression	0.641048
Akaike info criterion	1.954910	Sum squared resid	192.7318
Schwarz criterion	1.981331	Log likelihood	-458.3587
Hannan-Quinn criter.	1.965303	F-statistic	1866.191
Durbin-Watson stat	2.324862	Prob(F-statistic)	0.000000

B2. The Fixed Effects Model

Dependent Variable: DPST
Method: Panel Least Squares
Date: 01/02/21 Time: 20:20
Sample (adjusted): 1999 2018
Periods included: 20
Cross-sections included: 24
Total panel (unbalanced) observations: 472
White cross-section standard errors & covariance (d.f. corrected)
WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.246638	0.068874	3.580985	0.0004
DPST_1	0.616949	0.094442	6.532563	0.0000
EPS	0.053127	0.009134	5.816298	0.0000

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

Root MSE	0.549224	R-squared	0.917535
Mean dependent var	1.104354	Adjusted R-squared	0.909038
S.D. dependent var	1.914591	S.E. of regression	0.577440
Akaike info criterion	1.830057	Sum squared resid	142.3774
Schwarz criterion	2.226379	Log likelihood	-386.8935
Hannan-Quinn criter.	1.985953	F-statistic	107.9766
Durbin-Watson stat	2.376127	Prob(F-statistic)	0.000000

B3. The Random Effects Model

Dependent Variable: DPST
Method: Panel EGLS (Cross-section random effects)
Date: 01/02/21 Time: 20:27
Sample (adjusted): 1999 2018
Periods included: 20
Cross-sections included: 24
Total panel (unbalanced) observations: 472
Swamy and Arora estimator of component variances
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.113187	0.024263	4.665010	0.0000
DPST_1	0.806213	0.077819	10.36006	0.0000
EPS	0.040365	0.006646	6.073838	0.0000

Effects Specification

	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.600177	1.0000

Weighted Statistics

Root MSE	0.639007	R-squared	0.888370

Mean dependent var	1.104354	Adjusted R-squared	0.887894
S.D. dependent var	1.914591	S.E. of regression	0.641048
Sum squared resid	192.7318	F-statistic	1866.191
Durbin-Watson stat	2.324862	Prob(F-statistic)	0.000000

Unweighted Statistics

R-squared	0.888370	Mean dependent var	1.104354
Sum squared resid	192.7318	Durbin-Watson stat	2.324862

B4. F-test Outputs

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.914998	(23,427)	0.0000
Cross-section Chi-square	90.315212	23	0.0000
Period F	2.885025	(19,427)	0.0001
Period Chi-square	57.006836	19	0.0000
Cross-Section/Period F	3.595635	(42,427)	0.0000
Cross-Section/Period Chi-square	142.930435	42	0.0000

Cross-section fixed effects test equation:
Dependent Variable: DPST
Method: Panel Least Squares
Date: 01/02/21 Time: 20:22
Sample (adjusted): 1999 2018
Periods included: 20
Cross-sections included: 24
Total panel (unbalanced) observations: 472
White cross-section standard errors & covariance (d.f. corrected)
WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.109500	0.054609	2.005148	0.0455
DPST_1	0.822354	0.077744	10.57765	0.0000
EPS	0.037552	0.006050	6.207107	0.0000

Effects Specification

Period fixed (dummy variables)

Root MSE	0.604366	R-squared	0.900145
Mean dependent var	1.104354	Adjusted R-squared	0.895485
S.D. dependent var	1.914591	S.E. of regression	0.618963
Akaike info criterion	1.923945	Sum squared resid	172.4016
Schwarz criterion	2.117703	Log likelihood	-432.0511
Hannan-Quinn criter.	2.000161	F-statistic	193.1689
Durbin-Watson stat	2.356255	Prob(F-statistic)	0.000000

