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High-growth firms and the business cycle: A study on how the fastest growing Norwegian firms are affected by the different phases of the business cycle

Lars Magnus Brynildsrud

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Working Paper No 36/13

High-Growth Firms and the Business Cycle
A study on how the fastest growing Norwegian firms are affected by the different phases of the business cycle

by

Lars Magnus Brynildsrud

SNF project no 1306 “Crisis, Restructuring and Growth”

CRISIS, RESTRUCTURING AND GROWTH

This working paper is one of a series of papers and reports published by the Institute for Research in Economics and Business Administration (SNF) as part of its research programme “Crisis, Restructuring and Growth”. The aim of the programme is to map the causes of the crisis and the subsequent real economic downturn, and to identify and analyze the consequences for restructuring needs and ability as well as the consequences for the long-term economic growth in Norway and other western countries. The programme is part of a major initiative by the NHH environment and is conducted in collaboration with The Norwegian Ministry of Trade and Industry, The Research Council of Norway, The Confederation of Norwegian Enterprise/ABELIA and Sparebanken Vest/Bergen Chamber of Trade and Industry/Stavanger Chamber of Trade and Industry.

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Abstract[1]

This paper investigates the behavior of high-growth firms throughout the different phases of the business cycle. The analysis is based on a large sample of accounting data from Norwegian firms, between 1999 and 2010. The research was performed on a detailed level, through analysis of inter-connected relationships between different firm characteristics. The relationships proved to be more complex than initially anticipated, and several surprising discoveries were made. The results show that there exists a division between "super-growers", and profitable high-growth firms, as previous profitability negatively influence growth and previous growth negatively influence profitability, throughout the beginning of the business cycle. However, firms that showed profitability, or experienced growth in revenues during the downturn of 2009, were very likely to both grow and experience profitability during the retrieval of 2010. Furthermore, differing influences from age and size were unexpected, and size seems to positively influence growth in a cyclical manner. Lastly, the effects from previous growth in revenues and growth in labor costs were splayed, and indicate growth in labor costs as a more robust measure of intrinsic growth.

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Bergen, June 20th 2013

Lars Magnus Brynildsrud

[1] This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible − through the approval of this thesis − for the theories and methods used, or results and conclusions drawn in this work.

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1. Introduction

The global economy is characterized by fluctuating business cycles that occur relatively regularly, and affect national economies in different ways. Firms and industries in these countries are affected in particular ways depending on country, industry, and business specific characteristics. In the event of a recession, high-growth firms (hereinafter referred to as HGFs) generally experience more severe consequences because of credit tightening and liquidity strains, reduction in demand and lack of operational efficiency, amongst others (Lien & Knudsen, 2012).

The term *firm growth* is ambiguous and is applied in various settings. Commonly, *growth* concerns growth in revenues. Achieving growth in revenues is typically viewed as the key objective for businesses across the globe because of the collective opinion that growth equals profitability. "Growth is still the mantra and mission of every company" (Deans & Kroeger, 2004). The business media also presents growth as the precursor for profitability and success, which is exemplified by the annual Gazelle-awards given to Norway's fastest growing companies in terms of income (Vanvik & Ravn, 2012). High growth may well indicate profitability and competitiveness, but could also signal high risk. If so, high growth reflects high volatility.

As growth companies are differently affected by recessions, they experience different developments in booms, and throughout the different phases of the business cycle as well. High growth is commonly viewed as an indicator of profitability and/or competitiveness, and is often viewed in the context of relatively young companies. The importance of economic growth through entrepreneurship has also experienced growing attention (OECD, 2008). The recent financial crisis thus facilitates, and represents an opportunity to explore, and determine how modern high growth companies are affected by the different stages of the business cycle.

This thesis is written as a sub-product for the comprehensive five-year research project "Crisis, Restructuring and Growth," which is collaboration between The Norwegian School of Economics (NHH) and the Institute for Research in Economics and Business Administration (SNF). The overarching goal of the project is to shed light upon short, and

long-term causes to, and consequences of, the recent financial crisis. Of the eight sub-programs, this thesis is written on behalf of "Darwin: Industries and Businesses."

1.1 Research question

As the performance of individual businesses typically fluctuate with the general economy, specific firm, and industry characteristics affect each firm uniquely. HGFs generally fluctuate more than stable-growth companies, thus entailing higher risk of failure or relatively poor subsequent performance. High growth often accompanies young and seemingly successful firms, and these are commonly depicted as the star companies of tomorrow. Accordingly, I find it important to examine how the business cycle affects these companies and why it affects them in a certain manner. There is extensive research on how the business cycle, and especially recessions, affects companies on a general level. However, there are few that are concerned with HGFs specifically, and how the business cycle in general affects these.

On this basis, I attempt to clarify the following issue:

How are the fastest growing companies affected by the different stages of the business cycle, and why?

The term *fastest growing* is consciously applied, as I will analyze different definitions and cut-offs to growth. It is not to be confused with the often-misinterpreted term "gazelles," which, according to Birch (1979), are firms with minimum annual growth in revenues of 20 percent over four consecutive years or more. By analyzing this issue I seek to shed light upon the characteristics that affect HGFs the most, and how the importance of these characteristics change throughout the business cycle. This knowledge should lay the groundwork for further research, which may allow HGFs to better utilize, and adjust to shifting economic climates. In-depth research on this subject may also enable policymakers to further facilitate and support HGFs in the future.

1.2 Delimitations

This thesis, and the research question posed here, is delimited to concern conditions that are specific to Norwegian high-growth companies. I will analyze these businesses on the basis of accounting data from the time-span 1999-2010. The data will be adjusted for differences between industries so that the analysis concerns HGFs in general, and thus excludes industry-specific characteristics. The analysis assumes the year 2007 as the base year, hence all numbers are adjusted for inflation and appear in 2007-values. This means that I have defined growth firms based on pre-2007 growth.

I will use the term *performance* regularly, hence it is important that readers well understands the applied definition. *Performance* is typically measured as different types of returns, that is, return on assets (ROA), risk-adjusted returns, profit margins and so on. I will nevertheless use the term *performance* in relation with a firm's general development throughout the business cycle. I will analyze different firm characteristics to examine whether they develop in positive or negative ways. Thus, positive development in firm characteristics is equivalent to positive performance.

Business cycle phases are defined by examination of accounting data through the lens of business cycle theory, and may therefore be influenced by subjective interpretations. The thesis, however, does not concern causes to business cycle fluctuations. It exclusively examines the consequences of fluctuations on high-growth companies.

1.3 Structure

The introduction has addressed the background for the choice of research question, and I have presented the thesis' delimitations. Further, the thesis will be structured in a supportive manner. I have based my expected findings on the existing theories and research, and I will organize the analysis according to the framework presented in Saunders, Lewis, & Thornhill (2009). The second chapter concerns business cycle theory and financial statement analysis, and I will here define each phase of the business cycle. Chapter three presents previous research and literature on relevant topics. I have formed my expected findings, that is the hypotheses, on the basis of the reviewed literature. Chapter four will address the research design in line with the principles of Lewis, & Thornhill (2009), and will here evaluate the validity and reliability of the analysis. Chapter five presents the dataset and the criteria, as to

the definition of the applied data sample. The sixth chapter will introduce the analysis model, and technical specifics. I will in this chapter also present basic theory on linear regression analysis, which will be used as the analysis tool through SPSS. Lastly, chapter seven and eight will present findings and conclusions,

2. Theory

This section presents the theoretical background on which the analysis will be based. I will explain basic business cycle theory, and apply this theory to define the different phases of the business cycle. Important figures within financial statement analysis will be applied in the analysis as firm characteristics, and is thus theoretically explained.

2.1 Business cycles

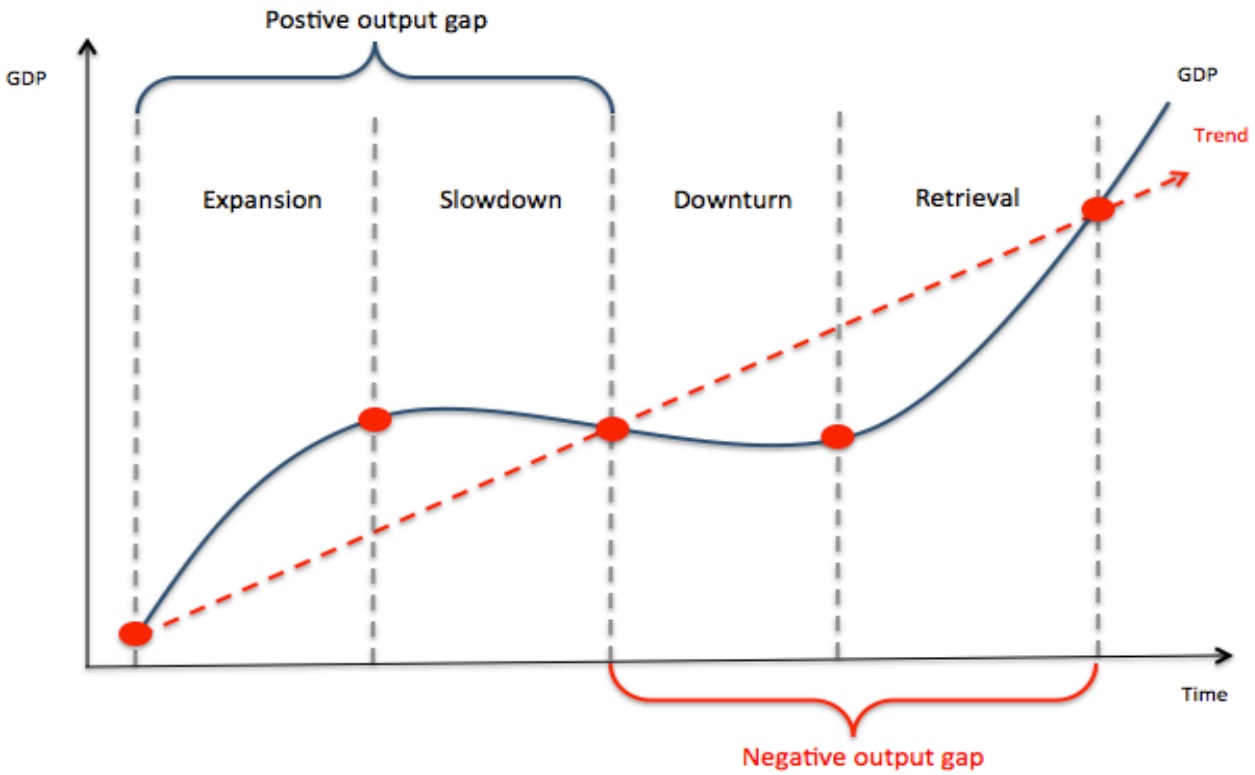
Commonly, the term *business cycle* is used to describe fluctuations of activity in the real economy, that is, the Gross Domestic Product (GDP). The business cycle fluctuations are triggered by stochastic impulses with decreasing effects over time, and constitute different phases of variations around a deterministic trend (Balke, 1991). These impulses usually originate from the demand-side of the economy and can trigger changes in expectations and/or changes in demand-affecting policies, such as interest rates and public spending. As the purpose of this thesis is to analyze conditions and developments within each phase of the business cycle, these phases needs to be defined to match certain time-spans.

2.1.1 Phases

The two main ways of defining and dating a business cycle is through classical cycles (American), or growth cycles (European). The classical cycle theory was developed by the National Bureau of Economic Research (NBER), and is based on a set of economic indicators for the American economy (Benedictow & Johansen, 2005). The general definition of a recession is also proposed by NBER and states that an economy is in a recession if it experience two consecutive quarters of negative growth in GDP. The European approach differs from the American due to differences in economic development over time, and is measured as growth in GDP relative to an estimated GDP trend. The business cycle thus appear as fluctuations in GDP growth around the trend. Figure 1 portrays the four different phases of the business cycle: expansion, slowdown, downturn and retrieval. The two former phases represents a positive output gap, while the latter phases

represents a negative output gap. The output gap indicates whether the economy is growing at a faster or slower pace than the general trend.

Figure 1: Phases of the Business Cycle by European standards



However, as short-term developments in GDP can be rather volatile, all changes cannot be considered as parts of the general business cycle. There are debates regarding the specific policy as to identifying which movements that are of interest, and which that should be considered noise. The American economist Wesley Chair Mitchell developed an identification approach with specific minimum requirements for developments to be considered as part of the business cycle. This approached was given the nickname "The three D's," as the requirements are applied to Duration, Depth and Diffusion (The Conference Board, 2001). Duration states that there should be a minimum of time passed between the turning points. Depth and diffusion ascertain a certain gap between the peak and through, and that changes should coincide between key economic components. To determine whether the requirements of the three D's are met, an economic development is typically compared with previous movements.

Expansion

In the phase of expansion, the output gap is positive and increasing until it reaches its peak value. The economy is in this phase typically characterized by consumer and investor optimism, increasing income growth rates, rising stock markets, cheaper credit and a general increase in overall wealth. As market segments increase, barriers of entry are weakened, and new competitors arise. Successful new entrants typically experience rapidly increasing revenue growth rates in the phase of expansion. Excessive optimism, in regards to the sustainability of these growth rates may cause failure or significant impairment as the economy slows. Asset price bubbles generally occur in the phase of expansion due to exaggerated optimism, excessive credit, miscalculations due to biased historical data and so called "irrational exuberance."

Slowdown

Either a contractive economic policy, or the bursting of one or more asset price bubbles, typically supersedes the expansion phase. The latter often results in a recession, though a recession not necessarily is an element of a business cycle. In the phase of a slowdown market participants and consumers gradually become aware of the expansionary condition of the economy and that the peak is imminent, or bypassed. Thus, they adjust their actions thereafter by, for example, postponing investments or decreasing consumption and the level of activity and GDP volume consequently decline. Income growth rates stagnate and decline, and the peak of the business cycle ensue.

Downturn

Declining economic indicators and activity typically have ripple effects and can, in cases of a crisis or recession, further progress into a vicious circle as the slowdown eventually develops self-reinforcing dynamisms. Declining growth rates may evolve into negative growth rates, and further spiral into a recession, or a crisis, before a through is reached. Kindleberger (2000) defines a recession as a "*sharp, brief ultracyclical deterioration of all or most of a group of financial indicators, short-term interest rates, commercial insolvencies, asset (stock, real estate, land) prices and failures of financial institutions"*. The trough level is generally below intrinsic value levels, and is determined by market sentiment and mass psychology. Illiquid, highly leveraged, and other firms considered risky, typically struggle with obtaining or maintaining sufficient financing, and bankruptcies tend to spike in this phase. New entrants often experience larger declines in their customer base because their growth is fuelled by new additions of customers to the segment. These customers are usually

more elastic in their consumption-pattern than more long-term customers (Lien & Knudsen, 2012). The downturn is usually stimulated by expansionary government policy, such as lowering of interest rates to promote credit, and financial stimulus to oppose negative, and initiate positive, self-reinforcing dynamisms. Market sentiment typically turns when participants realize that the trough is bypassed.

Retrieval

Preceding expansion is the phase of retrieval, which arise once the trough is bypassed. The output gap is still negative, but approaching the trend level of output at an increasing pace. Market sentiments increase as the economy gradually gains pace and momentum. Credit is usually loosened through government stimulus and spending is promoted.

2.1.2 Trend

As the different phases are defined by measuring fluctuations from the general trend line, this trend line needs to be estimated. An economic time series can be defined as: $Y_t = \tau_t + C_t \cdot Y_t$, where the difference between the trend (τ_t), and the cyclical component (C_t) represents the output gap. There are different approaches to determining these components, with the simplest and most widely accepted approach to decomposition of economic time-series being polynomial functions of time and the HP-filter respectively (Canova, 1998). Besides in-depth business cycle analysis, the choice of approach does not constitute major differences in outcome.

HP-Filter

The HP-filter was developed by economists Robert J. Hodrick and Edward C. Prescott, and function as a smoothing parameter to facilitate the extraction of the trend component. (Hodcrick & Prescott, 1997). A drawback to the HP-filter, however, is that the degree of smoothing is subjectively set by a lambda-coefficient, which ultimately determines the output gap. The value of lambda depends on how much of the variance in the dataset that is derived from temporary demand shocks (Benedictow & Johansen, 2005).

Polynomial functions of time ($y_t = x_t + c_t$,)

This procedure is considered both the simplest and the oldest way to determine the components inherent in the GDP developments (Canova, 1998). It assumes that x_t is a

deterministic development that can be approximated with polynomial functions of time. The trend is estimated by fitting y_t to a constant, and to scaled polynomial functions of time. The cyclical component is thus the residual from the equation above.

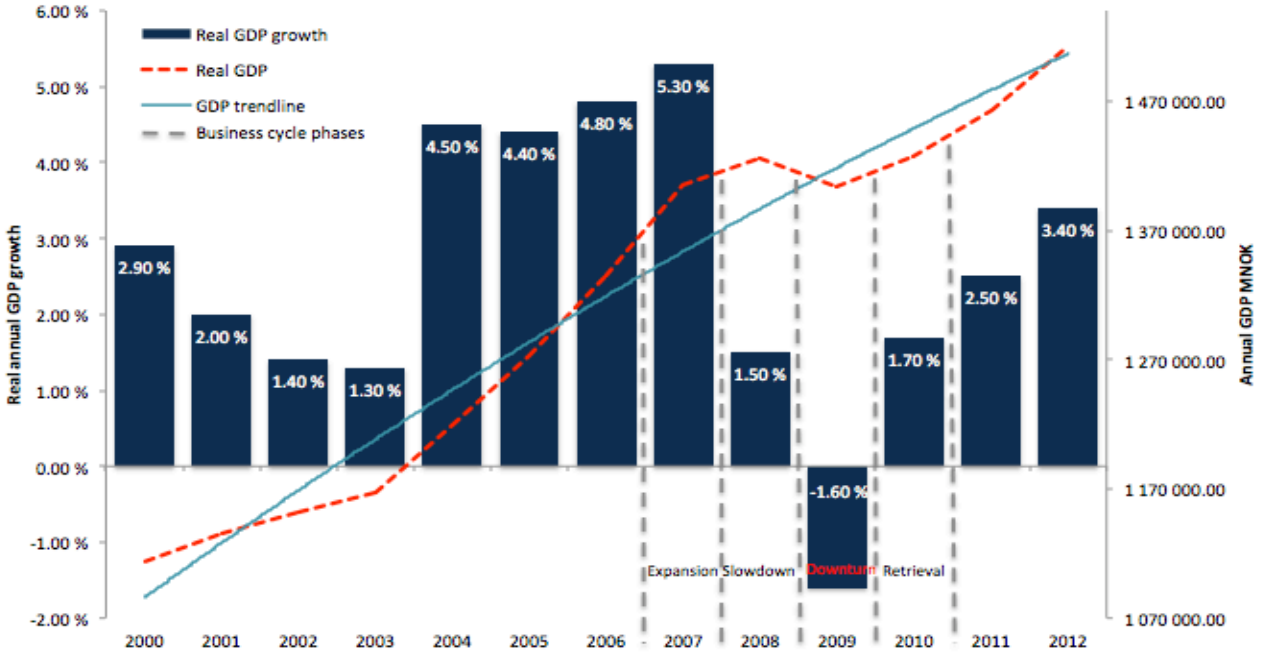
2.1.3 Norwegian economic developments in retrospect

The global economy has in the recent years experienced the worst peacetime financial meltdown since the Great Depression of the 1930's. The bankruptcy of the investment bank giant Lehman Brothers on September 15th 2008, and the subsequent near-collapse of insurance titan AIG marked the eruption of the initial credit squeeze and ensuing financial crisis. The situation evolved into depression-like conditions, with rising unemployment rates and inevitable fiscal crises in several European countries. From the banking crisis of 1987-1993 the Norwegian economy had experienced steadily increasing GDP growth rates, with the exception of a brief "hiccup," due to the US dotcom bubble. Crises such as the Asian crises of 1997-1998 and the default of the Russian government in 1998 had few implications for the Norwegian economy.

From 1992 until the fall of 2008, the Norwegian volume of credit (C2) had close to quadrupled, and the Oslo Stock Exchange Benchmark Index (OSEBX) showed annual growth rates of 45 percent on average from 2003-2007 (Grytten & Hunnes, 2010). This expansion fuelled the development of price bubbles in assets that were financed by continuously generous loans. The US sub-prime syndrome affected the perception of these loans, which were considered as low-risk, due to the belief that sharp declines in the housing markets never occur on a broad basis (Mjølhus & Larsen, 2009)

The impact of the global financial crises on the Norwegian economy, however, was relatively limited, except from that on the stock market. Unemployment rates, bankruptcies and GDP levels were weakly affected, compared to western economies in general where GDP contracted by between two and sixteen percent (Grytten & Hunnes, 2010). There had developed housing price bubbles in most of the hardest affected economies, and their bursting brought dramatic declines, thereby affecting homeowners and household spending to a much larger extent than in Norway.

Figure 2:Norwegian GDP 2000-2002



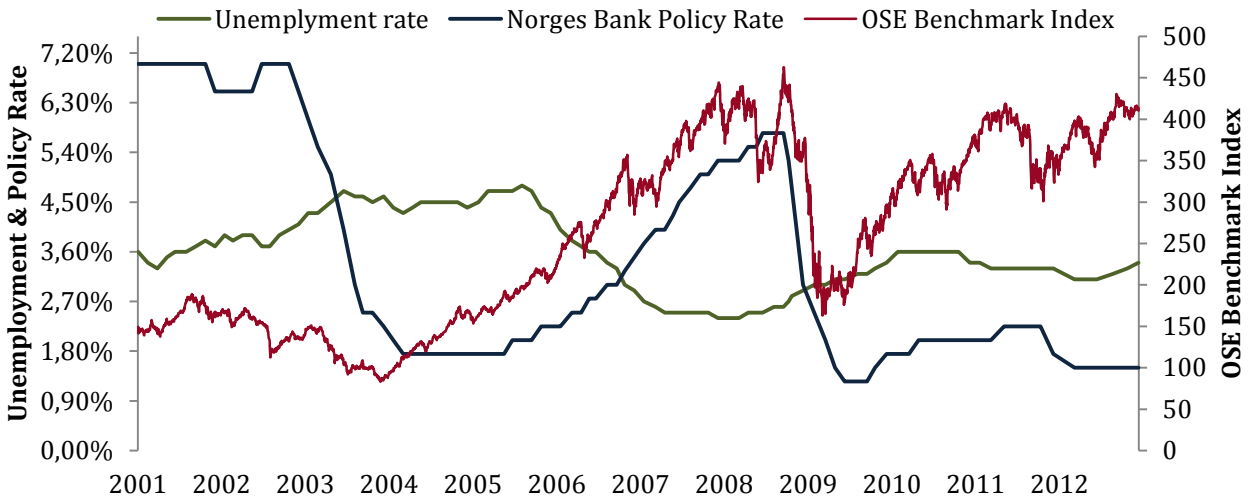
Source: Statistics Norway

Figure 2 portrays the development in Norwegian real GDP from 2000 until 2012 in both volume changes and value terms. I have estimated the trend of the GDP-development in value terms by applying polynomial functions of time, as described above. As the graph reads, GDP exceeded potential output in late 2005, peaked in 2008 and bottomed in 2009. This strongly indicates the phases of slowdown, downturn and retrieval. The expansionary phase lasted over roughly two years, which is in line with Wynne & Balke (1993) as they claim that the expansion phase has generally been the longest part of the business cycle in the post-war period. However, as single-year observations better fit the dataset and the method of analysis presented subsequently, I will define 2007 as the phase of expansion. Although the analysis optimally should include 2006, this breakdown seems appropriate as 2007 experienced the peak in GDP growth rates. 2010 will be defined as the phase of retrieval, as this is the last year included in the dataset. As the purpose of the analysis is to determine the effects within each phase in general, the important aspect is that each defined phase is representative of a general phase. Hence, the following concerns different aspects of the Norwegian GDP, to determine the fit of the defined phases. Moreover, the total length of the defined business cycle fit the average length, as this has been approximately 60 months, or 5 years, in the post-war period (Wynne & Balke, 1993).

Figure 2 portrays developments in the Norwegian stock market, the central bank policy rate and the unemployment rate relative to each other in the period 2001-2012. From mid 2005

the unemployment rate began a steady decline that lasted until mid 2008, before gradually rising in 2009. Its nethermost point was in 2008, indicating a business cycle peak and the slowdown phase. Unemployment, however, is a lagged economic indicator (Sörensen & Whitta-Jacobsen, 2005), thus signifying that the peak is bypassed at this point.

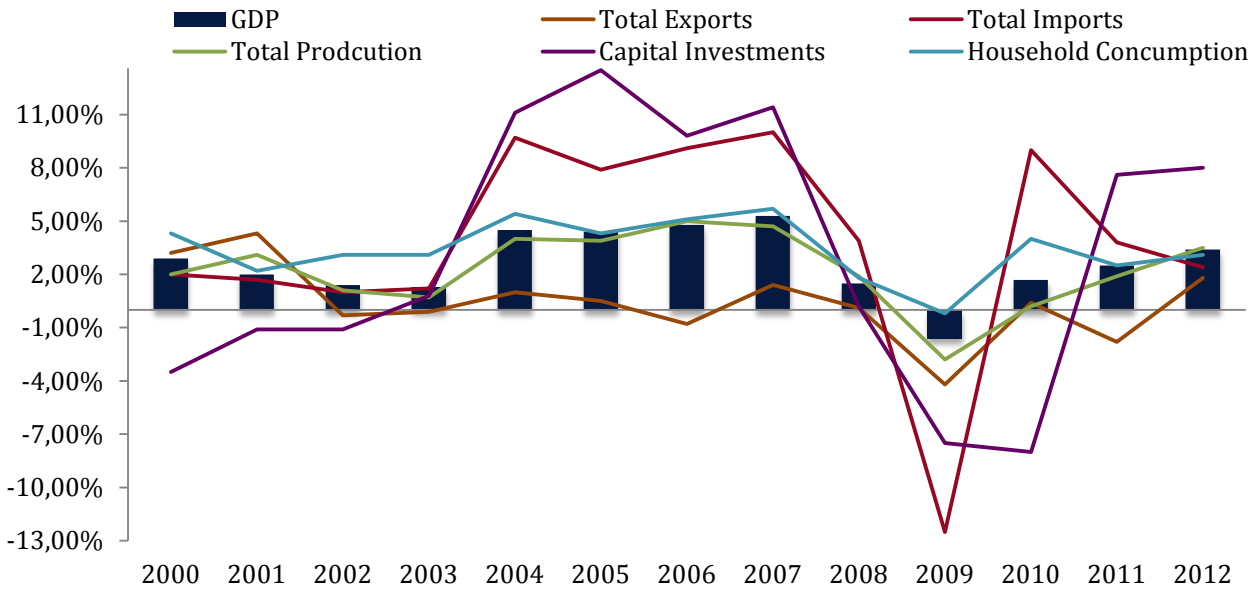
Figure 3: Norwegian Economic Indicators I



Sources: Statistics Norway, Norges Bank, Oslo Stock Exchange

OSEBX was halved between mid- 2008 and 2009, and the mid 2008 peak and 2009 trough indicates the phases of slowdown and downturn respectively. The central bank policy rate was highly correlated with OSEBX between 2004 and the second half of 2009. The stock market and the unemployment rate indicate expansion from roughly 2004 and 2006 respectively.

Figure 4: Norwegian Economic Indicators I



Source: Statistic Norway

Figure 4 depicts how the major components of GDP fluctuate relative to one another in real terms. The changes are measured in volume fluctuations, which omits inflation. The time-series in figure 4 are all correlated, thus fluctuate in comparatively the same manner. The change in total imports in 2009 was the most dramatic, while total exports were comparatively stable. This is likely due to the depreciation of the Norwegian Kroner in the second half of 2008 that contributed to higher import prices, while stimulating exports (Norges Bank, 2009). In line with the fact that Norwegian households experienced limited wealth declines because of stability in housing prices, growth in household consumption was only slightly negative in 2009. The trough in capital investments, however, occurred in 2010. The components of figure 4 further indicate an expansion from 2003 and a slowdown in 2007 and 2008.

The developments presented in figure 4 correspond with those of unemployment, the stock market and the central bank policy rate. All components, except capital investments, imply that the trough and downturn of the business cycle occurred in 2009, as total GDP experienced the only year of negative growth with a volume change of -1.6%. Almost all of the components indicate expansion in 2006-2007, and retrieval in 2010, thus supporting the initial phase-definitions. Therefore, the phases of the business cycle will be defined as portrayed in figure 2.

2.2 Financial Statement Analysis

Financial statement analysis concerns the process of reviewing and evaluating the financial statements of a company, that is, the income statement and the balance sheet. The analysis is typically performed to evaluate firms' current financial conditions, as is done in this analysis, but can also be applied to forecast firms' financial performance for valuation purposes. I will apply and analyze the development of different key figures through financial statement analysis to determine how HGFs are affected throughout the business cycle. Specifically, I will analyze how the different key figures affect each other. I will employ generally accepted key ratios that I believe to be of significant importance to HGFs

2.2.1 Return on assets (ROA) $= \frac{\boldsymbol{Net\ Income}}{\boldsymbol{Total\ Assets}}$

Return on assets (ROA) is the relationship between net income and the value of total assets, and is thus a percentage indicator of how profitable a company is relative to its total assets (Damodaran, 2012). An alternative measure on profitability is the return on equity (ROE), which is the relationship between net income and the value of a firm's equity. However, I believe that ROA is a more robust method of measuring profitability over time, due to the fact that the value of total assets is generally more stable than the value of equity. The composition of debt and equity shift over time, and is correlated with the business cycle (Damodaran, 2012). Especially listed companies experience drastic declines in market capitalization (market value of equity) in downturns and recessions. However, the dataset provides book values of debt and equity, which are more stable than market values over time. ROA is nevertheless a robust measure of profitability and will thus be applied in the analysis.

2.2.2 EBITDA-margin $= \frac{\boldsymbol{EBITDA}}{\boldsymbol{Total\ revenue}}$

Earnings before interest, taxes, depreciation and amortization (EBITDA) is a measure of a company's core revenues, as it adjusts for non-operating income and expenses. Effectively, EBITDA equals net income with interest, taxes, depreciation and amortization added back. The EBITDA margin is the relationship between EBITDA and total revenue, thus it measures a company's operating profitability. As the EBITDA margin measure operating profitability by applying revenues as the denominator, ROA comparatively measure profitability with respect to the return on a company's assets. It is important to emphasize

that these are two different measures of profitability, and does not necessarily reflect the same conditions.

2.2.3 Debt ratio $= \frac{\boldsymbol{Debt}}{\boldsymbol{Total\ Assets}}$

The debt ratio measures the amount of leverage employed, and is an indicator of the risk inherent in a company. There are two main approaches to calculate the debt ratio: debt to equity (D/E) and debt to assets (D/A). These are consistent with one another, but as value weighting in large datasets is problematic, with respect to statistical observations, I believe that employing total assets instead of equity will reduce bias. Companies with large amounts of debt, such as banks and financial institutions, may attain D/E's of up to 30. By applying D/A, the ratio will at all times stay between 0 and 1.

2.2.4 Liquidity ratio $= \frac{\boldsymbol{Short-term\ assets}}{\boldsymbol{Short-term\ liabilities}}$

The liquidity ratio, in the context of financial statement analysis, measures a company's ability to meet its short-term obligations, meaning their ability to convert short-term assets to cover debts (Damodaran, 2012). There are different definitions of the liquidity ratio, with the most commonly used being the current ratio, the quick ratio and the operating cash flow ratio. For reasons of simplicity, I will employ the current ratio as the measurement of liquidity. The operating cash flow ratio requires calculation of the operating cash flow, the quick ratio deducts inventories and prepayments from short-term assets before dividing short-term assets and the current ratio simply divides short-term assets by short-term liabilities. I find no reason why the current ratio should cause any bias to the analysis, and will therefore apply this measure.

Subsequent sections will further describe the method and design of the analysis related to the discussed financial ratios.

3. Literature and Hypotheses

According to Saunders, Lewis and Thornhill (2009, p595), methodology concerns ”*how research should be undertaken, including the theoretical and philosophical assumptions upon which research is based and the implications of these for the method or methods adopted*.” As the next chapter elaborate on issues regarding methodical choices, I will here review existing theories and research on relevant subjects, that will help form the basis for which patterns I suspect to observe throughout the phases of the business cycle. Based on the literature, I will form hypotheses that will lay the foundation of the ensuing analysis.

HGFs do, as mentioned above, receive a substantial amount of attention in business publications and periodicals, as high growth is generally viewed as an extremely desirable state (Nicholls-Nixon, 2005). Naturally, there are several definitions to the term growth and Delmar, Davidsson, & Gartner (2003) show that the identification of HGFs depends on the applied method of measurement. However, because income growth intuitively drives supplier growth and aids unemployment, thus benefiting most stakeholders in society–this definition of company growth has received most attention.

On the other hand, financial theory focus on cash available to claim-holders, thus cash is at the core of a firm’s attractiveness. Through Discounted Cash Flow analysis (DCF), a firm’s value is determined by its future free cash flows, thus growth in these should be desirable. Although it may be reasonable to assume that high income growth directly leads to high growth in cash flows, this relationship is not necessarily well correlated (Davidsson & Fitzsimmons, 2009). Furthermore, empirical financial literature prefers profitability as the time test of firm performance, instead of growth. Profitability measures such as Return on Assets (ROA) and EBITDA margins better reflects operational efficiency and value-creation (Damodaran, 2012).

Gazelles firms have, however, made large impacts on job creation and economic development, even in periods of recession (Henrekson & Johansson, 2008). These firms’ ability to generate jobs and improve the economic condition seems to be relatively independent of the given position in the business cycle, thus making HGFs and potential gazelles interesting from a social, as well as an economic, perspective. Consequently, substantial research has been done on revenue growth, and relationships between

performance and firm characteristics such as age, size and financial structure. Moreover, researchers have examined whether growth actually is profitable.

There is limited research on how firm characteristics affects HGFs specifically. Hence, I apply literature on firms in general to determine expectations concerning how HGFs evolve throughout the business cycle. I will mainly discuss the characteristics that I find to be of most importance to HGFs. As performance generally is synonymous to profitability, I emphasize that I apply the term performance with respect to how HGFs' characteristics develop.

3.1 Previous profitability

Mueller (1997) suggests that profitability provides resources that will help maintain subsequent profitability, meaning that profitability increase the probability of subsequent profitability. This is related to the survivor principle presented by Alchian (1950). Knudsen (2011) support this argument by concluding that pre-recession profitability is negatively related to how severely firms are affected by recessions. He further argues that the large amount of research that supports this relationship makes it intuitively reasonable to assume strong robustness of the conclusion. However, Geroski and Gregg (1996) find no statistically significant relationship between pre-recession profitability and performance during the downturn of 1991-1992. They argue that the performance of firms during recessions was random.

I will nevertheless base my expectations on the majority of theories, which propose that profitability has negative effects on how severely firms are affected by recessions. This is equivalent to stating that profitability has positive effects on performance. I find no reason to suspect any significant cyclicality in this relationship. This means that I expect previous profitability to have positive effects on performance in all phases of the business cycle. The effect will, however, probably fluctuate.

H1: Previous profitability has cyclically positive effects on HGFs

3.2 Previous growth

The theoretical case for growth itself driving performance is related to economies of scale, experience, learning, and competitive advantages built on first-mover advantages (Davidsson & Fitzsimmons, 2009). The theories presented by Davidsson and Fitzsimmons (2009) suggests that growth drives profitability either through cost reductions, or by establishing stronger market positions. However, there are differing conclusions regarding the growth-profitability relationship. Fitzsimmons, Steffens and Douglas (2005) found that growth rates are highly volatile over time, and that there is no clear relationship between the two. Although their research concern small, and medium sized Australian firms, I find it reasonable to assume that this sample is representative for Norwegian firms.

Knudsen (2011) found that high pre-recession growth led to increased vulnerability during recessions. Lien and Knudsen (2012)'s findings are reinforced by Geroski (1997), and supports this discovery by concluding that industry-adjusted growth prior to a downturn affects firm performance during a recession, or a period of negative output adversely. They theorize that the reason may be that high-growth companies attract elastic customers, which disappear quickly during a downturn. Markman & Gartner (2002) found that extraordinary growth, i.e. between 500 and 31,000 percent over five years, both in sales and number of employees, was not related to profitability. Their study was conducted on the *Inc. 500* lists in the time periods 1992-1996, 1993-1997 and 1994-1998.

A reason that Fitzsimmons, Steffens and Douglas (2005) failed to find a relationship between growth and profitability is perhaps that the connection is twofold. If the theories of Davidsson and Fitzsimmons (2009) and Lien and Knudsen (2012) are applicable in periods of expansion and downturns respectively, the relationship may in fact be cyclical. Thus, high growth will indicate increasing growth and profitability during booms, while it will amplify the downturn due to, for example, lack of liquidity, operational efficiency an elastic customers in downturns and recessions (Lien & Knudsen, 2012).

H2: Previous growth has cyclical effects on HGFs

3.3 Age

Dunne, Samuelson, & Roberts (1989) show that size affects company performance during downturns, and Bernanke (1983b) demonstrate how smaller firms experienced a larger degree of distress during the depression years of the 1930s. Most firms enter at the bottom of the size distribution, making it intuitively reasonable to consider size and age as an interconnected relationship. Researchers have usually applied this approach when examining relationships involving either of them, until recently, when empirical research documented the need to distinguish between the two (Fort, Haltiwanger, Jarmin, & Miranda, 2012). The reason is that hypotheses formed about small firms often are more aptly relevant for startups and younger firms. Thus, conclusions reached on size effects likely contain age effects as well. This may be the reason behind differing academic stands on which effects firm age has on firm performance throughout the business cycle. Davis and Haltiwanger (2001) find that industries with a large share of young firms are more cyclically sensitive to credit market shocks than older firms. Evans (1987) found robust support for Jovanovic's model, which predicts that growth decrease with firm age when firm size is held constant. Jovanovic's theory states that firms uncover their true efficiencies through Bayesian learning over time. Furthermore, (Markman & Gartner, 2002) found that firm age was significantly, and inversely, related to profitability; younger firms experience slightly higher profitability than older firms.

I expect to find that the age of HGFs countercyclically affects firm performance in a diminishing manner, i.e. that older firms to a lesser extent are sensitive to fluctuations in the business cycle. The younger the firm, the better it is expected to perform during boom, and the harder it is expected to be hit during downturns. However, as the diminishment of the effect is difficult to observe through datasets of short time periods, I choose not to include this element in the hypothesis.

H3: Firm age has countercyclical effects on HGFs

3.4 Size

The theory that growth drives profitability through economies of scale and learning (Davidsson & Fitzsimmons, 2009) inherently applies to size, as size and economies of scale are related (Porter, 2001), and growth is necessary to achieve size. There are several stands

on the size-performance relationship. Kitching, Blackburn, Smallbone, & Dixon (2009) claim that size does not affect firm performance during downturns, and that both small and large companies were affected. Hall (1987) supports the finding, and concludes that year-to-year growth rates are uncorrelated over time with firm size. This supports Gibrat's rule of proportionate growth. The intuitive reasoning behind this claim is that size itself does not affect anything. However, the benefits typically associated with size, such as economies of scale and increased access to credit, does affect firm performance. Thus, size indirectly leads to profitability.

Samuelson, Dunne, & Roberts (1989) claim that the probability of survival in downturns and recessions is higher for both older and larger firms, relative to younger and smaller firms. One reason may be that small firms have a disproportionate response to financial and monetary policy shocks, relative to large firms (Gertler & Gilchrist, 1994). Geroski and Gregg (1996,1997) found that size had a negative relationship to firm performance during the 1991-1992 downturn. Furthermore, Bernanke (1983b) support the relationship by stating that smaller firms are less profitable than older firms.

Knudsen (2011), on the other hand, claims that larger firms are more prone to experience distress during downturns than smaller firms, due to less flexibility. This statement is suppoerted by Reid (2007), who argue that smaller companies are more flexible, thus better equipped to meet economic distress.

It appears that the literature is not only separated by the view on how size affects performance, but by in which time-period their research was conduted. Modern research seems to conclude that firm size affects firm performance cyclically. Since Knudsen (2011) analyzes Norwegian firms on the same dataset as I will use to analyze HGFs, I expect to find similar patterns. Thus, I expect firm size to have negative effects on HGFs during recessions, while positive effects in periods of positive output gaps.

H4: Size has cyclical effects on HGFs

3.5 Leverage

Bernanke (1983) demonstrate how the banks' cost of credit intermediation (CCI) increased during the Great Depression, and how this especially affected small- and medium sized

businesses. The inherent risk of smaller companies are generally less observable, and this uncertainty leads to restricted access to financing, or higher costs of debt. Banks and financial institutions are often severely affected by a downturn due to exposure to e.g. the stock, and bond market, currency markets, and different types of derivatives, which means that they seek to minimize their risk during a downturn. As HGFs typically are more cyclically sensitive than the average company, and that the uncertainty related to these firms performance is difficult to observe in advance, they often experience decreased access to credit during downturns (Bernanke, 1983). This theory is supported by Geroski & Gregg (1993), which argue that lenders avoid risky borrowers during downturns. In relation, Braun & Larrain (2005) states that dependence on external financing ahead of a recession amplifies the negative effect during the downturn. The two latter arguments should be seen in relation to HGFs especially, as high growth typically coincides with volatile growth (Fitzsimmons, Steffens, & Douglas, 2005) and because volatility implies high risk. Small firms typically finance their capital expenditures and R&D investments externally, hence HGFs should be severely affected by high debt ratios during downturns. Moreover, Opler & Titman (1994) states that the most affected companies during the 1991-1992 recession, were firms with high pre-recession debt ratios. Knudsen (2011) also show that high pre-downturn levels of leverage contributed to poor performance during the financial crisis of 2008. Another consequence of leverage is that the market value of equity decrease at a faster pace than the market value of debt during downturns (Damodaran, 2012). This means that the observed risk of leverage increase during downturns.

It is generally accepted that leverage increase a company's or an investment's volatility, thus also improve performance during booms. It is reasonable to assume that this relationships applies to HGFs as well. Previous research is unambigous as to the effect of leverage during downturns, and I find no reason why this relationship should differ with respect to HGFs. Hence I expect the debt ratio to to affect HGFs cyclically.

H5: Leverage has cyclical effects on HGFs

3.6 Liquidity

Kool & Bruinshoofd (2002) examined a sample of Dutch firms, and concludes that there exists long-run corporate liquidity targets, and that short-term liquidity responds passively to

exogenous shocks. The latter is consistent with buffer stock behavior, and pecking order theory. Buffer stock liquidity states that firms may choose to let their liquidity holdings absorb any exogenous shocks, such as decreased access to external financing. (Harford, 1998)

Haan (1997) argue that firms with higher leverage face higher degrees of uncertainty regarding future access to debt thus desire higher precautionary liquidity holdings. These findings are supported by Ees, Garretsen, Haan, & Sterken (1998)

Baum, Caglyan, Stephan, & Talavera (2005) show that corporate liquidity ratios increase along with macroeconomic uncertainty. Interestingly, they argue that there are significant differences in results for durable good makers and non-durable goods manufacturers, where the former show larger sensitivity to macroeconomic uncertinaty. This is in line with the findings of Lien & Knudsen (2012), which claim that the more durable goods companies have in their product mix, the more likely they are to be negatively affected by a downturn.

It is reasonable to suspect that investment opportunities for HGFs are relatively unlimited, thus they are likely to suffer high opportunity costs by maintaining high cash reserves. However, should they enter a downturn with high investement costs, possibly high leverage, and low liquidity reserves, they are likely to suffer more than their peers.

Therefore, I expect liquidity to have countercyclical effects on the performance of HGFs. This means that HGFs with low liquidity levels should outperform those with higher liquidity levels during booms, and vice versa during busts.

H6: Liquidity has countercyclical effects on HGFs

3.7 Growth definitions

In an analysis that explores how HGFs are affected by different factors, the definition of the data sample is extremely important. The data sample applied in this thesis is, amongst others, defined by the way one choose to define *growth*. Although growth is commonly associated with percentage growth in sales or profits, firms grow in several different ways, such as in size, employees, market share and physical output, both through organic growth and through acquisitions. Delmar, Davidsson, & Gartner (2003) explore heteregeneity in how firms have achieved growth, and identifies seven different patterns of firm growth. They argue that even though the different patterns are correlated with one another, choice of measurement approach affects research results, and should be based on the research purpose. However, the

most commonly applied growth measures in empirical growth research, are growth in sales and employees (Davidsson & Delmar, 1997). Because this thesis examine how HGFs are affected, I find it reasonable to apply the two most widely used measurements so that the research is generalizable and to a larger extent prepared for continuation. The question of method of measurement should be more important for research that is concerned with how firms achieve growth (Nystron, Weinzimmer, & Freeman, 1997), and there is more or less a academic consencus that growth in sales is the preferred measure (Cardozo et al., 1998).

The next issue concerns whether to measure growth in absolute or relative terms. Absolute measures refer to growth as an actual increase in revenues or employees, and tends to ascribe higher growth to larger firms. Relative growth regards growth as an percentage increase from the previous period. As smaller firms typically are more able to double their absolute income than larger firms, relative growth ascribe higher growth numbers to smaller firms. I have taken measures to exclude the smallest, and thus the most volatile, companies by defining criteria on minimums of both revenues and labors costs. These criteria are presented in section 5.1. Hence, I will focus on relative growth to define the relevant companies.