Period fixed effects test equation:
Dependent Variable: DPST
Method: Panel Least Squares
Date: 01/02/21 Time: 20:22
Sample (adjusted): 1999 2018
Periods included: 20
Cross-sections included: 24
Total panel (unbalanced) observations: 472
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.232004	0.060115	3.859318	0.0001
DPST_1	0.616713	0.092250	6.685238	0.0000
EPS	0.056460	0.009196	6.139761	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Root MSE	0.583413	R-squared	0.906949
Mean dependent var	1.104354	Adjusted R-squared	0.901733
S.D. dependent var	1.914591	S.E. of regression	0.600177
Akaike info criterion	1.870326	Sum squared resid	160.6549
Schwarz criterion	2.099312	Log likelihood	-415.3969
Hannan-Quinn criter.	1.960399	F-statistic	173.8828
Durbin-Watson stat	2.345744	Prob(F-statistic)	0.000000

Cross-section and period fixed effects test equation:
Dependent Variable: DPST
Method: Panel Least Squares
Date: 01/02/21 Time: 20:22
Sample (adjusted): 1999 2018
Periods included: 20
Cross-sections included: 24
Total panel (unbalanced) observations: 472
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.113187	0.024263	4.665010	0.0000
DPST_1	0.806213	0.077819	10.36006	0.0000
EPS	0.040365	0.006646	6.073838	0.0000

Root MSE	0.639007	R-squared	0.888370
Mean dependent var	1.104354	Adjusted R-squared	0.887894
S.D. dependent var	1.914591	S.E. of regression	0.641048
Akaike info criterion	1.954910	Sum squared resid	192.7318
Schwarz criterion	1.981331	Log likelihood	-458.3587
Hannan-Quinn criter.	1.965303	F-statistic	1866.191
Durbin-Watson stat	2.324862	Prob(F-statistic)	0.000000

B5. Hausman Test Outputs

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	14.656563	2	0.0007

** WARNING: robust standard errors may not be consistent with
assumptions of Hausman test variance calculation.
** WARNING: estimated cross-section random effects variance is zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DPST_1	0.616713	0.806213	0.002454	0.0001
EPS	0.056460	0.040365	0.000040	0.0113

Cross-section random effects test equation:
Dependent Variable: DPST
Method: Panel Least Squares
Date: 01/02/21 Time: 20:27
Sample (adjusted): 1999 2018
Periods included: 20
Cross-sections included: 24
Total panel (unbalanced) observations: 472
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.232004	0.060115	3.859318	0.0001
DPST_1	0.616713	0.092250	6.685238	0.0000
EPS	0.056460	0.009196	6.139761	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Root MSE	0.583413	R-squared	0.906949
Mean dependent var	1.104354	Adjusted R-squared	0.901733
S.D. dependent var	1.914591	S.E. of regression	0.600177
Akaike info criterion	1.870326	Sum squared resid	160.6549
Schwarz criterion	2.099312	Log likelihood	-415.3969
Hannan-Quinn criter.	1.960399	F-statistic	173.8828
Durbin-Watson stat	2.345744	Prob(F-statistic)	0.000000

B6. White Test Outputs

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

F-statistic	8.957109	Prob. F(5,466)	0.0000
Obs*R-squared	41.38484	Prob. Chi-Square(5)	0.0000
Scaled explained SS	813.9297	Prob. Chi-Square(5)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 02/17/21 Time: 20:35
Sample: 1 480
Included observations: 472

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.098523	0.154299	0.638521	0.5234
DPST_1^2	0.095811	0.035816	2.675126	0.0077
DPST_1*EPS	-0.021270	0.006343	-3.353296	0.0009
DPST_1	0.125058	0.206957	0.604269	0.5460
EPS^2	0.001000	0.000449	2.225455	0.0265
EPS	0.008103	0.019192	0.422194	0.6731

R-squared	0.087680	Mean dependent var	0.408330
Adjusted R-squared	0.077891	S.D. dependent var	2.580055
S.E. of regression	2.477537	Akaike info criterion	4.665037
Sum squared resid	2860.396	Schwarz criterion	4.717880
Log likelihood	-1094.949	Hannan-Quinn criter.	4.685823
F-statistic	8.957109	Durbin-Watson stat	1.505701
Prob(F-statistic)	0.000000		