Furthemore, the issue of regularity of growth over time is important to the effects of growth volatility. That is, growth over time may be highly affectd by stochastic variation. Methods of ”smoothing” reduce these effects, but Delmar, Davidsson, & Gartner (2003) argue that smoothing is in direct conflict with solving the problem with comparing size at two points in time. This means that the irregularity in the growth pattern may itself be of interest. However, some irregularity may occur as a consequence of misreporting. Moreover, as I merely wish to define a sample of firms for further analysis, irregularity in growth patterns is of little interest. Hence, I have chosen to define two groups of HGFs; the ten and twenty percent highest growing firms based on average growth over three periods of time prior to 2007. Growth will be measure as:

$$Growth_{t,i} = \frac{Value_t}{Value_{t-i}} - 1$$

3.8 Overview of hypothesis

Hypotheses	
Hypothesis 1	Previous profitability has cyclically positive effects on HGFs
Hypothesis 2	Previous growth has cyclical effects on HGFs
Hypothesis 3	Firm age has countercyclical effects on HGFs
Hypothesis 4	Firm size has cyclical effects on HGFs
Hypothesis 5	Leverage has cyclical effects on HGFs
Hypothesis 6	Liquidity has countercyclical effects on HGFs

Table 1: Overview of hypotheses

4. Method and Research Design

The research question forms the basis, and the structure, of which methods that are appropriate choices, and how collection, sampling and analysis of data should be conducted. Saunders, Lewis, and Thornhill (2009, p595) define method as the *"techniques and procedures used to obtain and analyse research data, including for example questionnaires, observation, interviews, and statistical and non-statistical techniques.*" The definition includes both research design and research tactics, which are concerned with the overall plan for research and the finer detail of data collection and analysis respectively. Data collection includes the definition and appraisal of the data sample, which the analysis ultimately is based upon.

Choices with respect to data collection, however, were in this thesis limited as it is a part of a larger research project-collaboration between NHH and SNF, and the data was provided. The following will present the design of the analysis before reviewing different specific research tactics.

4.1 Research design and strategy

The research design is a general plan of how the analysis is going to be implemented. It creates a draft of how one wish to solve the research question.

4.1.1 Purpose

Saunders, Lewis and Thornhill (2009) propose that the research purpose can take one of three forms; exploratory, descriptive or explanatory, and that it may or may not include elements of one another. An exploratory purpose will attempt to add further insightful, and exploratory information to existing research and literature. This type of purpose is especially helpful if there exists uncertainty as to the precise nature of an issue. Further, Saunders, Lewis and Thornhill (2009) propose literary searches as a principal way to conduct exploratory research. *"Exploratory research can be likened to the activities of the traveller or explorer"* (Adams & Schvaneveldt, 1991) Descriptive research is to accurately describe how situations or events have unfolded (Robson, 2002). A descriptive study is often a precursor to, or a piece of exploratory studies, as it is important to be aware of actual relationships before drawing further conclusions. Studies that inherent both descriptive and

exploratory elements are called descripto-exploratory studies. Lastly, explanatory research revolves around the establishing of causal relationships between variables. The researcher is interested in the analysis of a situations or event in order to provide an explanation.

The purpose of this analysis is to describe how high-growth companies are affected by the business cycle, and why they are affected in a given way. Thus, the research question comprises elements from all of the above-mentioned purposes. The descriptive element emerges, as the part of the purpose is to accurately describe developments of high-growth firm characteristics. As this relationship is not yet thoroughly documented, the research question seeks to add insightful and exploratory information. As discussed earlier, there are several theories and documented research regarding different growth-relationships. These, however, concern firms in general, and not HGFs specifically. That HGFs should react to economic developments differently than firms in general is relatively obvious, but the nature of their reaction is uncertain. Lastly, "why?" raises the issue of causal relationships between economic and firm-specific developments. The explanatory element of the research purpose will be based on qualitative assessment as opposed to the quantitative analysis that will be applied to the rest of the elements.

4.1.2 Research approach

Business and economic research typically distinguishes between deductive and inductive studies (Saunders, Lewis, & Thornhill, 2009). Deductive research applies existing literature to form expectations and hypotheses that are analyzed quantitatively. When conducting inductive studies, researchers explore a dataset to develop theories that are subsequently linked to theory. As this analysis applies existing research and literature to form hypotheses about how HGFs are affected, this study is deductive in nature.

4.1.3 Research strategy

There are distinctions between different research strategies. Saunders, Lewis and Thornhill (2009) emphasize that no strategy is "superior" and that all are applicable to either of the research purposes, although some clearly belong to deductive studies and vice versa. The three most recognized strategies are experimental, case, and survey design. Experimental strategies study the effect of one variable from a change in a different variable, and the casual relationship therein. This strategy is, accordingly, often used in natural sciences. The survey design is heavily applied in business, and economic research, as it is based on

analysis of large sets of data, thus making it preferable to descriptive and exploratory studies. Case studies differ from survey studies because they are contemporary, thus not as empirical. As this study is highly empirical and based on a large set of data, I will choose surveys as the applied research strategy.

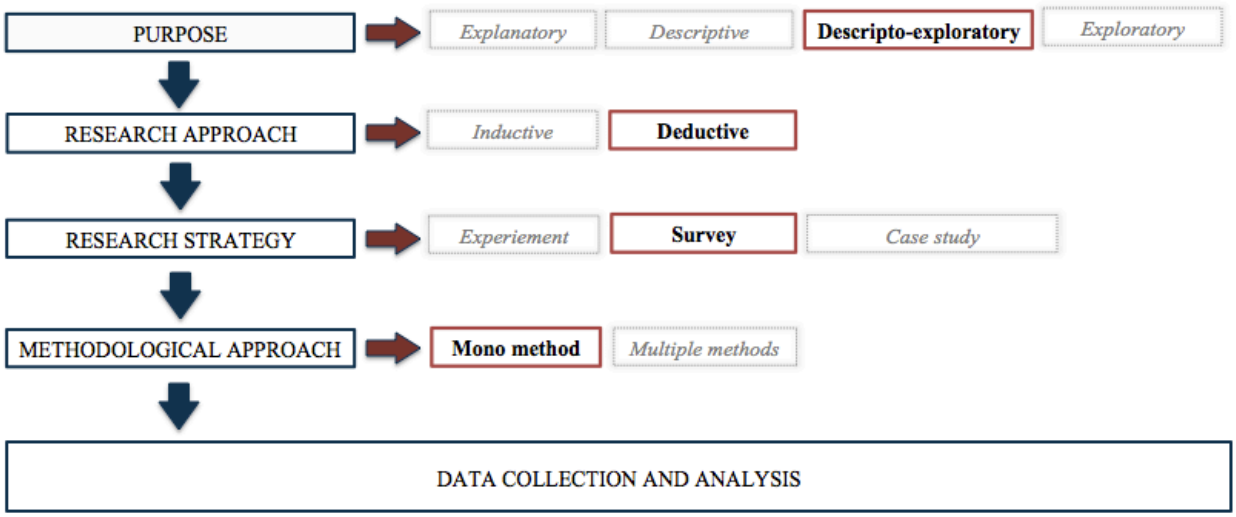
4.1.4 Methodological approach

Method is generally concerned with the choice of information form in conjunction with data collection–whether the observations/data is in a quantitative or qualitative form, and how the data is analyzed. Quantitative data are numerical in nature, and are typically analyzed by quantitatively based computer programs. Qualitative analysis is often based on information obtained from interviews and non-numerical sources. The two main methods used to collect and analyze data are the "mono method" and the "mixed method." The mono method involves single data collection techniques and corresponding analysis procedures, while the mixed, or multiple-method, applies several techniques to answer the research question. The dataset used in this analysis is based on secondary quantitative information, thus the mono method is applied.

4.1.5 Summary

The figure below summarizes, and presents an overview of the research design that will lay the foundation for the analysis.

Figure 5: Research design



4.1.6 Credibility

It is difficult to be sure whether already drawn conclusions and evidence will stand up to closer examination. A technique to decrease the probability of wrongly drawn conclusions and false evidence is to neatly scrutinize the reliability and validity of the research design. The reliability and validity you describe to secondary data are functions of the method by which the date were collected and the source (Saunders, Lewis, & Thornhill, 2009).

Reliability distresses the extent to which the chosen methods of data collection and analysis will yield consistent results in different situations, or under different circumstances, and whether another researcher would make the same observations as me. Threats to reliability include elements of inappropriate subjectivity, miscalculations and different biases. The dataset in this analysis is based on officially reported accounting numbers, which are routinely quality assured (Mjøs & Øksnes, 2012), making subjectivity and biases with respect to the collection of data minimal. I will nevertheless draw relatively subjective conclusions regarding observed patterns. However, these patterns will be transparently presented, so the reader is welcome to interpret patterns and developments.

Would my analysis yield the same results if it were conducted on data from the 1980s instead of the 2000s? Validity concerns whether the circumstances in which the analysis was conducted is representative in general, and is divided between internally and externally validity. Internal validity principally concern experimental and causal analysis, and address the issue to whether an observed relationship is derived from the expected causes, or if there are unknown influencing variables. External validity indicates the generalizability of the results. Are the results representative to all business cycles, or just the 2007-2010 cycle. Internal and external validity are contradictory in nature because enhancement of internal validity will be at the expense of external validity. As this analysis is based on officially reported secondary data, the internal validity is considered robust. The external validity, however, is more worrisome. Economic conditions change over time as the world develops and grow more globalized. Thus, each economic recession and crisis is uniquely characterized. However, adjusting for industry and inflation will to a certain degreed reduce the importance of this factor. The exact effect that the 2008-2009 downturn and slowdown had on the Norwegian economy and HGFs will nevertheless differ relatively to other recessions. Finally, the fact that the Norwegian economy was mildly affected promotes the core movements of representative business cycles.

5. Data

The dataset applied in this analysis is obtained through SNF and NHHs database, and is the basis for evidence found and conclusions reached in the analyses tied to the research project "Crises, restructuring and growth." The data originate from "The Brønnøysund Register Centre" via Dun & Bradstreet Norway AS, and consists of officially reported accounting information on all Norwegian firms in the time-period 1992-2010 (Mjøs & Øksnes, 2012). In addition to accounting information, the database distinguishes between industry, by including industry classification codes (NACE), location, and type of business entity. This enables the exclusion of irrelevant industries, such as governmental organizations.

5.1 Data Cleansing

As the purpose of this analysis is to accurately describe how HGFs are affected by the different phases of the business cycle, the data set first and foremost needs to represent firms of high growth. Percentage growth is the most common method of measurement, and I will primarily focus on this definition. Percentage growth is nevertheless biased with respect to firms with very little income, and so, small absolute changes can cause dramatic changes in the growth rate. At the request of my supervisor I have formed certain criteria as to which firms that will be included in the analysis. The criteria are formed to promote the core Norwegian business environment, and concerns revenues, labor costs, type of business entity, governmental organizations, type of industry and industry-adjustment. Furthermore, 2007 is used as the basis year, thus are all criteria applied to this year.

Period of analysis

Due to changes in accounting rules in 1998, the data prior to this year are based on different assumptions than the data from 1999-2010. This hampers the ability to analyze the effects of the dot com bubble thoroughly, especially as I will apply previous averages to determine current conditions.

Criterion 1: Exclude data prior to 1999

Business entity

The dataset include information on the type of business entity for each company. Norwegian company models are relatively similar to American and European models, and include a range of different entity types defined by e.g. capital requirements and degree of liability. As requested by my supervisor, the analysis should reflect a typical Norwegian growth company, hence are atypical business entities, such as sole proprietorships, excluded from the dataset. The most commonly used types of entity in Norway are AS and ASA. Respectively, these are limited companies (Ltd) and public limited companies (Plc.). The criteria will exclude a wide range of irrelevant companies, while still maintaining a wide base of data.

Criterion 2: Business entity = AS, ASA.

Revenues

As percentage growth is liable to misrepresent the relevant growth rate, e.g. growth from $1 to $2 equals a 100% growth rate, it is important to exclude companies with very little income. To remove different biases related to this issue, a criterion is set at minimum revenues in 2007 of ten million NOK. This will also function as a filter for inactive firms.

Criterion 3: Revenues (2007) > 10.000.000 NOK

Labor costs

Some companies are outliers with respect to number of employees, and may meet the criterion regarding revenue although they do not represent the typical Norwegian company. Additionally, my primary interest is in firms of some activity. Thus labor costs are added as a criterion to further exclude irrelevant companies and promote the core Norwegian business environment.

Criterion 4: Labor costs (2007) > 3.000.000 NOK

Government firms

Government firms are normally not run to maximize profits and/or to create shareholder value. It is reasonable to assume that these firms do not pursue growth and profitability, and that they operate differently from most private companies. However, this criterion does not apply to companies in which the government is the controlling shareholder, such as Statoil and Statoil's subsidiaries.

Criterion 5: Exclude government organizations

Exclude misrepresentative industries

As this analysis strives to promote the core Norwegian business environment, businesses that do not operate under "normal" market conditions should be excluded from the data sample. These are businesses that receive governmental subsidy, are affected by import restrictions or operate under atypical market dynamism, such as financial institutions. Norway has a long tradition of agriculture, and this was a dominant industry before oil-discoveries industrialized the country in line with the rest of Europe. As agriculture is relatively expensive, the Norwegian government provide subsidy to prevent inflationary pressure on farm products. The health-sector is under strong governmental restriction, and does therefore not represent the core business environment. The cultural sector is generally not profit maximizing, and is influenced by volunteer labor. Additionally, it receives substantial government subsidy. Financial companies operate under different market mechanisms than for example a plumber company, which is indicated by the term "the real economy." The financial industry is highly volatile relative to a typical small-medium company and experience dramatic growth rates in both directions that could cause bias to the analysis.

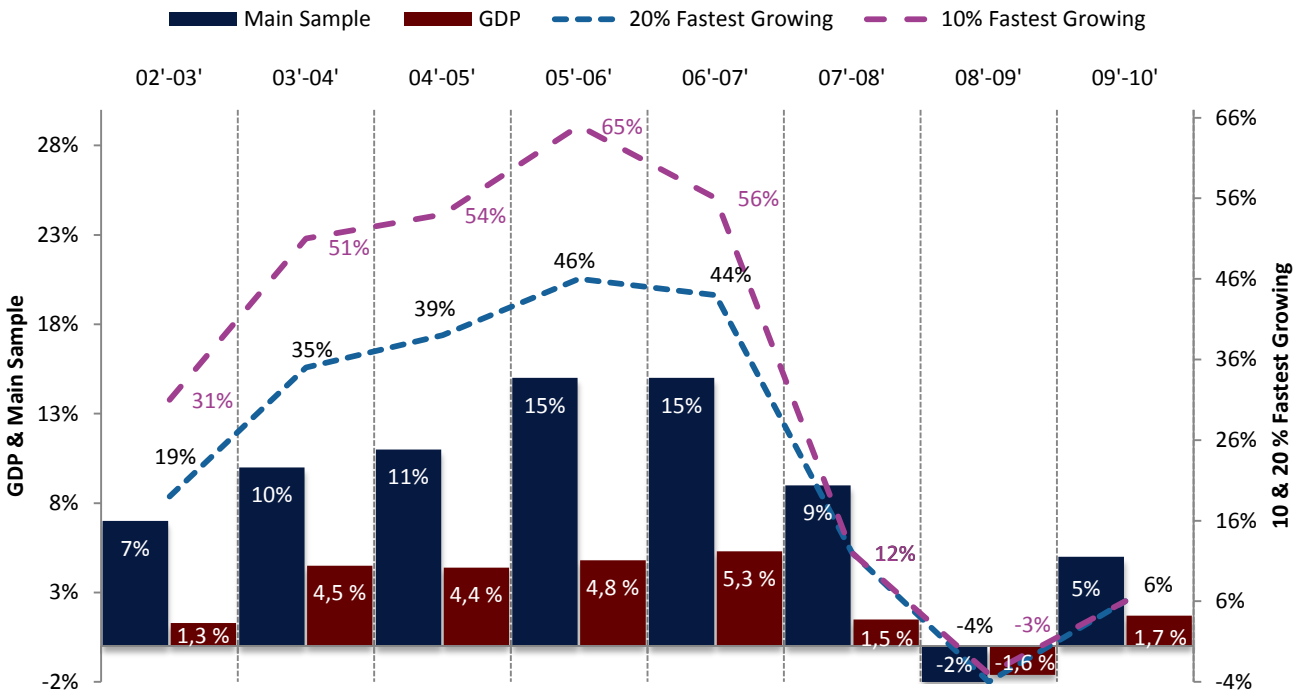
Criterion 6: Remove biased industries

Exclude non-growth firms

I have examined different growth cutoffs to determine which firms that are relevant for the analysis. I am interested in firms that experience growth over a certain period of time, instead of so called "one-shots". To identify these firms, I calculated growth rates over three

periods of time, 2002-2007, 2003-2007 and 2006-2007, and used the average of all three periods. Figure 6 presents the growth rates of the 10 and 20 percent fastest growing firms, compared to those of the main sample and GDP. Although the 10% fastest growing firms are faster than the 20% fastest growing, the data sample doubles in size, from approximately 1500 to approximately 3000 firms, when using the 20% fastest. As the 20% grow at a significantly faster pace than the main sample, I believe that using this sample will promote robustness and reduce variation in the results. Furthermore, the growth rates of the two "growth samples" are more or less equal during the downturn and the retrieval.

Figure 6: Revenue growth in different samples



Additional adjustments

As the analysis concern HGFs in general, measures are taken to reduce the influence of industry characteristics. Specifics as to which measures that are taken will be discussed subsequently in relation to the relevant variables. Further adjustments to outliers based on standard deviations are made during the analysis, but vary depending on the analyzed variable and are thus not included in this discussion. To promote core developments, I have adjusted the dataset for inflation, by applying 2007 as the basis year (2007 = 100). The inflation-adjustment is presented in appendix A. Finally, some companies lack industry description and are removed from the dataset for this reason.

5.1.2 Limitations

Although the purpose of the criteria is to promote the core business environment, it may nevertheless lead to certain biases. The criteria regarding revenues and labor costs exclude smaller companies that are still important elements of the economy, and may include the stars of tomorrow. Nevertheless, I believe that the avoided bias that would occur from including dramatic and unweighted growth rates by large compensate for the biased caused by their exclusion. Moreover, as 2007 is the basis year, the criteria will apply to this year only. It will allow for HGFs with revenues and labor cost below the criteria to enter the data sample through the earlier observations. This fact is important to keep in mind when reviewing the results of the analysis.

5.1.3 Descriptives

It is evident how the variations of certain variables sharply increase after removing the 80% slowest growing firms. This variation is even higher when examining the 10 percent fastest growing firms.

Variable	2002	2003	2004	2005	2006	2007	2008	2009	2010	Std. Deviation
N Main Sample	15249	15947	16751	17450	17896	18478	18475	17845	17218	
ROA	136 %	473 %	52 %	34 %	18 %	20 %	457 %	1061 %	5625 %	
EBITDA-margin	1628 %	755 %	142 %	224 %	1769 %	29 %	116 %	1140 %	1001 %	
Revenue Growth	-	22006 %	3982 %	4247 %	7364 %	11420 %	105 %	103 %	430 %	
Labor Growth	-	6102 %	3854 %	4419 %	8443 %	770 %	45 %	292 %	860 %	
Age	-	-	-	-	-	0.9	0.9	0.8	0.7	
Size	-	-	-	-	-	1.4	1.4	1.5	1.5	
D/A	-	-	-	-	1.6	0.3	8.7	8.6	17.3	
Current Ratio	-	-	-	-	6.2	56.9	48.1	2654.6	59.5	

Table 2: Sample Descriptives: Main Sample

Variable	2002	2003	2004	2005	2006	2007	2008	2009	2010	Std. Deviation
20% Fastest	2488	2811	3120	3388	3539	3616	3616	3445	3280	
ROA	333 %	1125 %	115 %	71 %	30 %	27 %	1011 %	2411 %	54 %	
EBITDA-margin	4084 %	1817 %	327 %	509 %	3975 %	31 %	97 %	777 %	2130 %	
Revenue Growth		55188 %	9341 %	9894 %	16270 %	25642 %	57 %	76 %	964 %	
Labor Growth	-	9307 %	8564 %	10036 %	18195 %	1665 %	44 %	187 %	1878 %	
Age	-	-	-	-	-	0.9	0.9	0.7	0.7	
Size	-	-	-	-	-	1.5	1.5	1.6	1.6	
D/A	-	-	-	-	353 %	28 %	1956 %	1766 %	132 %	
Current Ratio	-	-	-	-	5.1	3.1	18.8	204.5	59.8	

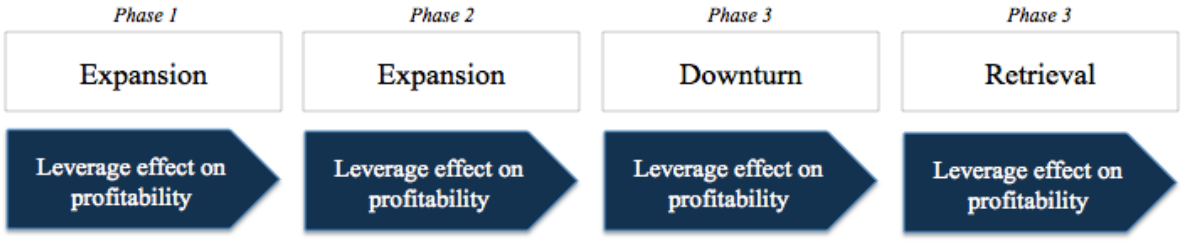
Table 3: Sample Descriptives: 20% Fastest Growing

6. Model and tools

The model of analysis is based on the research design outlined in the previous chapter. The research design presents the structure of the analysis, but omits the technical approach. This chapter will define the general approach that I will apply to analyze and solve the research question. Furthermore, as my hypotheses are relatively general, I will outline different components of each hypothesis.

Key financial ratios, as outlined in chapter 2, can be viewed as characteristics of a firm. Chapter 3 discussed previous research and literature on how these characteristics developed and affected firm performance. Although there are several measures of a firm's financial condition and performance, I find these to be preferable as they are heavily applied in practice. As previously mentioned, I do not define *performance* as profitability, but whether firm characteristics change in a positive or negative manner throughout the different phases of the business cycle. A way of measuring this development is to analyze which effects a given firm characteristic has on another characteristic, and how this effect changes throughout the different phases. As different effects, e.g. the leverage effect on profitability, can only be analyzed in a one-directional fashion, I will analyze a range of different relationships to determine the general development of HGFs. This means that I will run the model several times on different firm characteristics to obtain a detailed examination of the hypotheses. As the figure below exemplifies, with respect to the effect of leverage on profitability, the model provides an overview of how the explanatory variable (Leverage) affects the responsive variable (Profitability).

Figure 7: Overview of research model (Leverage-profitability example)



The interesting aspect of the model is mainly the explanatory variable, hence I will attempt to test the hypotheses by exploring an explanatory variable's effect on a range of responsive variables. I will for example examine the effect of leverage on different firm characteristics to determine whether leverage has cyclical effects on firm performance (Hypothesis 5).

6.1 Variables

Chapter three outlined the hypotheses that, collectively, will answer the research question. As exemplified above, the research model will focus on the explanatory variable's effect on the responsive variable. Meaning that the firm characteristic of each hypothesis will function as an explanatory variable. Performance will be measured as the development of the key financial ratios described in chapter 2, and these will function as the responsive variables in the model.

As the explanatory variables were more or less outlined above, I will in this section lay out in detail how they are being measured and adjusted. As there is a broad range of profitability measures I will apply both ROA and the EBITDA-margin to examine whether there exists any significant differences. I will also measure growth as growth in both revenues and labors costs.

Explanatory variables	
Hypothesis 1:	Previous Industry-adjusted ROA
Hypothesis 1:	Industry-adjusted EBITDA margin
Hypothesis 2:	Previous industry-adjusted growth
Hypothesis 3:	Age
Hypothesis 4:	Size
Hypothesis 5:	Industry-adjusted debt-to-assets
Hypothesis 6:	Industry-adjusted current ratio

Responsive variables
Industry-adjusted ROA
Industry-adjusted EBITDA margin
Industry-adjusted growth
Industry-adjusted debt-to-assets
Industry-adjusted current ratio

Table 4: Overview of variables

Return on assets (ROA)

I calculated ROA by dividing net income by total assets, as described in chapter 2. As I am interested in the core business environment, I needed to remove industry bias. I adjusted ROA for industry affects by subtracting the aggregated industry ROA. This method provides a better estimate than by, for example, subtracting the median ROA, as the median not necessarily reflects the industry average. I will analyze the relationship that the 1-year pre-analysis ROA and the 3-year pre-analysis average have on firm performance.

$$Industry\text{–}adjusted\ ROA = \frac{Net\ Income}{Total\ Assets} - \left(\frac{\sum Industry\ Net\ Income}{\sum Industry\ Total\ Assets}\right)$$

EBITDA margin

The EBITDA margin is provided in the dataset, and is according to Mjøs & Øksnes (212) calculated as EBITDA divided by total revenues. I adjust the EBITDA-margin for industry bias by subtracting the aggregated industry average, such as with ROA. Moreover, the analysis will focus on how previous 1-year and 3-year average EBITDA-margins affect current characteristics.

$$Industry\text{–}adjusted\ EBITDA\ margin = \frac{EBITDA}{Total\ Revenues} - \left(\frac{\sum Industry\ Net\ Income}{\sum Industry\ Total\ Revenues}\right)$$

Previous industry-adjusted growth

This variable will be applied in different forms, as growth is ambiguous. I will examine the effects of growth in revenues and in labor costs as a proxy for number of employees. Even though a firm's number of employees is provided in the dataset, differences to whether the variables are defined as "numerical" or "scale" in SPSS complicates the practical application. Furthermore, as growth varies over time, I will employ previous growth rates of 1, and 3 years prior to the point of analysis. The different definitions of growth will nevertheless be calculated using the same method.

$$Growth_{t-1,t} = \frac{Value_t - Value_{t.1}}{Value_{t-1}} - \frac{\sum indsutry\ value_t - \sum Industry\ value_{t-1}}{\sum Industry\ value_{t-1}}$$

Age

As the dataset only reports a firm's founding year, I have calculated the age of each firm by subtracting the respective year of analysis in each phase from the founding year. To promote the diminishing effect mentioned in section 3.3, I have adjusted the calculation by applying the logarithm of age. This will ensure that age will have a proportional effect on the responsive variable by estimating the marginal effect of a given increase in age, instead of the absolute effect. Moreover, to make sure that companies that are founded in the year of analysis are included in the analysis, I have added one year to the founding year.

$$Age = \ln\big((year\ of\ analysis - (Founding\ year + 1)\big)$$

Size

Size is measured as the accounting value of total assets, because preferable market values are unavailable. As size is expected to affect performance in a similar manner as age, I have applied the natural logarithm of total assets as a proxy for size.

$$Size = \ln(Total\ Assets)$$

Industry-adjusted debt-to-assets

As a measure of leverage, I have applied the ratio of debt to total assets. This ratio is adjusted for industry bias in the same manner as ROA and the EBITDA-margin.

$$Industry\text{–}adjusted\ debt\text{–}to\text{–}assets = \frac{Total\ Debt}{Total\ Assets} - \frac{\sum Industry\ Debt}{\sum Industry\ Total\ Assets}$$

Industry-adjusted current ratio

I will apply the current ratio as a measure of corporate liquidity, and adjust for industry bias in consistency with ROA, EBITDA-margin and debt-to-assets.

$$Industry\text{–}adjusted\ Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilities} - \frac{\sum Industry\ Current\ Assets}{\sum Current\ Liabilities}$$

6.2 Cyclicality

To clarify matters, I have defined expected patterns as different types of cyclicality. These are: cyclical, countercyclical, positively cyclical, positively countercyclical, negatively cyclical, negatively countercyclical, positive and negative. Appendix B, presents a graphical overview on how each type of cyclicality influence a certain variable.

6.3 Components included in the hypotheses

As discussed above, I will examine the hypotheses through a number of sub-components to support the model. This approach will break down inter-connected relationships between the variables. Furthermore, it will open up for possible findings outside of the hypotheses.

To determine what effect profitability has on high-growth companies, I will analyze ROA and EBITDA-margin effects on all of the responsive variables. I will also include an examination of how previous ROAs and EBITDA-margins affect current ROAs and EBITDA-margins. Thus, hypothesis 1 includes ten sub-components.

Growth will as mentioned be defined as both growth in revenues and growth in labor costs, over different time-spans. The growth-hypothesis will thus be rather detailed compared to the other hypotheses. As with ROA and EBITDA-margin, previous growth will be used to examine how it affects current growth in addition to the other responsive variables. I will also examine how, for example, previous growth in revenues affects current growth in labors costs.

Age, size, leverage and liquidity effects will be analyzed straightforwardly, as the effect on each the different responsive variables.

6.4 Data analysis

To quantitatively analyze the components, I will use the statistical computer software *Statistical Package for the Social Sciences* (SPSS). SPSS allows you to estimate one or more explanatory variables' $(x_1 \dots x_i)$ effects on a scalar responsive variable (Y) through linear regression analysis. The following presents the basic theoretical background of linear regression, and the specifics on how the different variable effects will appear.

6.4.1 Linear regression analysis

"*Regression analyses are a set of statistical techniques that allow one to assess the relationship between on DV and several IVs."* (Tabachnick & Fidell, 2007, p117). DV and IV stands for dependent variable (responsive) and independenet variable (explanatory) respectively. The assessed relationships generate a regression model, which quantify the strength of the relationships, and can be used for predictive pruposes. Linear regression analysis is a popular technique in many disciplines, due to its simplicity and the ability to analyze data sets in which the the explanatory variables are correlated with one another. Furthermore, linear regression can be performed as either *simple,* or *multiple,* regression analysis, depending on whether there are multiple explanatory variables included in the regression equation.

The data in linear regression is modeled using linear predictor functions, and unobservable model paramters are estimated from the data. (Rubinfeld, 2000). A typical linear regression equation can be represented as:

$$\hat{Y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 \cdots + \beta_i X_i$$

The model states that the responsive variable (Y) is a product of different scales of the explanatory variables, where the estimated coefficients (β_i) determine the degree of scaling. The equation presented above is an approximation of the true relationship, thus the difference between the estimated and the true relationship is the error term (ε_i). That is, the collective unobservable influence of any omitted variables (Rubinfeld, 2000). In linear regression, each of the variables that are added involves unknown parameters (β_i), which are estimated by fitting the equation to the data that is being analyzed. The "fitting" is done by using *least squares*. When the regression equation is estimated, the "fitting" will in practice always, to a certain degree, deviate from the true relationship, and the deviations are called residuals (e_i). Least squares is a mathematical approach that minimizes the sum of squared residuals. Thus, the least squares approach insures that the estimated coefficients fit the data as well as possible, that is, the difference between the estimated, and the true relationship, is at its minimum (Tabachnick & Fidell, 2007). It is the regression coefficients that are of interest to this analysis. These, as well as their statistical significance, will show how, for example, leverage affects profitability over time.

6.4.2 Applied sub-techniques

Throughout the analysis I have applied certain techniques to determine the significance of a given relationship and to remove wrongly influencing variables.

Model strength

The coefficient of determination (R squared) indicates how well data points fit a certain regression equation, meaning that it provides a measure of how well observed outcomes are estimated by the model (Tabachnick & Fidell, 2007). The measure indicates how much of the variation in a data set that is explained by the model. R squared is especially important when regression analysis is used as a tool for prediction of future conditions. While I do not intend to use linear regression as a forecasting tool, R squared will complement the analysis by measuring the strength of a given relationship.

Although R squared provides a measure of a models strength, the estimated number will at times be very small. For example, there are many different variables, other than leverage, that influence a company's growth rate. As I analyze the different characteristics one on one, the reported explained variance of the model will at times be zero, hence the level of significance will allow me to further evaluate the strength of a relationship.

Outliers

SPSS is **e**xtremely sensitive to the included variables, and expects that the variables are estimated without error. (Tabachnick & Fidell, 2007). Thus, I have set criteria as to which variables that should be excluded from the analysis. As the variances of the different characteristics are very different from one another, I have evaluated the appropriate limit of standard deviation in each analysis. The cutoff was set in SPSS' casewise diagnostics. While this method will remove a lot of wrongly influencing observations, some will always stay behind. Thus, I have further applied Cook's distance and Mahalanobis distance.

Cook's Distance is broadly used to identify highly influencing data points in least squares regression analysis, by measuring the effect of deleting a certain observation. I have followed Tabachnick & Fidell (2007)'s suggestion of removing cases with Cook's D values above 1. I have, however, not removed all these cases as the dataset has a large variation in nature. Hence, I have identified and evaluated the correctness of each observation before any deletion.

6.4.3 Relevance

Linear regression will complement my analysis as the coefficients (β_i) indicate whether the relationship between the explanatory, and the responsive variable is positive or negative, as well as the strength of the relationship. By running linear regression analysis on the explanatory, and responsive variables, as described in section 6.2, I will be able to plot how the coefficients develop over time. As I will perform a thorough breakdown of the different expected relationships, existing patterns should emerge to test the hypotheses and clarify the research question.

6.4.4 Limitations

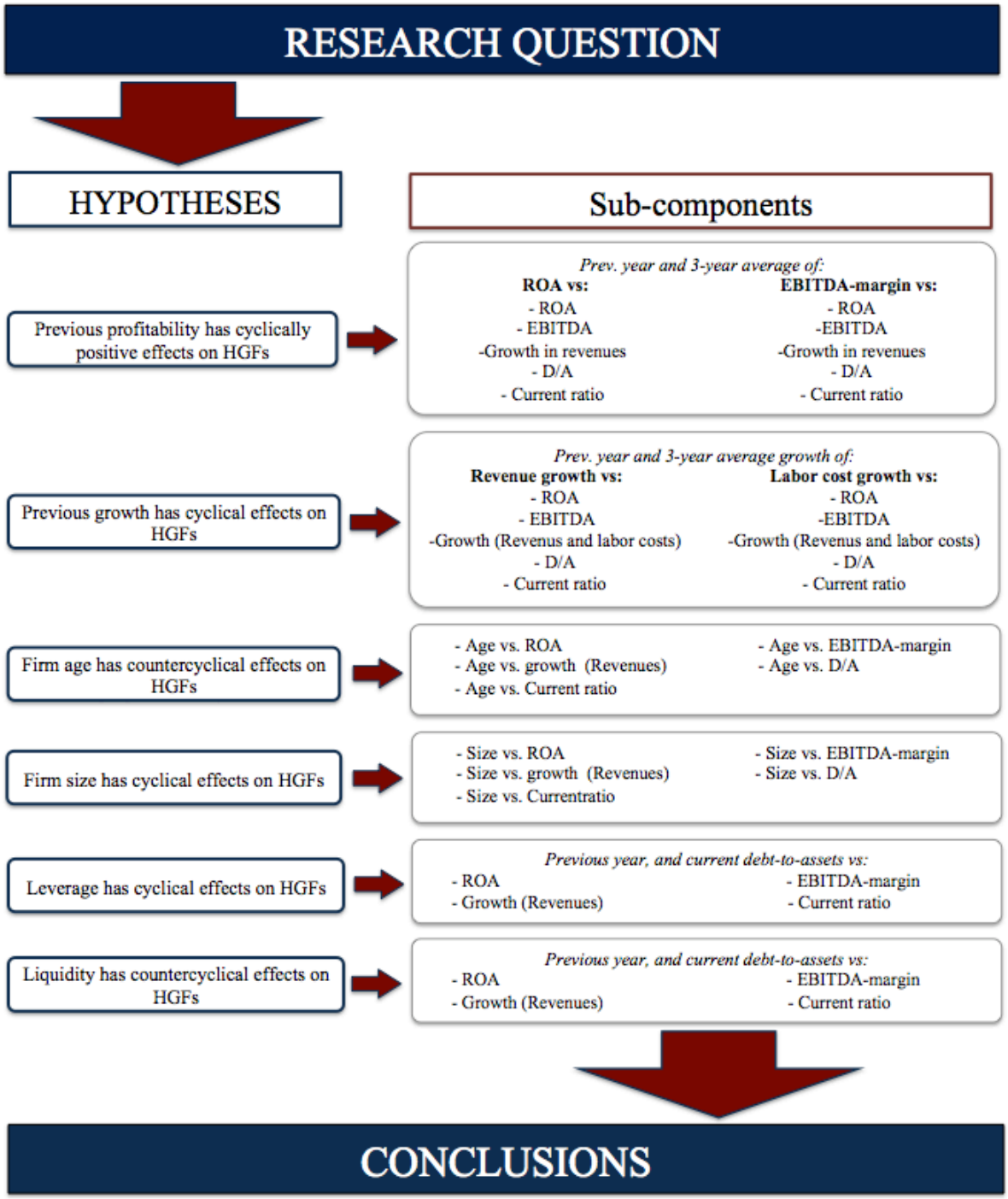
However, regression analysis includes certain limitations. Although, the regression analysis may confirm that there exist relationships between variables, these relationships are not

necessarily causal. An apparently strong empirical relationship between variables could stem from, for example, other unmeasured variables. The reviewed literature that forms the basis for the hypotheses should nevertheless to a certain degree confirm causality.

6.5 Summary and overview

The figure below presents an overview of the applied model of analysis on a detailed level. It shows the corresponding sub-components of each hypothesis, and how I will analyze them to arrive at the subsequently presented conclusions.

Figure 8: Overview of analysis model



7. Analysis, Discussion and Conclusions

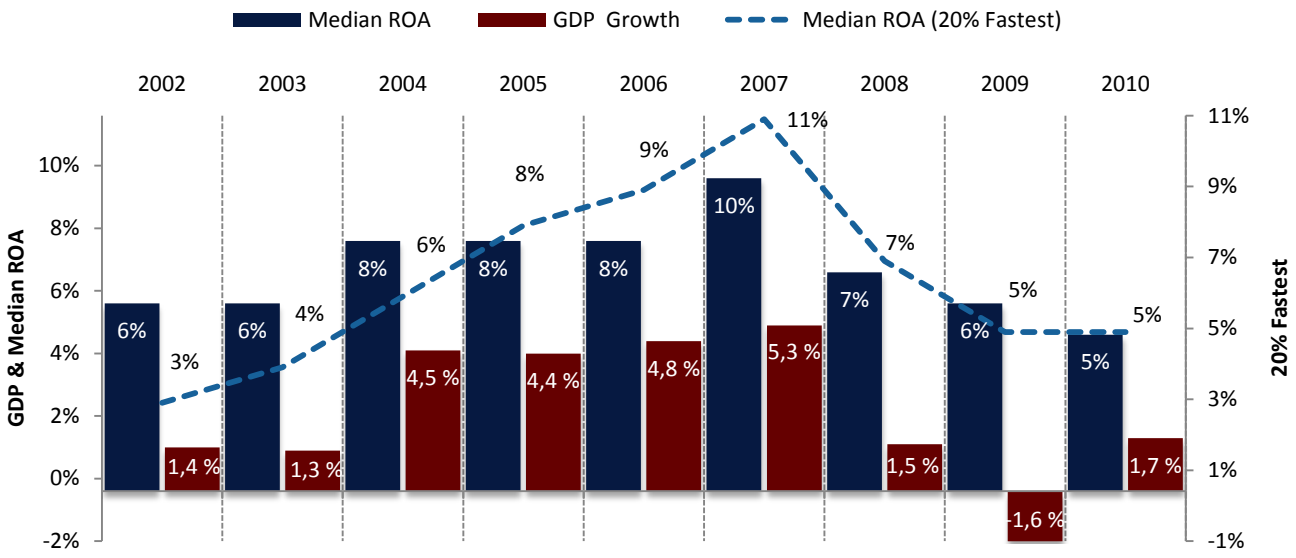
I will analyze the effect that certain firm characteristics have on other firm characteristics throughout the business cycle. Before evaluating the results from the regression analyses, I will present the historical development of the respective hypothesis-characteristic. This development may contribute to the interpretation of causal relationships from the regression coefficients. Moreover, certain arguments will relate to the explanatory power (R^2) and the level of significance of the difference regression coefficients, which are presented in appendix C.

7.1 Hypothesis 1: Profitability

Previous profitability has cyclically positive effects on HGFs

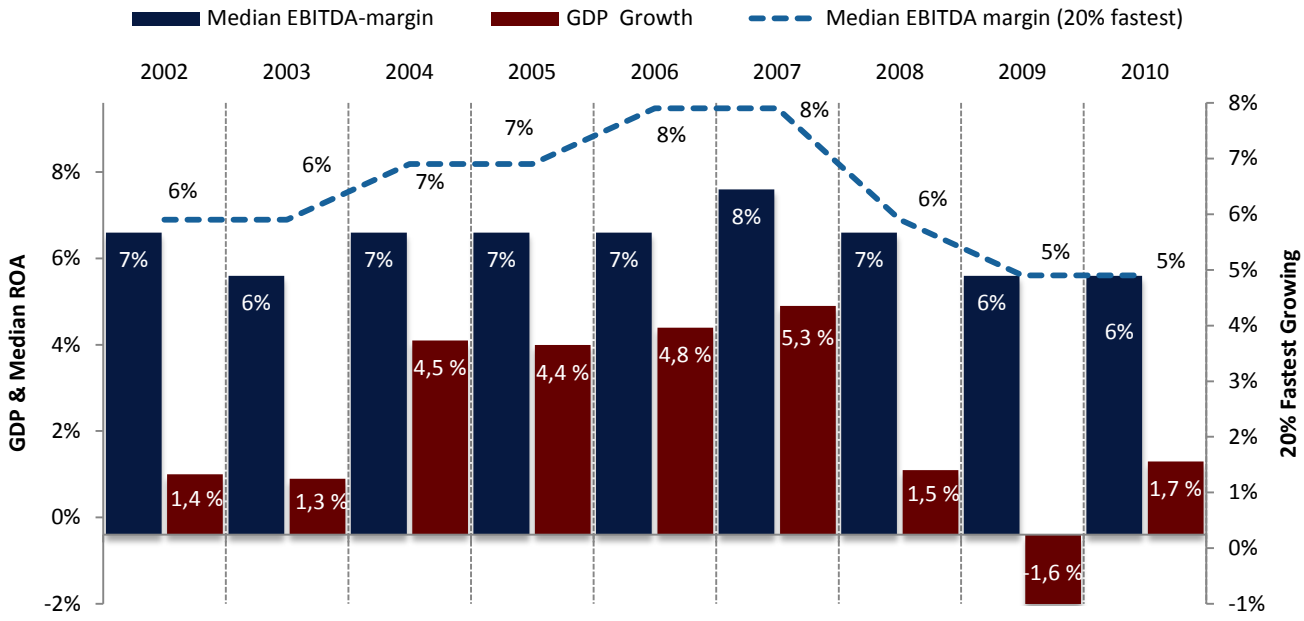
I have, as mentioned, applied both ROA and the EBITDA margin as measures of profitability. The subsequent analysis will examine the effect that previous profitability has on different firm characteristics. Figure 9 shows that the median ROA of the 20% fastest growing firms between 2002 and 2007 have developed in a similar pattern as the median ROA of the main sample as well as with GDP growth. It is not surprising that HGFs experience a lower than average ROA outside of the boom years of 2005, 2006 and 2007. This is because HGFs usually do not enjoy economies of scale, and/or are able to increase productivity. High growth in revenues typically entails high growth in operating costs, thus preventing ROA from increasing along with growth.

Figure 9: ROA and GDP



Development in the EBITDA margin is similar to that of ROA, which is to be expected. However, while the median ROA of the HGFs was slightly higher than the general population during the expansion, the median EBITDA margin of the HGFs is equal to that of the main sample at it's highest. This may be because ROA is influenced by other income and costs, such as interest income and expenses and depreciations. Larger and stable firms tend have a larger base of fixed, and depreciable assets, which influence net income. The EBITDA margin measures core profitability, which excludes other income and costs.

Figure 10: EBITDA margin and GDP



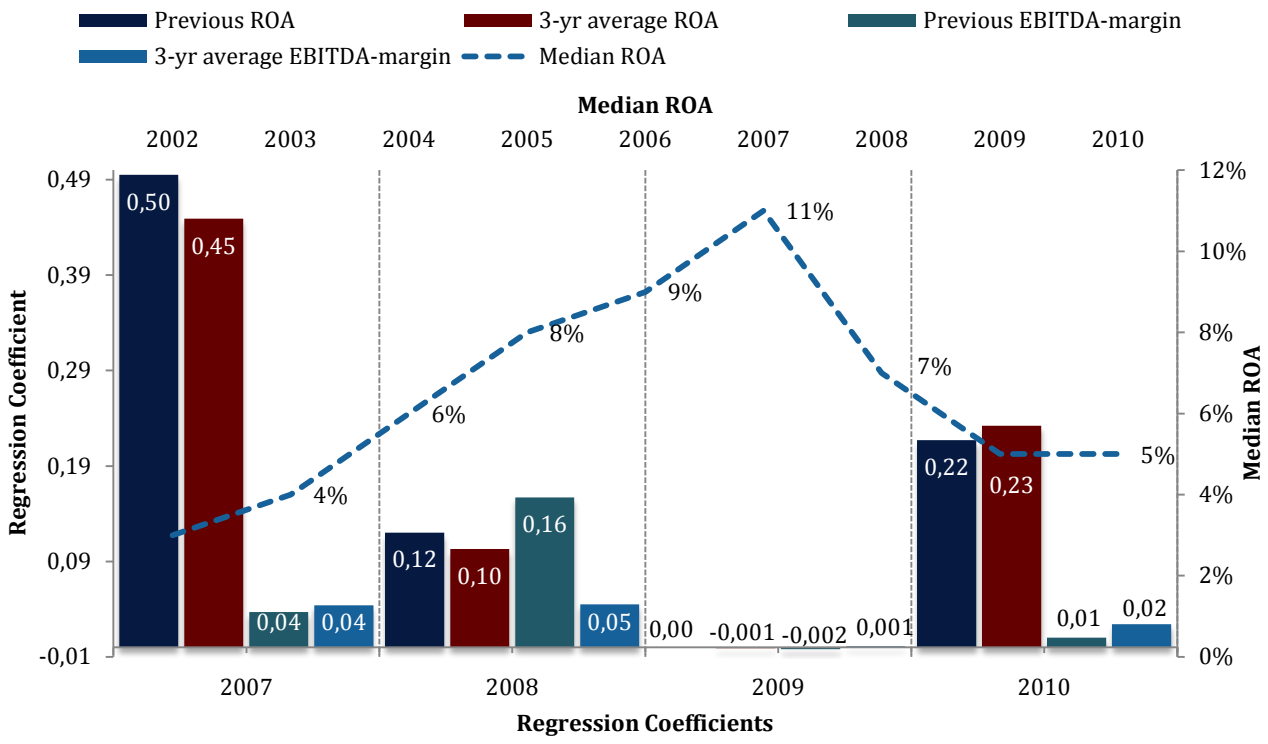
Previous profitability Vs. Current profitability

The analysis is performed by defining previous ROAs, and EBITDA margins, as the explanatory variable in a regression equation with different firm characteristics as the responsive variable. The resulting regression coefficients presented in the figure 11 and figure 12, indicate the relationship between the two. Figure 11 displays how the standardized beta coefficients of the regression equation change throughout the different phases. The effect that previous ROA has on current ROA is clearly cyclical, and remains positive, except from in 2009. However, the coefficient in of three-year average ROA in 2009 is very slight as well as far from significant (.975, Appendix C-1), thus it could be considered as zero. If this assumption is made, the results indicate that previous profitability does not affect current ROA at all during the phase of downturn, on a general level.

The results coincide with the standard deviations of each period (Table 4), because the predictive power of the regression equation decreases when the variation in ROA increase.

The EBITDA margin, on the other hand, does not show a clear relationship to the current ROA, but is positive throughout the cycle, with the exception of 2009. This could be ascribed to the same reason as with ROA.

Figure 11: Previous ROA/EBITDA Vs. ROA

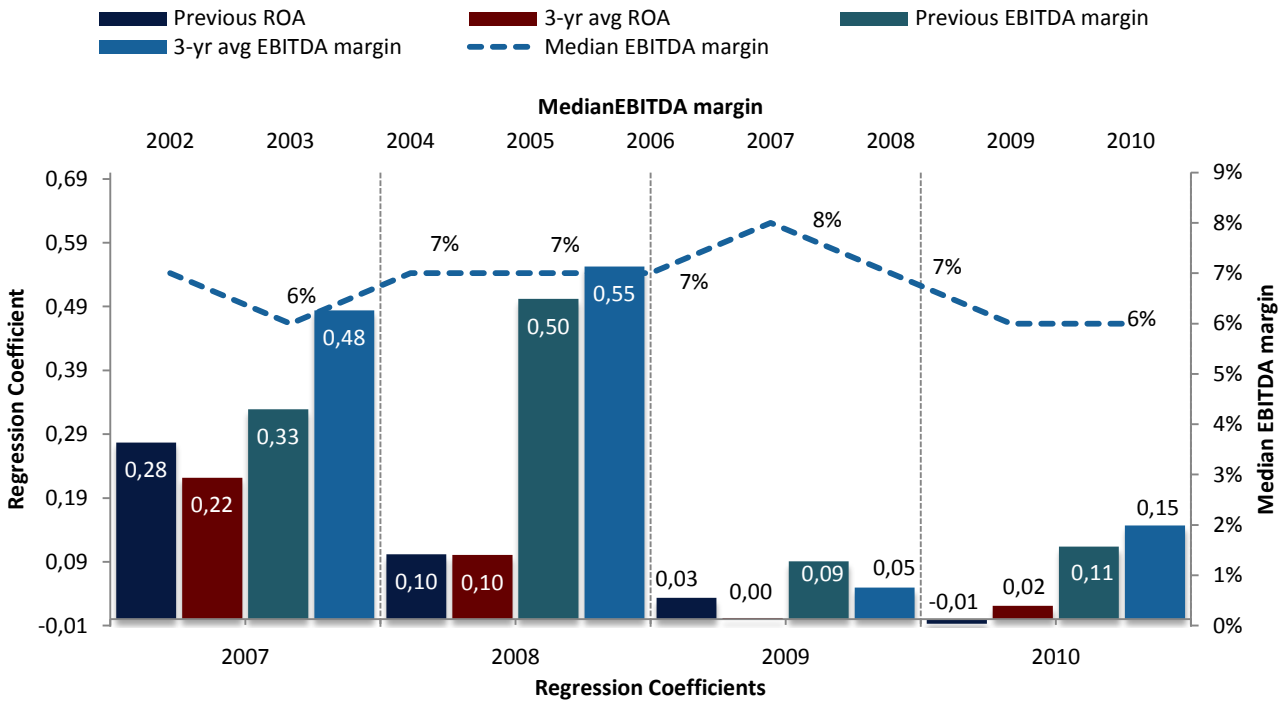


Previous profitability seems to indicate current profitability on a general level, especially in stable periods. Meaning that profitable firms in 2006 were likely to remain profitable in 2007 and 2008, and vice versa for non-profitable firms. In expansionary years such as these, this should be expected. The interesting periods, in my opinion, are 2009 and 2010. Both ROA and the EBITDA margin show that firms that are profitable prior to a downturn, not necessarily are profitable during the downturn. However, the firms that were profitable during the downturn are highly likely to be profitable during the retrieval, and will likely stay profitable in the next phase of expansion.

The results regarding the EBITDA margin should yield relatively the same results as with ROA as both are concerned with profitability. They are, however, not as similar as initially expected. Firstly, it is striking how much more previous ROA affects current ROA than previous EBITDA margin, and vice versa. This should be explainable by the differences between overall profitability and operational profitability. Another noticeable difference is the effect the previous EBITDA margin has on current EBITDA margin in the slowdown and downturn (2008 and 2009). As previous profitability had no effects on ROA during the downturn, this is not the case with the EBITDA margin. Actually, profitable firms prior to the slowdown were very likely to remain profitable during this phase. Furthermore, operationally profitable firms prior to the downturn typically stayed slightly positive during this phase too. However, these firms were not necessarily as profitable during the retrieval as those with larger returns on assets.

Overall, previous profitability generally indicate current profitability in a cyclical manner.

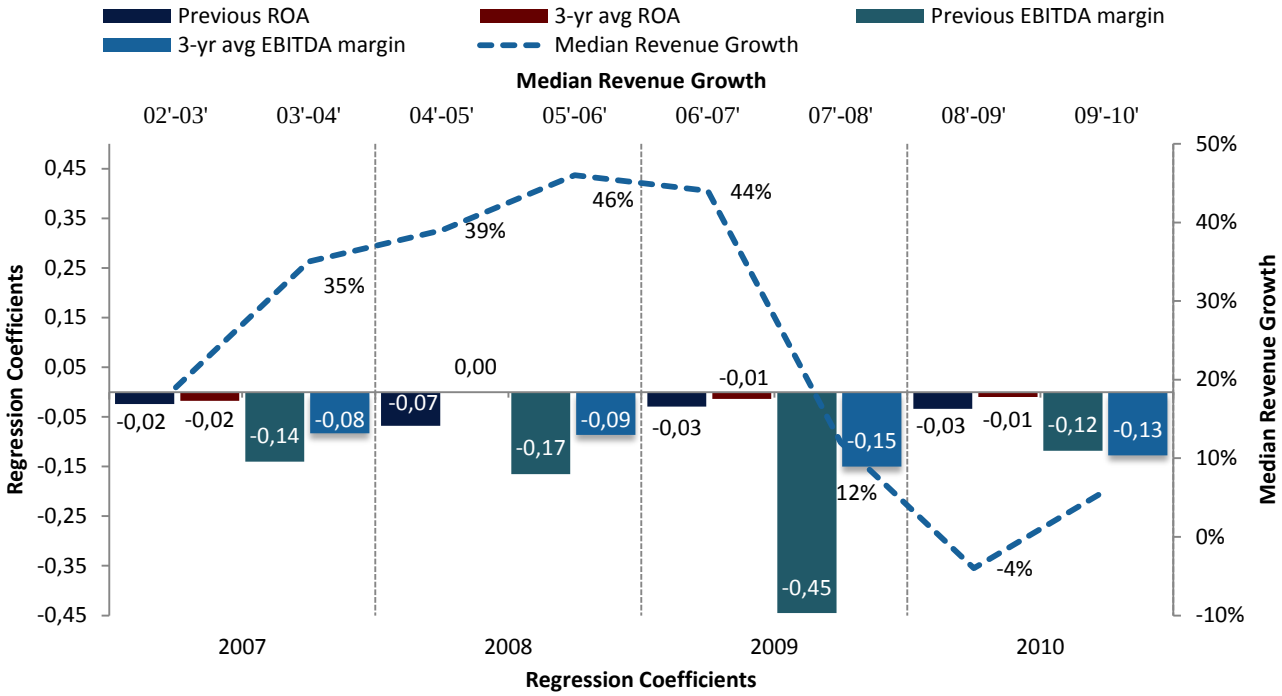
Figure 12: ROA/EBITDA Vs. EBITDA margin



Previous profitability Vs. Growth in revenues

Growth drives profitability through economies of scale and firs mover advantages, as argued by Davidsson & Fitzsimmons (2009). Thus, I have assumed that the relationship is not the other way around, meaning that profitability drives growth. Rather, I expect firms with high proftiability to experience lower growth. Figure 13 presents the regression results along with annual growth in revenues. The general apperance is that previous profitability prevents high growth subsequently. The clearest relationship seems to be between the most recent EBITDA margin and current growth in revenues, which indicates that operationally profitable firms grow at a slower pace than less profitable ones. This especially stands out during the downturn, where profitable firms generally experienced lower growth rates than less profitable ones. However, this condition does not appear to be the same for ROA, where growth was more or less unaffected by previous ROA. This is supported by the levels of significance, which are presented in appendix C-1 and C-2. A reason could be that operationally profitable firms are more stable. Stable firms are, e.g. through cost effectiveness, to a larger extent able to increase the gap between operating income and operating costs, while smaller firms' (A decrease in assets would boost ROA, holding net income constant) growth in assets could coincide with growth in net income.

Figure 13: ROA/EBITDA Vs. Revenue Growth

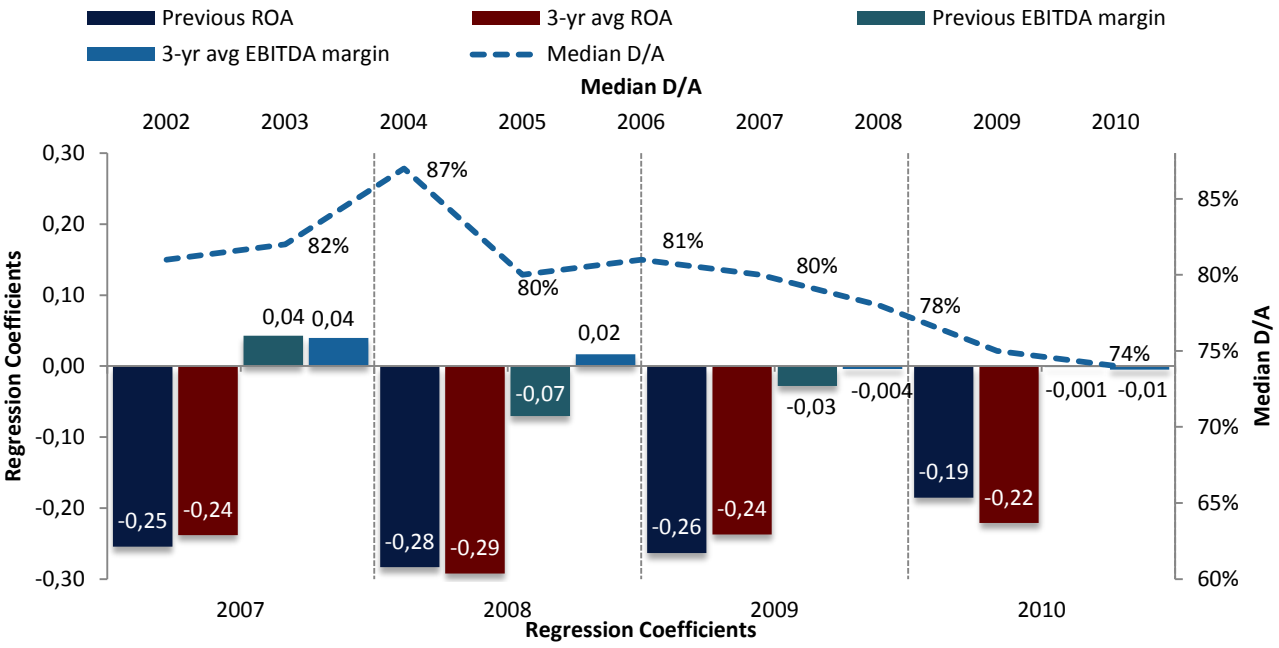


Previous profitability Vs. Debt to assets (D/A)

As ROA is measured as net income against total assets, the financial structure, that is the debt ratio, directly influences ROA. This should be the reason why ROA in figure 14 is more determining on the debt ratio than the EBITDA margin. According to figure 14, higher ROAs indicate lower debt ratios throughout the business cycle. Thus, a company with negative ROA should have a larger than average debt ratio. This is related to the argument made above (section 7.1.3), that higher ROAs prevents high growth. If the fastest growing HGFs experience lower ROAs, the same firms should have a larger debt ratio than the average firms. If so, the relationship between growth, ROA, and D/A, is that HGFs at a general level are less profitable and have higher debt ratios than the average.

However, the coefficients of the EBITDA margin tell a slightly different story. Although this relationship is much less significant than the former, firms with high previous operational profitability tend to have a higher debt ratio in the expansion phase, before the relationship converge with that of ROA.

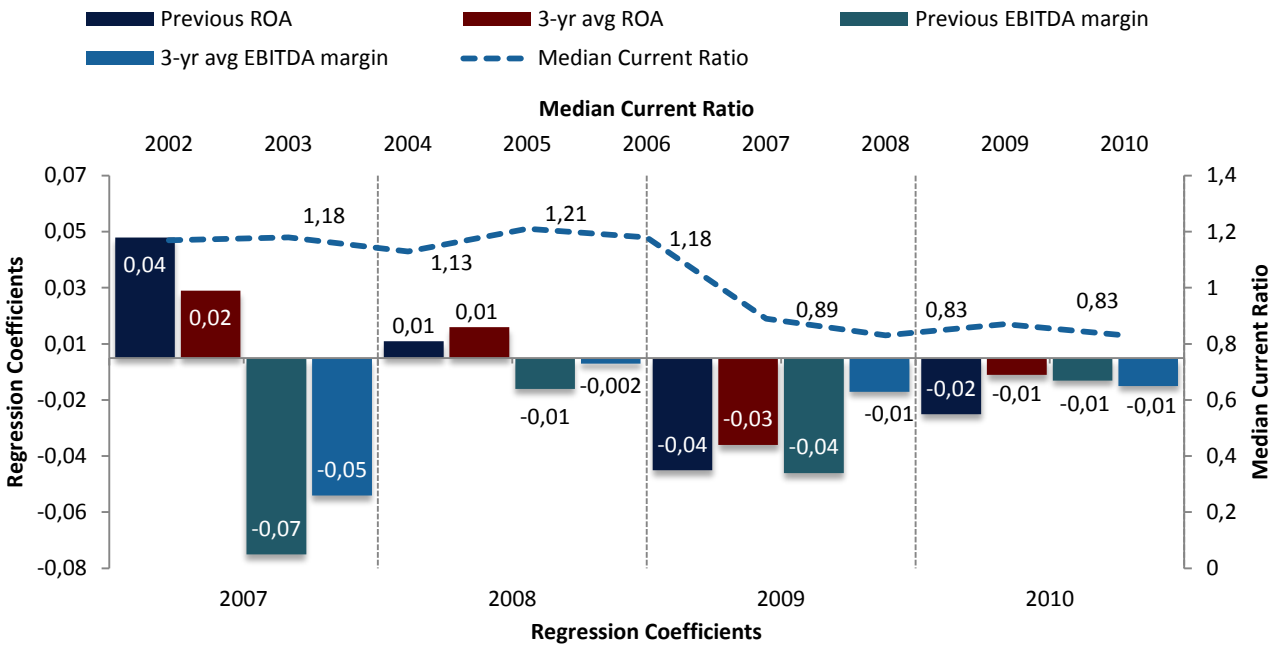
Figure 14: ROA/EBITDA Vs. Debt ratio



Previous profitability Vs. The current ratio

Lastly, I have examined the effect that previous profitability has on the current ratio throughout the different phases. There is a clear decrease in liquidity from 2007, which was not expected to occur before the phases of slowdown and downturn. Interestingly, the effects of ROA and the EBITDA margin seem to move in different directions prior to 2008. As discussed in section 7.1.3, firms with higher EBITDA margins may be more stable than the rest of the population, thus I would expect previous EBITDA margins to have positive effects on the liquidity, since stable firms typically have larger liquidity reserves. This is not the case. However, the relationships are far from significant, with coefficients in figure 11 and 12 of almost zero. Although the relationship between profitability and liquidity is minimal, it appears that higher profitability affects liquidity negatively throughout the business cycle.

Figure 15: ROA/EBITDA Vs. Current ratio



Conclusions

I assess the effects of previous profitability to positively influence current profitability during all periods except from the downturn. The debt ratio is also positively affected throughout the cycle. The debt assessment is based on the view that lower debt ratios are preferable due to lower risk, holding profitability constant. The effects on subsequent growth were in line with my expectations, but are regarded as cyclically negative. The most interesting finding, in my view, is that profitability negatively affects liquidity. This relationship is however very slight, and should be further examined by researchers on a general level as opposed to just HGFs.

The overall assessment is nevertheless that previous profitability affects HGFs in a cyclically positive manner, and hypothesis 1 is retained.

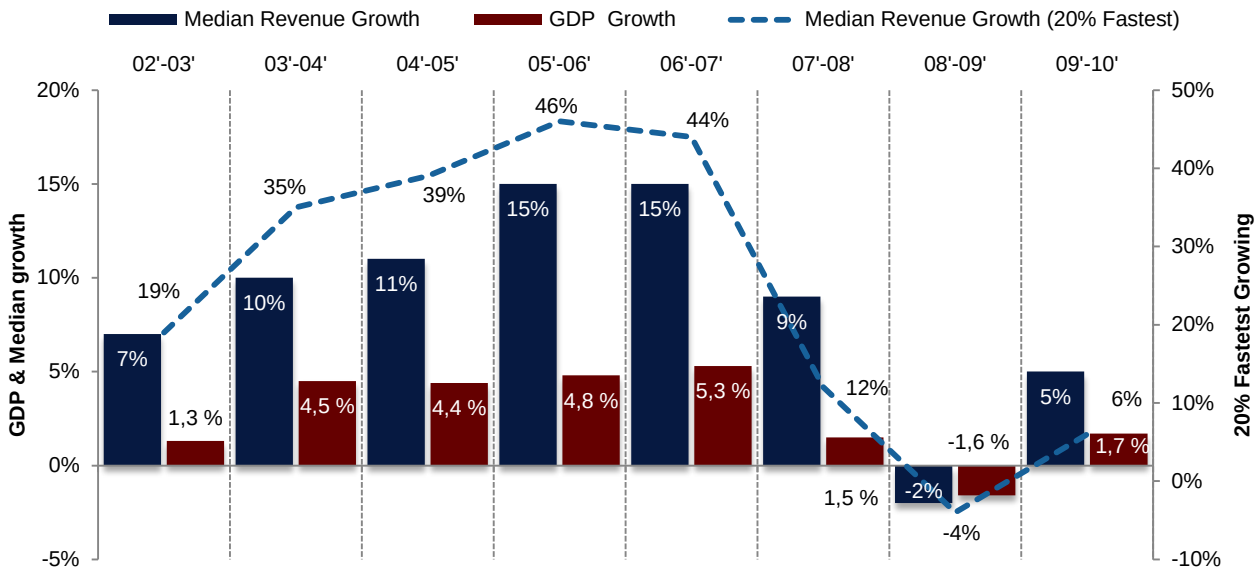
7.2 Hypothesis 2: Previous growth

H2: Previous growth has cyclical affects on HGFs

I have, as mentioned in section 5.1, decided to focus the analysis on the 20% fastest growing firms in the data sample. These grow at a significantly higher rate than the main the sample, according to the median of both samples. Figure 16 displays the development in growth in

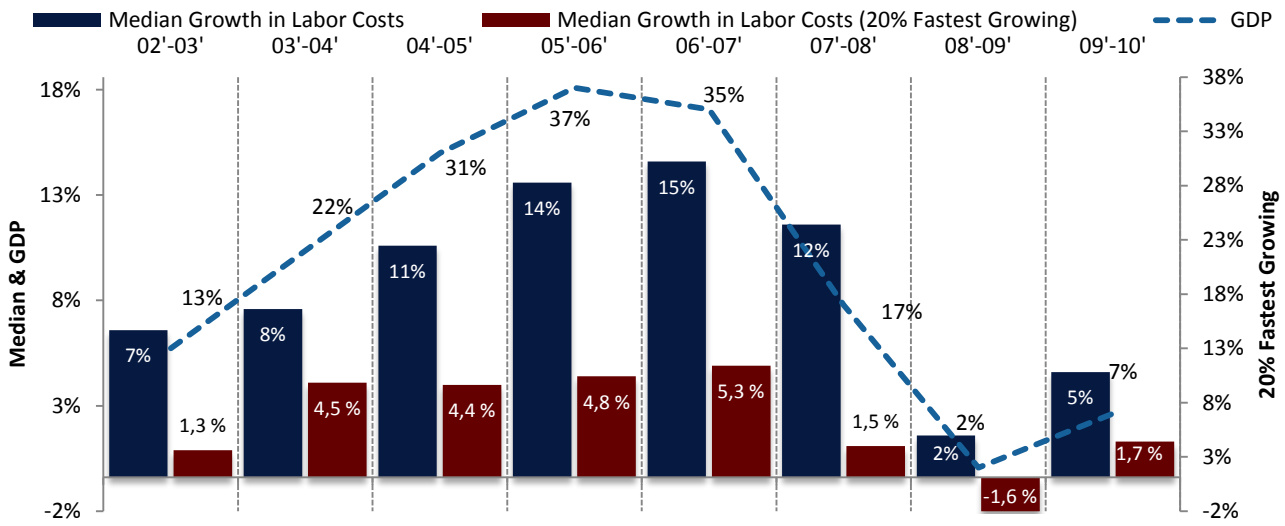
revenues between 2002 and 2010 of the 20% fastest growing, the main sample, and the growth in GDP. While GDP growth peaked in 2007, median growth for the 20% fastest growing firms peaked in 2006 with 46%. This could indicate that growth in HGFs function as a leading economic indicator. As HGFs typically are more cyclically sensitive than the general population, it is not unreasonable to suspect that worsening economic conditions could affect HGFs earlier than the general economy. The argument that Lien & Knudsen (2012) makes, regarding how companies that either sell or produce non-durable goods are more cyclically sensitive, may be adaptable to HGFs as well. HGFs are generally younger than the average and may not yet possess a stable and long-term customer base. New cusomters probably act more elastic in their consumption patterns than long-term cusomers, thus HGFs could experience a higher and a earlier than average loss of cusomers. This is also supported by previous findings in Knudsen (2011) and Geroski & Gregg (1997), which argue that high pre-recession growth make firms more vulnerable during downturns.

Figure 16: Growth in Revenues and GDP



Growth in labor costs develops in a very similar manner as growth in revenues, but with approximately 10% less growth each year on average. Furthermore, labor costs did not reach negative growth in 2009 such as growth in revenues.

Figure 17: Growth in Labor Costs and GDP

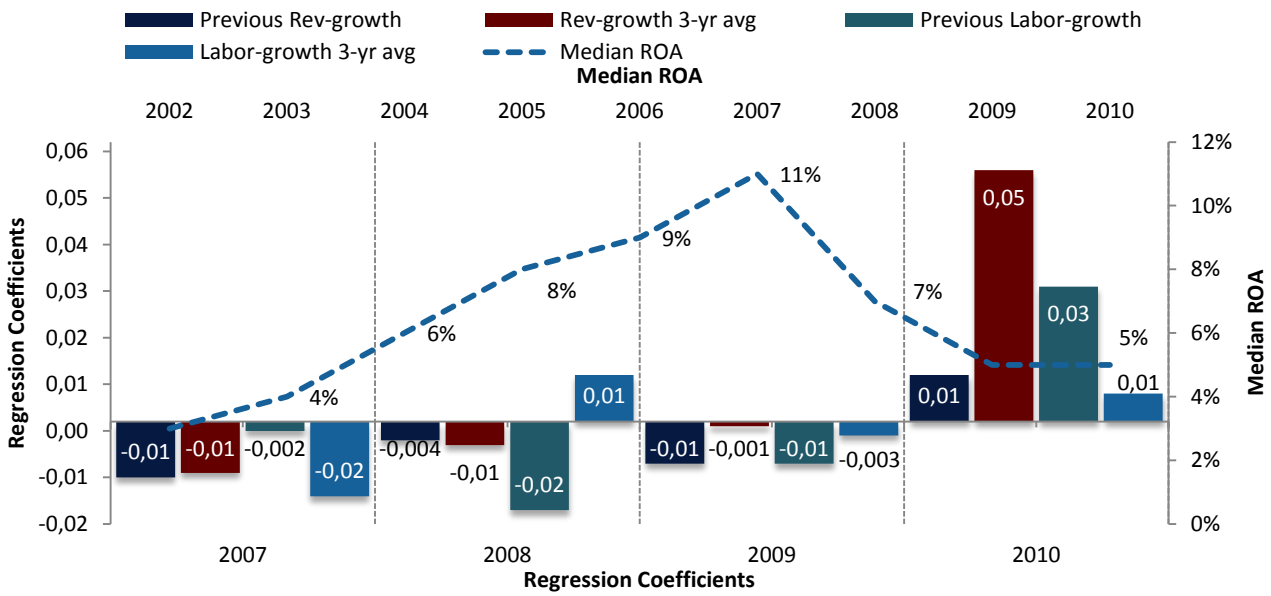


Previous growth Vs. Profitability

As discussed in section 7.1.2, do growth drive profitability through economies of scale, amongst others. Essentially, this means that high growth is profitable in the long term, as growth is necessary to reach a "steady-state" where firms are better equipped to focus on productivity and profitability. As this analysis concerns growth numbers with a 1 and 3-year lead, the mentioned growth-profitability is not likely to appear. On the other hand, the results will shed light upon short-term effects throughout the cycle.

As shown in figure 18, the only relatively significant relationship is previous growth's affect on ROA in 2010, and three year average growth in revenues is the only statistically significant variable (Appendix C-2, A).

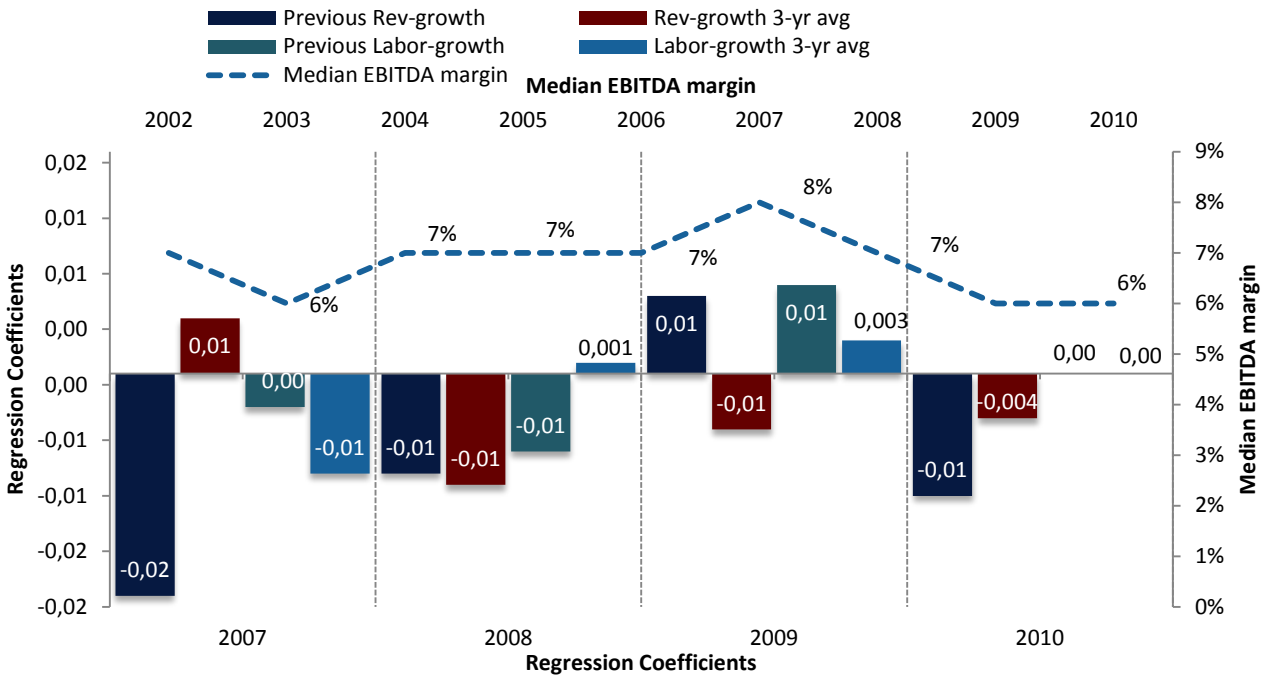
Figure 18: Previous Growth Vs. ROA



Coefficients for growth in both revenues and labor costs are relatively stable at around zero. This means that previous growth generally has no affect on profitability. That the coefficients are slightly negative, however, support the finding displayed in figure 13 where ROA seems to prevent high growth. Furthermore, the significant relationship in 2010, suggests that those who managed to maintain growth throughout the first three phases were more likely to experience higher profitability during the retrieval.

Regarding operational profitability, however, the relationship appears to be similarly negative, with zero or slightly negative effects of previous profitability in 2010 as well. The difference probably occurs because the EBITDA margin is a lot less cyclical than ROA. Lack of cyclicality in the EBITDA margin is expected, as operating revenues and costs commonly fluctuate in a similar manner. As ROA is influenced by more constant figures, such as fixed costs and assets, it generally fluctuates in accordance with net income, and thus with the business cycle.

Figure 19: Previous Growth Vs. EBITDA



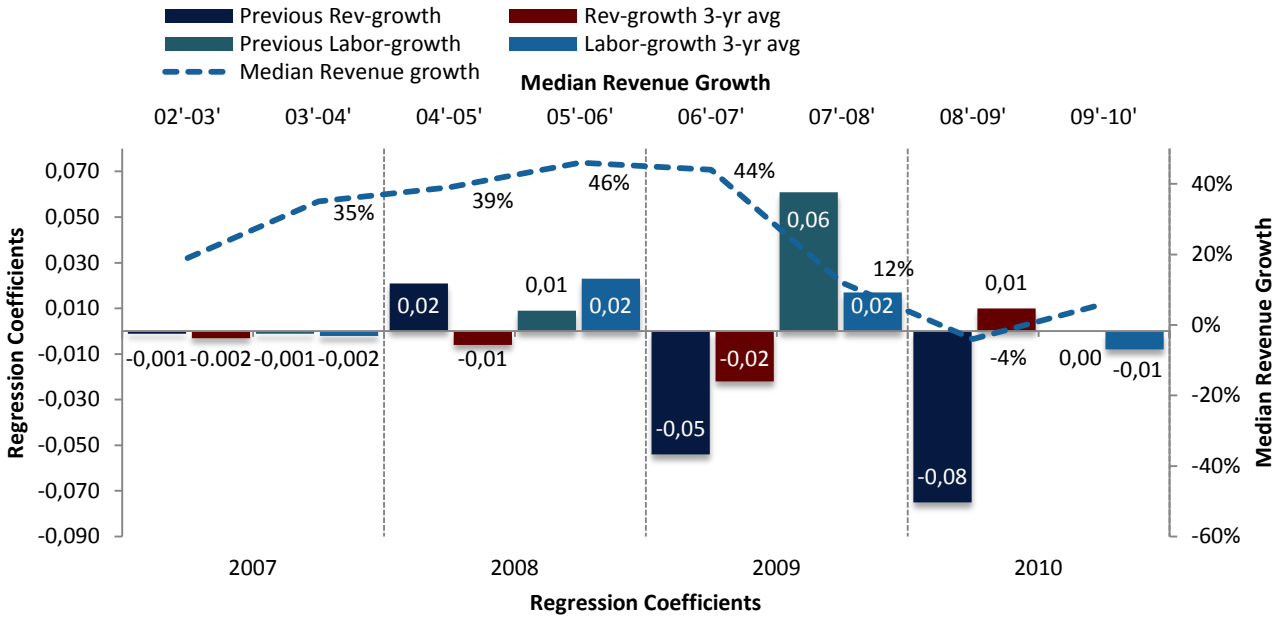
The overall effects of previous growth appear to influence profitability negatively throughout the business cycle, with the exception of the effect of growth during the downturn on ROA, which is significantly positive.

Previous growth Vs. Current growth

The relationship between previous growth and current growth in revenues was surprisingly unclear, and the variation of statistical significance was very large (Appendix C-2, A & B). Statistically significant variables on the 95% level are previous labor growth's affect on current growth in revenues in 2009, and previous growth in revenues' effect on current revenues in both 2009 and 2010. The same variables stand out in figure 20 below. Unidentified outliers and/or errors in the dataset may of course, influence the results. The significant variables should, however, be considered as valid. If so, the effects of previous growth in revenues and labor costs are splayed. Previous growth in revenues indicates a negative influence on current growth in the downturn and retrieval. This is in line with previous findings in Lien (2011), Lien & Knudsen (2012) and Geroski (1997). The lack of support for earlier relationships, are likely due to the high standard deviations presented in table 11. Growth in labor costs, on the other hand, positively influence subsequent high growth in revenues, especially in 2009. A reason behind the difference may be that firms that hire more employees, thus growing in labor costs, are more confident about future prospects

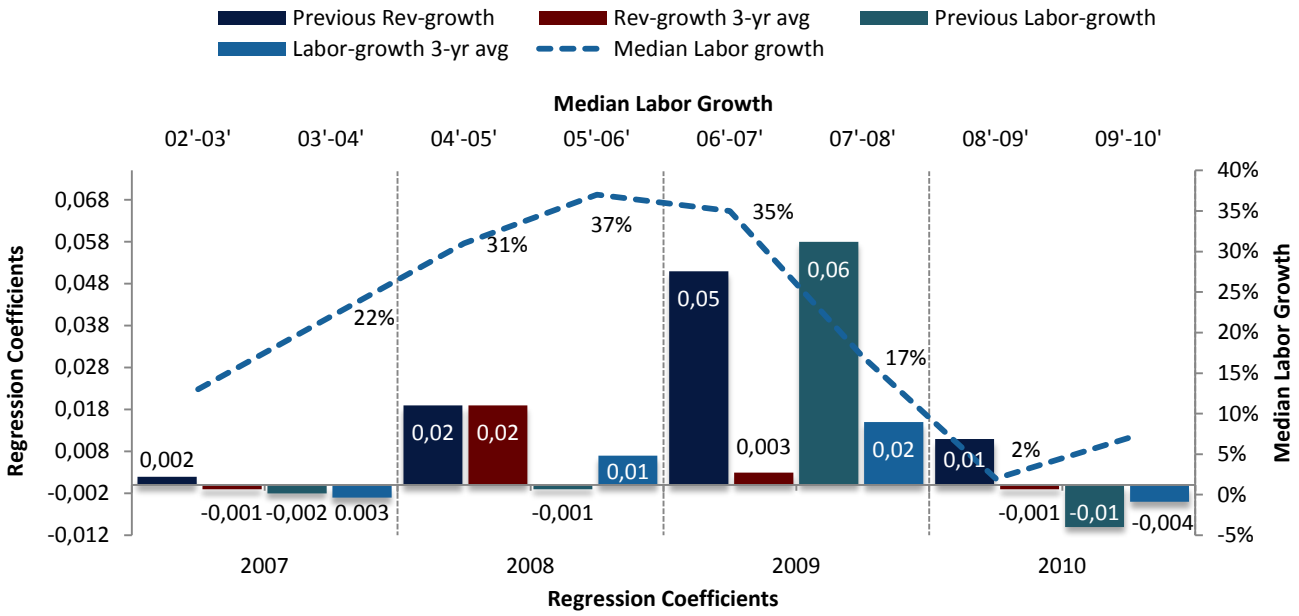
and growth, while positive growth in revenues could be caused by one-time and stochastic factors.

Figure 20: Previous Growth Vs. Current Growth in Revenues



The effects on growth in labor costs, as presented in figure 21, are different from those on growth in revenues. As the former relationship was splayed, the latter seems to be positive with the only statistically significant variable found in 2009. This indicates that growth in labor costs in the downturn is associated with growth in both revenues and labor costs in 2008. As hiring is time consuming, labor costs should lag growth in revenues. This does, according to figure 20 and 21, not seem to be the situation. However, previous growth could influence managers' views on future development, thus motivate to increase capacity through e.g. hiring. If so, the three-year averages should be also be of higher influence, which they are not. Nevertheless, firms that experienced high growth in the slowdown tend to grow in labor costs during the downturn.

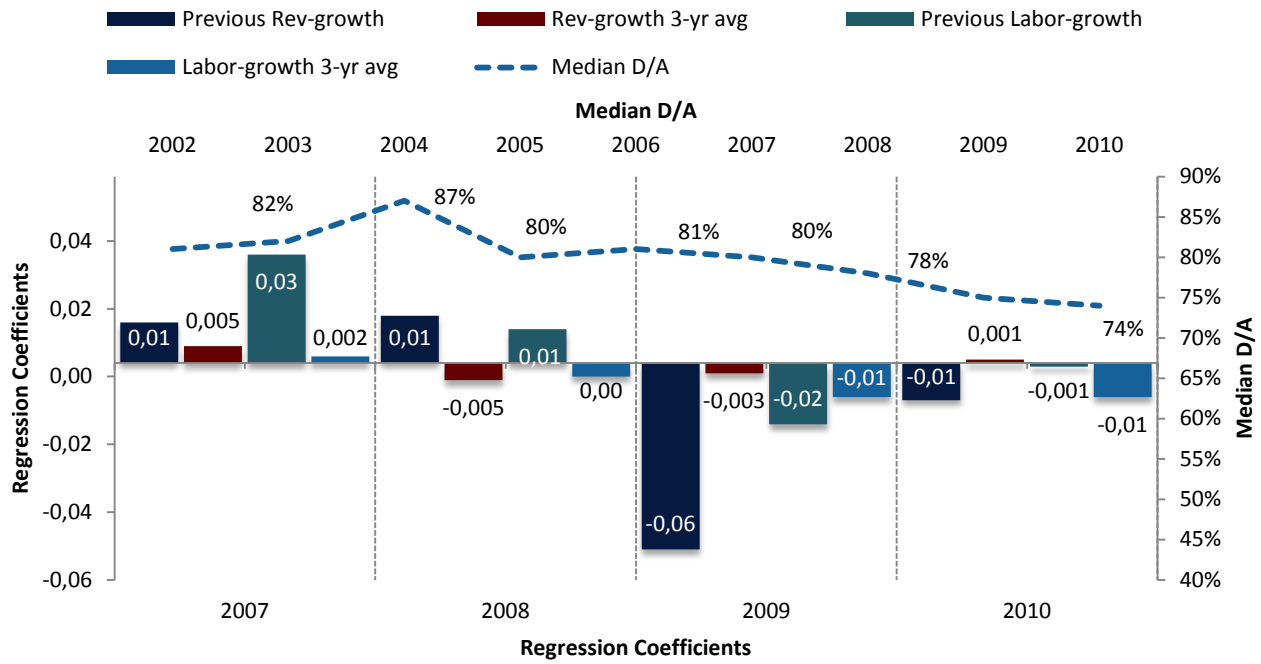
Figure 21: Previous Growth Vs. Current Growth in Labor Costs



Previous growth Vs. Debt to assets (D/A)

I expected to find that high growth positively influenced the debt ratio, such that the higher growth, the higher the debt ratio. I formed this expectation because high growth typically entails finance-requiring investment opportunities and high opportunity costs. The relationship seems to be the opposite. The coefficients presented in figure 22 fluctuate around zero, with the exception of previous growth in revenues on D/A in 2006. As the only significant variable, this indicates that firms with large growth rates in 2008 typically reduced their debt ratio in 2009. It may well be the case that HGFs assets outgrow the debt ratio, by plowing back revenues. The relationship does also indicate that firms with negative growth increased their D/A. This could be because the value of their equity decrease and/or they need additional financing to stay afloat during the downturn.

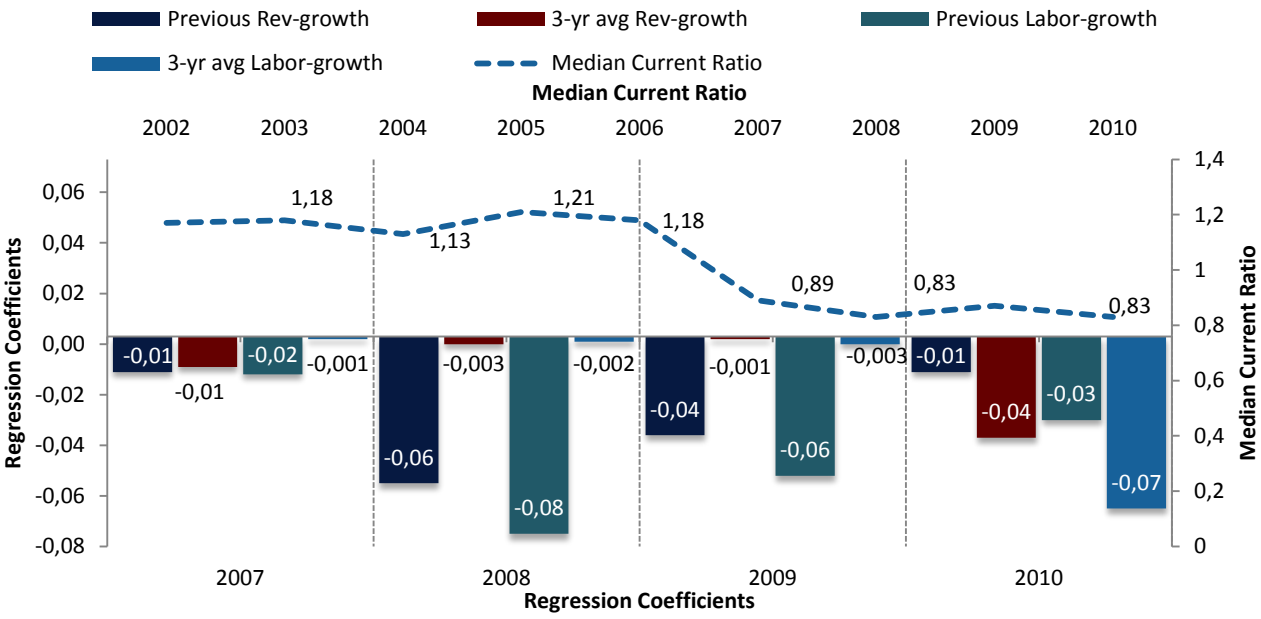
Figure 22: Previous Growth Vs. D/A



Previous growth Vs. The current ratio

The effects that previous growth has on liquidity are expectedly negative. Meaning that high-growth entails lower liquidity. HGFs typically have easy access to positive investment opportunities, thus will liquidity reserves have high opportunity costs and, puts strains on further growth. Especially growth in the previous year had large effects on debt levels during the downturn, while the three-year averages are significant in 2010.

Figure 23: Previous Growth Vs. The Current Ratio



Conclusions

The effects that previous growth had on different firm characteristics throughout the business cycle were more complex and unclear than I had initially expected. The fact that the effects of growth in revenues and labor costs were splayed imply that the two types of growth are caused by different factors, and that there is not necessarily a causal relationship between them. I expected labor growth to lag growth in revenues, but this does not seem to be the case according to the medians. Perhaps the lag is shorter, thus being ignored when applying annual numbers.

However, positive growth in 2009 significantly affected ROA during 2010 positively. This means that firms that experience positive growth during a downturn are likely to remain profitable during the retrieval. On the other hand, firms with negative growth during a downturn will likely experience negative profitability during the retrieval as well. This is in line with how profitability during the downturn affects profitability during the retrieval.

The variation in annual growth numbers is very large, and this likely influences the observable effects that previous growth has on current growth. Growth in revenues is generally unaffected by previous growth in the expansion and slowdown. Growth during the downturn and retrieval, on the other hand, is negatively affected by previous growth. Meaning that high pre-recession growth affect growth adversely during the downturn and retrieval. This is opposite to the effects on labor growth, which, in 2009, is positively affected by previous growth.

The debt ratio was on general slightly affected by previous growth in a negative way, as opposed to my expectations. During the expansion, however, the debt ratio increased when previous growth was positive. As this period was characterized by easy access to credit, one should expect D/A to increase on a general level. As displayed in figure 21, this was not the case. The current ratio was negatively affected by previous growth throughout the business cycle, as expected. The effects were, however, a lot larger in the three latter phases compared to the expansion.

Hypothesis 2 states that growth has cyclical effects on HGFs. I find varying support for this expectation, with the most affected area being ROA during the retrieval, and growth during periods of negative output (2008 and 2009). Thus, I conclude that previous growth have relatively unpredictable, but weakly cyclical, effects on HGFs. I thereby reject hypothesis 2.

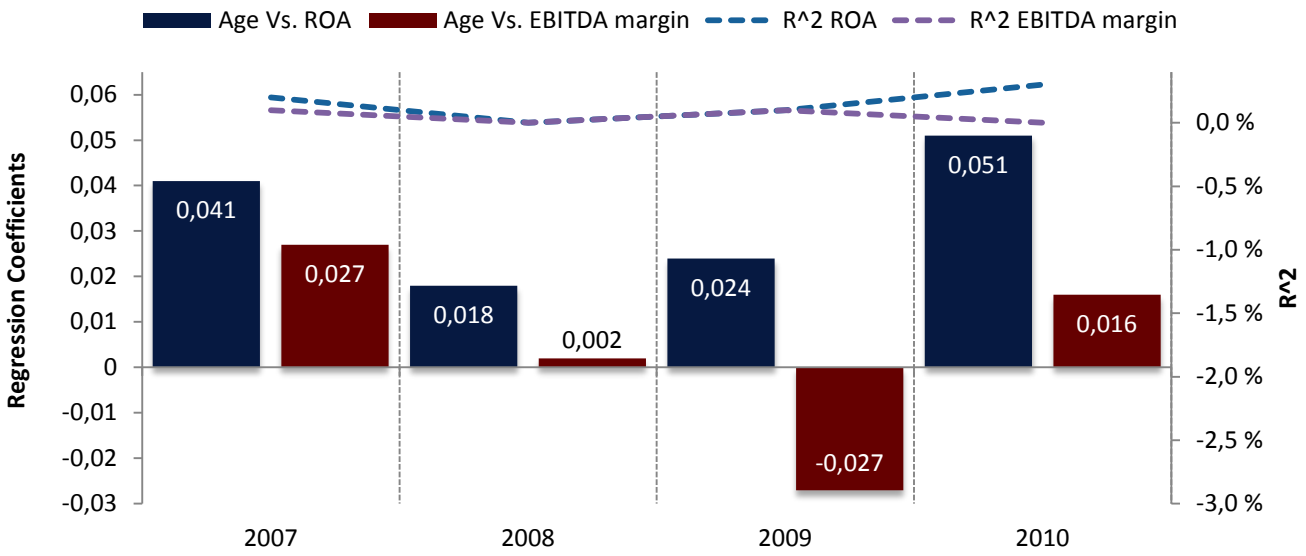
7.3 Hypothesis 3: Firm Age

H3: Firm age has countercyclical effects on HGFs

Firm age Vs. Profitability

Age effects on profitability are presented in figure 24 below, and shows and different pattern from the one expected. Firm age have a relatively clear positive and cyclical effect on ROA. This indicate that age imply different characteristics for HGFs than for the firms analyzed in Davis & Haltiwanger (2001), and opposes the findings in Markman & Gartner (2002) that states that younger firms are more profitable.

Figure 24: Firm Age Vs. Profitability



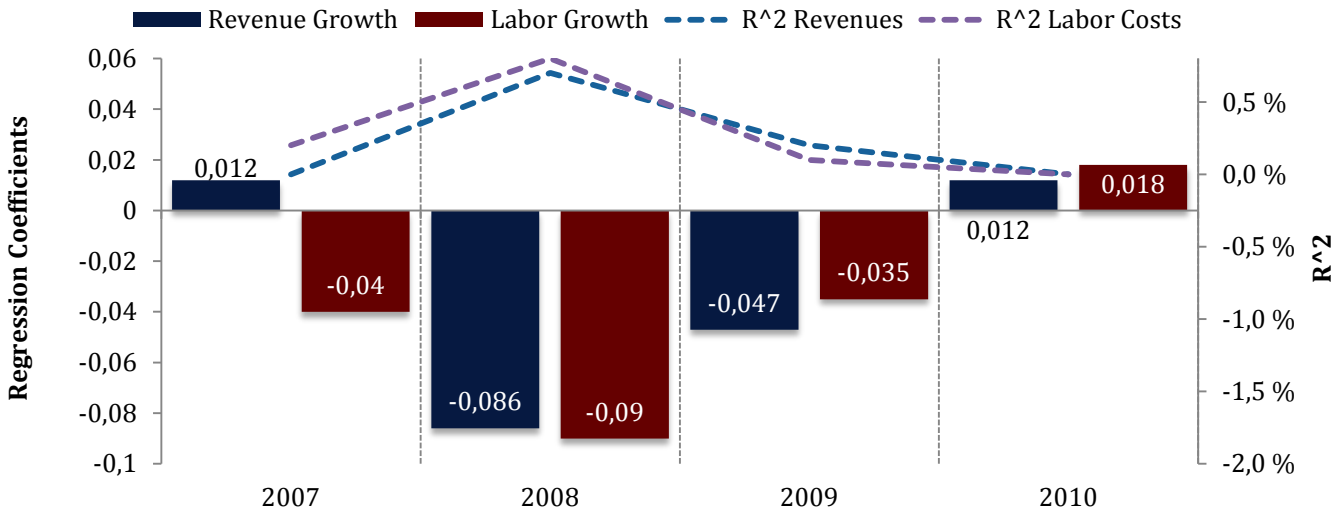
Age effects on operational profitability display similar effects as age on ROA, but younger firms are more severely affected on operational profitability during the downturn than older ones. This difference should be caused by the condition described above, that older and more stable firms typically experience more fluctuations in ROA than in the EBITDA margin. The pattern is nevertheless cyclical, thus opposite from my expectations as stated in the hypothesis.

Firm age Vs. Growth

The effects indicated by age are very similar on growth in revenues as in and labor costs. The pattern shows a clear negatively countercyclical development. The older a firm is, the slower it is likely to grow in both revenues and labor costs. This relationship corresponds to my expectations and the hypothesis, and is further expected correlate with how size effects

influence growth patterns. A slight deviation from my expectation, however, is that older firms seem to experience lower growth in 2008 than in 2009.

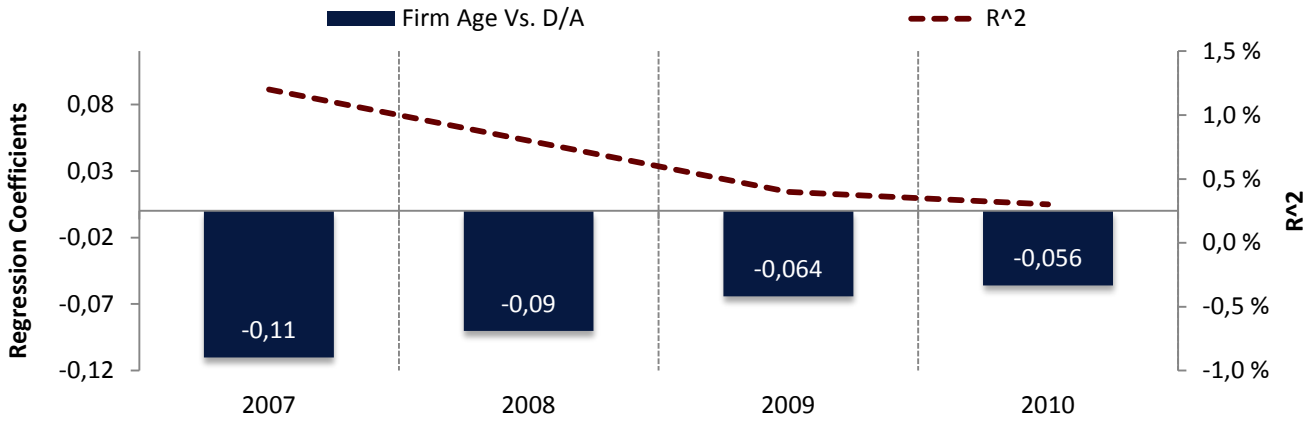
Figure 25: Firm Age Vs. Growth



Firm age Vs. The debt ratio

Age seems to have negative effects on leverage, meaning that younger firms tend to have lower debt ratios, and vice versa for older firms. Initially, I expected young firms to have larger debt ratios because younger firms tend to be smaller, and smaller firms require less debt to increase their debt ratios. The opposite relationship could mean that young firms depend on internal funding, due to restricted access to external financing. The latter argument is supported by Bernanke (1983b), which argue that smaller firms tend to have more inherent risk, thus experiencing limited access to bank financing.

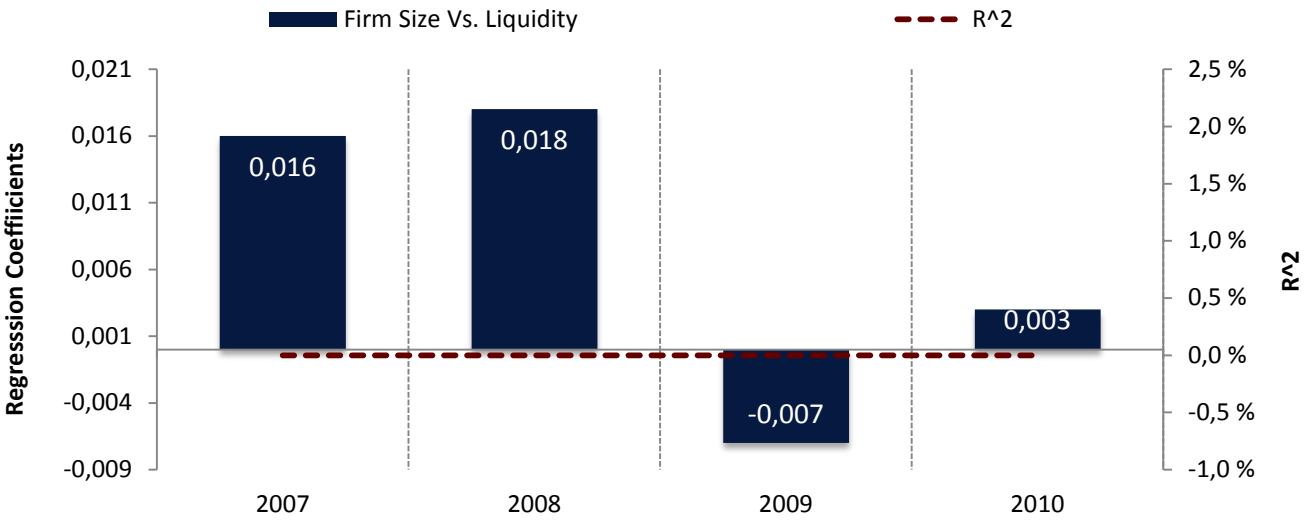
Figure 26: Firm Age Vs. D/A



Firm age Vs. The current ratio

There is very little support for any relationship between firm age and liquidity, as measured by the current ratio. The slight relationship that exists, however, indicate that older firms have higher current ratios during the expansion, and the slowdown, while lower ratios during the downturn and the retrieval.

Figure 27: Firm Age Vs. The Current Ratio



Conclusions

Age appear to affect HGFs in different ways than initially expected. Age positively affects ROA and the current ratio in general, while it is negative on both growth in revenues and labor costs, as well as on the debt ratio. The negative effect on the debt ratio, however, is essentially positive, as I view lower debt ratios and risk as positive. As growth in itself is not necessarily positive, I consider age to have cyclically positive effects on HGFs. This conclusion is the opposite to my expectations, thus the hypothesis is rejected.

7.4 Hypothesis 4: Firm Size

Size has cyclical effects on HGFs

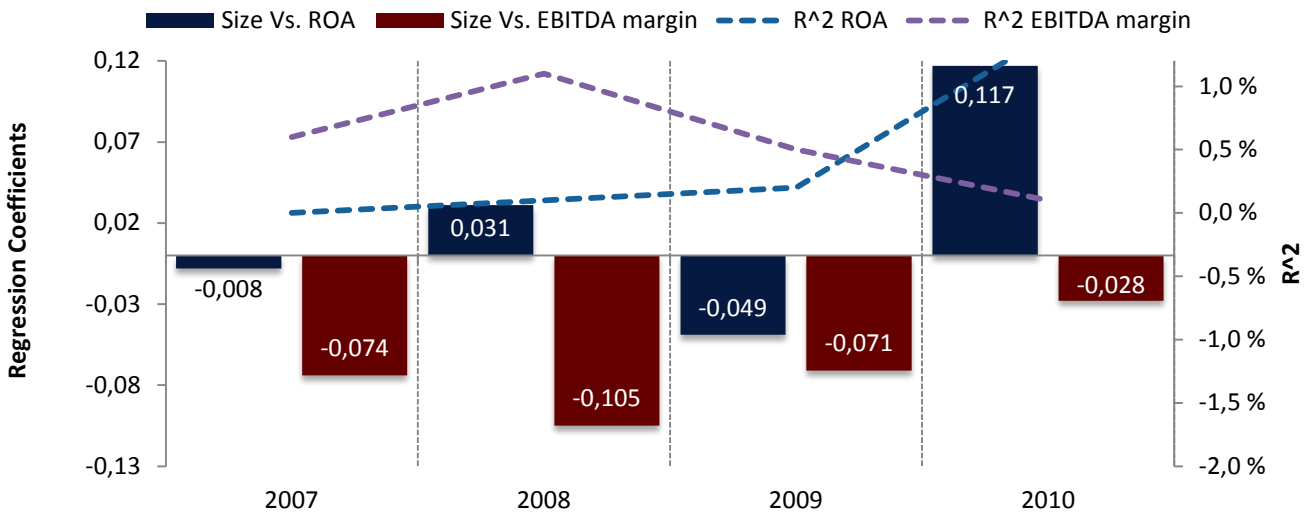
Size Vs. Profitability

The effects of size on profitability have been relatively thoroughly documented by previous researchers, but there are differing opinions as to the exact nature of the relationship. As mentioned in section 3.4, it appears that the views are divided by which time-period they originate from. Research from the 1980s and the 1990 generally claim either no relationship,

or that smaller firms are more severely hit by recessions. Modern research, on the other hand, argues that larger firms tend to be more negatively affected by recessions, due to their lack of flexibility and adaptiveness. Knudsen (2011), which supports the latter argument, identified this relationship by analyzing the same dataset as this thesis is based on, thus I should expect my results to be similar.

The results presented in figure 28 supports modern research on the size-profitability relationship. That is, firm size negatively affects ROA during the downturn. During the phase of expansion, the relationship is as well as non-existent, but will influence ROAs significantly positive in both the slowdown and the. A reason for this pattern may be, as mentioned, that larger firms are adversely affected during the downturn due to their relative lack of flexibility. However, the same factor could be the explanation for the positive effect during the retrieval, because the lack of flexibility causes firm characteristics to remain more or less constant throughout the business cycle. Thus, they will be able to quickly assume previous business patterns as the economic conditions improve.

Figure 28: Size Vs. Profitability

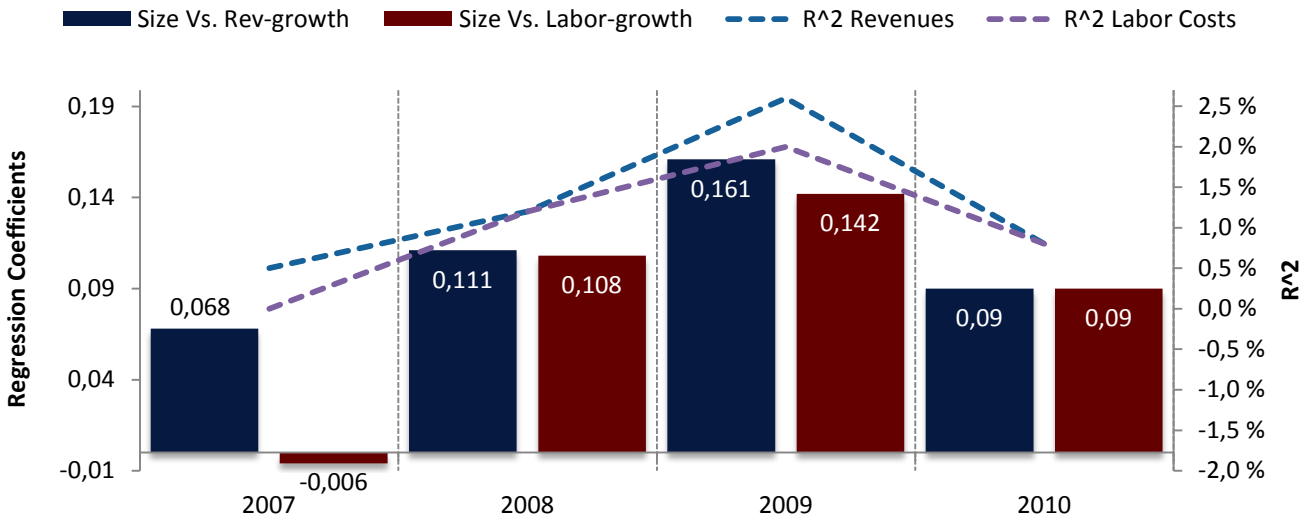


This argument is, however, not supported by the size-EBITDA margin relationship presented above, which suggests that size negatively affects operational profitability countercyclical throughout the entire business cycle. Furthermore, the relationship appears to be the strongest during the slowdown. This finding ignores the arguments regarding how larger firms typically are better equipped to focus on productivity and operational profitability, e.g. through economies of scale. However, as the analysis concerns HGFs, arguments regarding economies of scale and similar benefits of size may not be applicable.

Size Vs. Growth

Opposed to the general view that smaller firms grow faster in relative number compared to bigger ones, it appears that HGFs have to reach a certain size before growth accelerates. The reason could be the time-consumption of the startup process (European Commission, 2011). Very young firms are typically very small, and may not accelerate in revenue growth before critical factors, such as funding and financing, are in place.

Figure 29: Size Vs. Growth



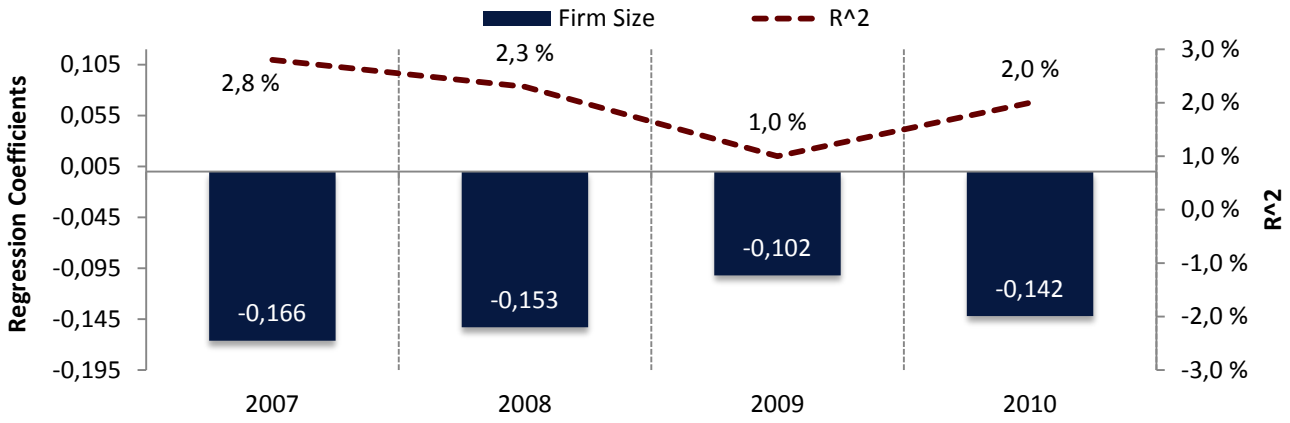
The relationship between size and growth in labor costs is almost identical to size and growth in revenues, thus reinforcing the arguments made above. The implied negative effect in the phase of expansion, however, is very slight and far from significant (Appendix C-3).

The fact that the size of HGFs significantly influences growth in a positive manner is interesting, as the relationship, according to modern research, is negative for firms in general.

Size Vs. Leverage

Size appears to affect the debt ratio in a negatively cyclical way, as expected. Meaning that larger firms generally have lower debt ratios, but that this relationship is weakened during the downturn. Small firms need less debt in absolute terms to achieve high debt ratios compared to larger firms. Thus, small and possibly young firms will achieve high debt ratios before they are able to accumulate larger values of equity.

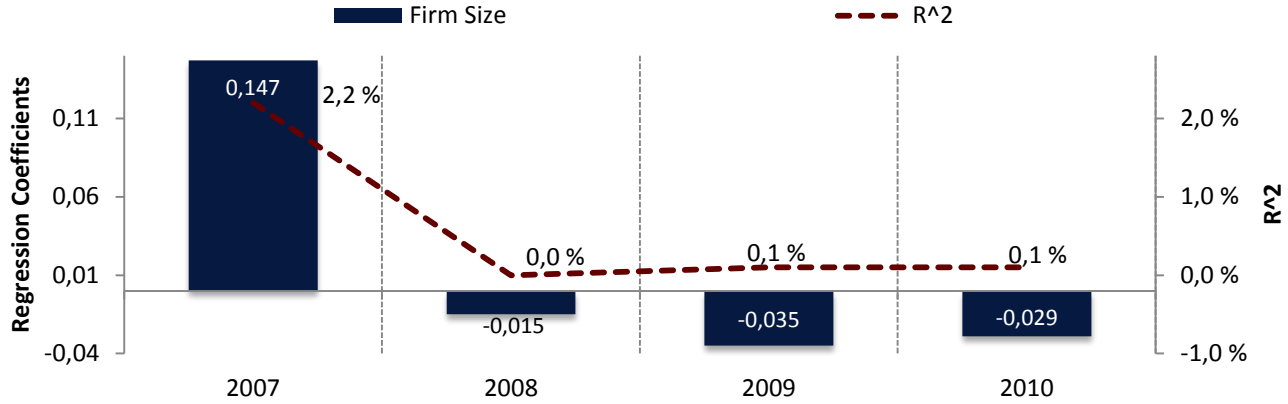
Figure 30: Size Vs. D/A



Size Vs. The current ratio

The relationship between size and the current ratio, as presented in figure 31, was unexpectedly negative in the three latter phases. I expected larger firms to have larger reserves of liquidity throughout the business cycle. The significant positive effect in 2007 may indicate that larger firms have more liquidity in "normal times", while this decrease during the slowdown and the following phases. Smaller firms typically have little liquidity, thus there is less room for reduction.

Figure 31: Size Vs. The Current Ratio



Conclusions

All of the size relationships were significantly cyclical in either positive or negative ways, except for ROA and the current ratio. The size-profitability relationship was partly explainable, based on previous literature. However, size-liquidity was unclear. On an overall level, I find support for hypothesis 3.

7.5 Hypothesis 5: The debt ratio

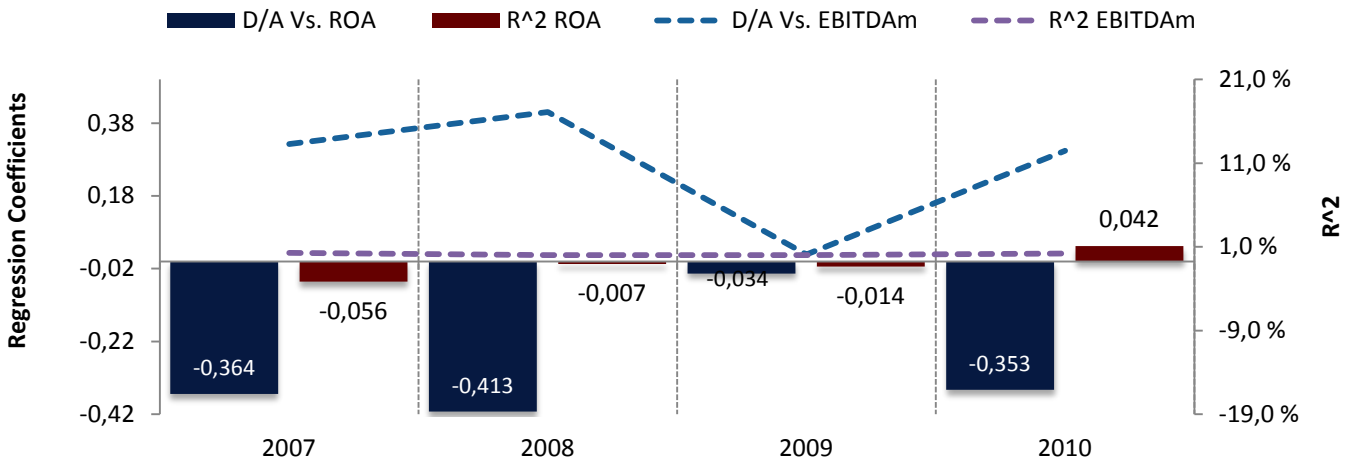
Leverage has cyclical effects on HGFs

Opler & Titman (1994) and Knudsen (2011) states that the most affected companies during the 1991-1992 recession, were companies with high pre-recession debt ratios, and finds support with Braun & Larrain (2005), which argue that dependence on external financing ahead of a recession amplifies the negative effect during the downturn. Furthermore, Bernanke (1983), and Geroski and Gregg (1993), found that lenders tend to shy away from high-risk borrowers during downturns. Volatility is typically inherent in HGFs, as emphasized by Fitzsimmons et al. (2005), and observable in table 4. Thus, HGFs are likely prone to experience restricted access to credit during recessions.

D/A Vs. Profitability

The regression results regarding profitability, presented in figure 32, imply a slightly different relationship. Here, larger debt ratios seem to significantly reduce the ROA in all phases except from in the downturn. Larger amounts of debt imply high interest costs, especially for high-risk companies, thus a lower net income and ROA. The debt ratio appears to have fewer effects on HGFs during the downturn, which was unexpected. However, HGFs performance during the downturn was very volatile.

Figure 32: D/A Vs. Profitability



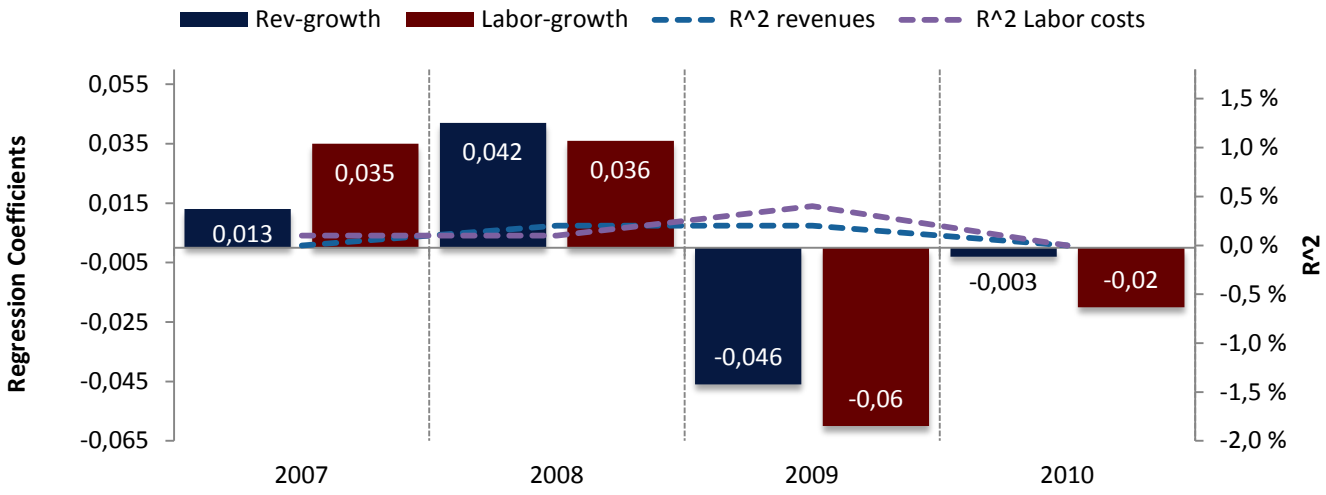
Operational profitability, as measured by the EBITDA margin, shows a more or less non-existent relationship with the debt ratio. The reason may be the same as with why D/A had few effects on ROA during the downturn, namely, high volatility in performance amongst

HGFs. Leverage has direct affects on ROA through interest costs influence on net income. EBITDA, however, measures operational profits by excluding non-operating costs, such as interest expenses. The relationship is nevertheless generally negative, with the exception of 2010.

D/A Vs. Growth

The pattern that emerges on how D/A affects growth is in line with my expectations, both with regards to revenues and to labor costs. Leverage seems to influence growth positively in periods of a positive output gap, while negatively in periods of a negative output gap. This is in line with how leverage affects returns on investments in general (Damodaran, 2008). Leverage boosts positive returns, while it amplifies negative returns similarly.

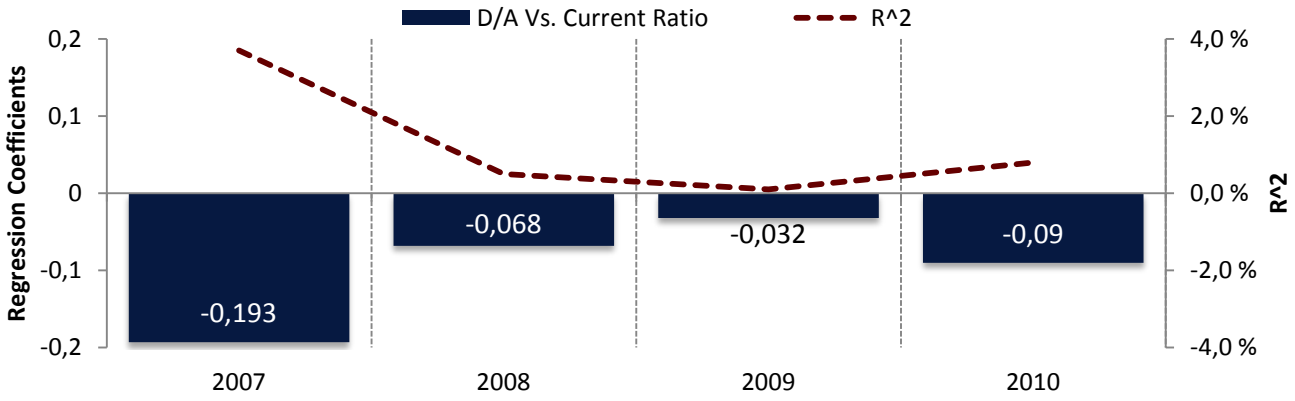
Figure 33: D/A Vs. Growth



D/A Vs. The current ratio

The leverage effect on liquidity is similar to that on ROA. The negative effects was as expected, but the cyclicality was opposite. This is, again, probably due to the increase in variation during the downturn (Table 4).

Figure 34: D/A Vs. Liquidity



Another reason may be that firms that attempt to boost their growth through leverage, keeps liquidity reserves at a minimum for the same motives.

Conclusions

Leverage appears to affect both profitability and liquidity in a negatively cyclical manner, while the effect on growth is cyclical. The observed effect on ROA, and the lack of effect on the EBITDA margin, was unexpected. Although, leverage affects growth as expected, I consider the debt ratio to have overall negative effects on HGFs. However, as debt appears to have negative effects in the short run, it is often a necessity in the long run. The hypothesis is rejected.

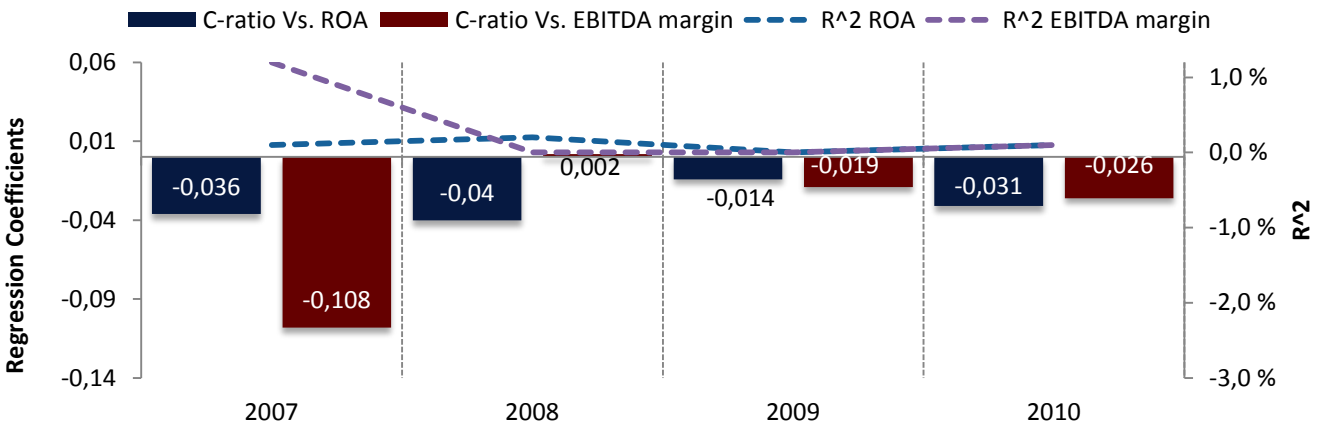
7.6 Hypothesis 6: Liquidity

Liquidity has countercyclical effects on HGFs

Liquidity Vs. Profitability

Liquidity had negative effects on profitability throughout the entire business cycle, and the biggest effect occurred during the expansion. This is probably because of the described strain that keeping liquidity reserves puts on growth and performance. It is easier to achieve higher profitability in periods of positive economic conditions, thus will liquidity reserves has higher opportunity costs in these periods. However, I expected liquidity to have positive effects on profitability during the downturn, as it would function as a buffer for many companies in liquidity crises. As HGFs are likely to not conduct systematical liquidity management, the buffer effect does probably not kick in. The relationship is nevertheless not equally protruding with ROA as with EBITDA.

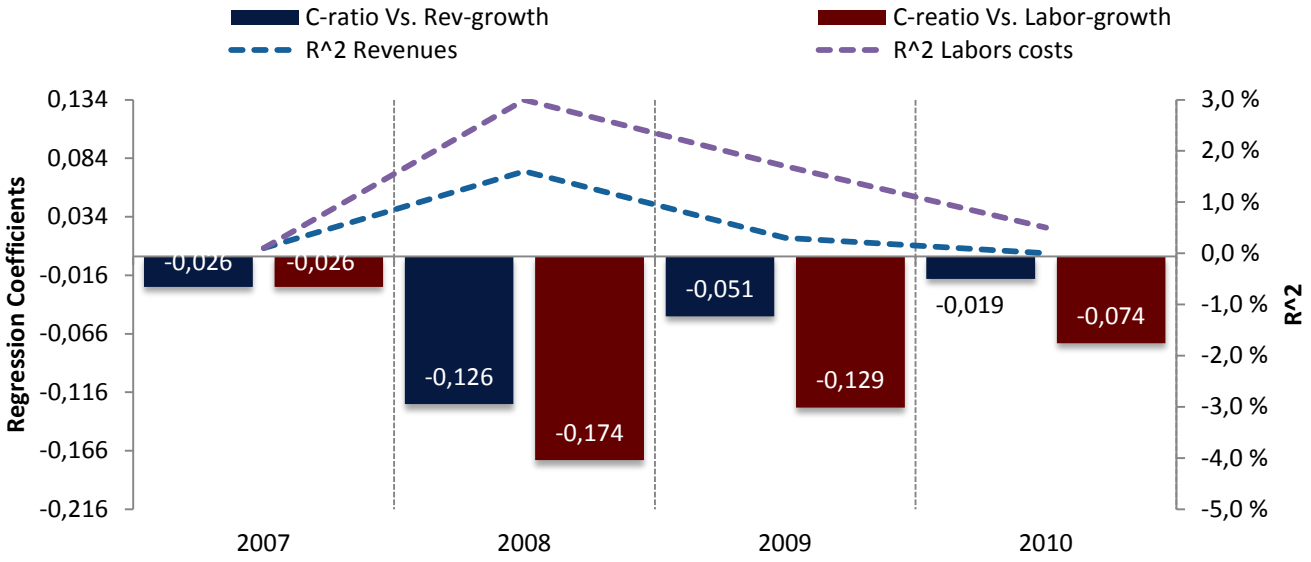
Figure 35: Liquidity Vs. Profitability



Liquidity Vs. Growth

Growth in both revenues and labor costs show the same effects from liquidity throughout the different phases. As presented in figure 36, the relationship is cyclically negative with the largest effects occurring in 2008. As with profitability, reserves of liquidity put strains on growth rates. However, as with profitability it was expected that liquidity would positively affect growth during the downturn. This supports the argument that HGFs on general have too low levels of liquidity for the buffer effect to be observable.

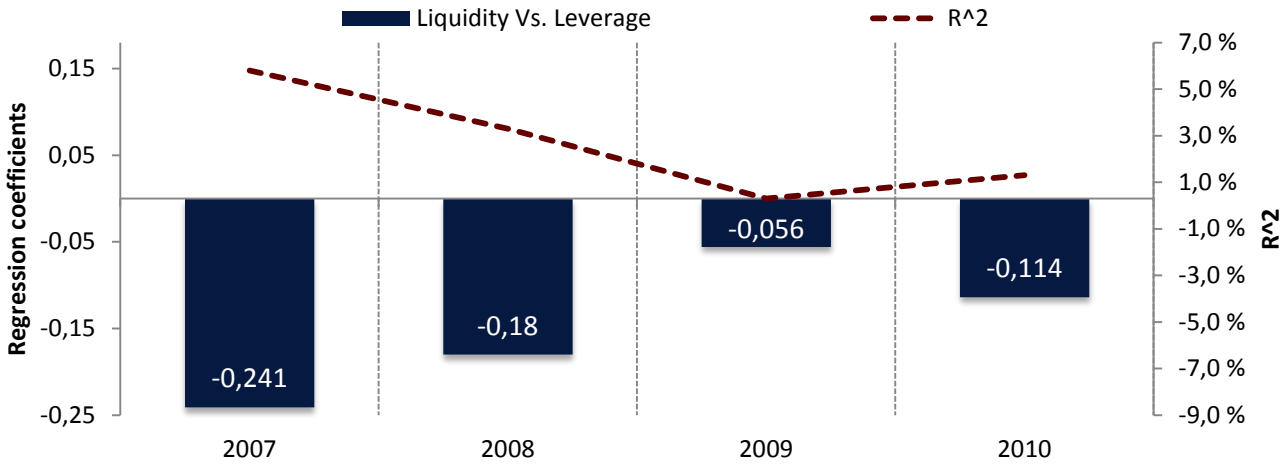
Figure 36: Liquidity vs. Growth



Liquidity Vs. Leverage

The effects portrayed in figure 37 indicate that those firms who are able to maintain sufficient levels of liquidity are in less need of external financing than those with lower liquidity levels. The relationship is cyclically negative

Figure 37: Liquidity Vs. Leverage



Conclusions

Liquidity has negative effects on all of the components except from on leverage. The effect on profitability during the downturn is especially interesting, as it is the opposite of what was expected. It appears that liquidity has very different effects on HGFs than on firms in general. High liquidity affects profitability relatively strongly negative during the expansion, which is because it puts strains on performance due to high opportunity costs.

7.7 Summary and overview

Out of the six hypotheses, only the profitability, and size hypothesis was retained. The remaining four appears to be more complex than initially expected. There were, however, several patterns that were in line with the hypotheses, but I find it difficult to justify their retainment when there are clear opposing patterns.

The phase of expansion is, as discussed in section 2.1.1, characterized by positive economic conditions, rising stock markets, expanding credit availability, and consumer and investor optimism. Firms generally experience increasing growth rates and profitability during this period. Figure 9, 10 and 16 portrays how the median profitability measures and growth rates, of the 20% fastest growing companies, developed in line with the increasing growth rates of GDP. Debt levels, however, experienced a steady decline from approximately 2005 and going forward, which was not as expected. Liquidity ratios declined 2007 levels, which is in line with anticipated developments.

It appears that firms that were previously profitable are stronger than average in this period, and they continued to see profitability, had lower debt levels and higher liquidity ratios than the rest of the sample. Previous growth, however, had adverse effects on profitability during the expansion phase. This is likely because HGFs have smaller operational margins than average, thus grow similarly in costs as in revenues. Thus, revenues and assets will grow faster than net income, and especially ROA will decrease.

Growth rates will inevitably peak, thus firms experience declining revenues and profitability, and enter the second phase: slowdown. Growth and profitability, however, appear to peak earlier than growth in GDP, indicating that HGFs may function as a leading economic indicator. HGFs are generally more cyclically sensitive than firms in general, and may have a larger base of "elastic" customers. Thus, they will experience a larger and earlier loss of customers. This argument is supported by the relationships between previous growth and profitability. Very high growth typically indicates high risk, and the results here show that firms with high growth in the preceding year were negatively affected during the slowdown.

As growth rates inevitably peak, they will decline and consequently reach a trough level. The downturn represents the worst economic conditions of each business cycle, and the weakest firms often disappear in this phase. Credit is typically restricted, and consumers and investors are conservative in their behavior. Companies that are involved with non-durable and/or elastic goods are typically harder hit than the rest. HGFs growth in revenues reached their trough at -4% growth, according to the median, while ROA and the EBITDA margin reached troughs at 5% and 6% respectively. Similarly to the slowdown, companies that had experienced higher preceding growth in revenues were harder hit, as well as firms with high debt levels and liquidity. However, previous growth indicates higher growth in labor costs. Size, on the other hand, positively influences growth in revenues during this period, while age affects HGFs negatively.

Firms that perform well during the downturn are likely to outperform the general business population in the phase of retrieval. This is especially observable in figure 11 and figure 18. During this phase, the economic climate is increasingly positive and firms generally experience positive growth rates. The economic output, however, is still below potential output, hence competition between firms is tough. HGFs' growth rates increased during the retrieval, but profitability, debt levels and liquidity was maintained the 5% trough level. Bigger firms nevertheless experienced better profitability than smaller and younger firms.

This could, as mentioned above, be due to the same reason as why bigger firms perform worse than smaller firms during the downturn, namely that they are less flexible. Less flexible firms will be worse equipped to meet worsening economic conditions, but will remain ready to meet improving conditions.

Table 5, below, further provides an overview of the findings of the analysis.

		Responsive Variable				
		ROA	*EBITDA margin*	*Growth*	*Leverage*	*Liquidity*
Exploratory variable	**Previous ROA**	Positively cyclical	Positively cyclical	Weakly negative	Negatively cyclical	Weakly cyclical
	Previous EBITDA margin	Positively cyclical	Positively cyclical	Negatively cyclical	Weakly cyclical	Negatively countercyclical
	Previous growth in revenues	Slightly negative, but positive during retrieval	Unclear	Weakly cyclical	Weakly cyclical	Negatively cyclical
	Previous growth in labor costs	Slightly negative, but positive during retrieval	Unclear	Weakly countercyclical	Weakly cyclical	Negatively cyclical
	Age	Positively cyclical	Cyclical	Cyclical	Negative	Cyclical
	Size	Unclear, but positive during retrieval	Negatively cyclical	Positively cyclical	Negatively countercyclical	Unclear, but positive during expansion
	Leverage	Negatively countercyclical	Unclear	Cyclical	-	Negatively countercyclical
	Liquidity	Negatively countercyclical	Negatively countercyclical	Negatively cyclical	Negatively countercyclical	-

Table 5: Overview of main findings

8. Concluding Remarks

The purpose of this analysis has been to examine HGFs on a general level throughout the business cycle. The influences between different firm characteristics throughout the business cycle proved to be more complex and unclear than initially expected, and only two of six hypotheses were retained. However, the hypotheses were formed on the basis of literature and research regarding firms in general, due to lack of literature regarding HGFs specifically. Hence, a certain deviation from the expected patterns was anticipated. There nevertheless emerged several interesting relationships.

I find the interconnected relationships between profitability and growth to be of especial interest. Firstly, the effect of previous profitability on current profitability showed an expected pattern, except from during the downturn. Here, it appears that profitability is independent of previous profitability. Furthermore, none of the other characteristics promote profitability during the downturn. Thus, according to the results presented in this analysis, profitability during the downturn is more or less random. Actually, the overall impression is that the different characteristics negatively influence profitability during this period, with some deviations between ROA and the EBITDA margin. The retrieval, however, was highly influenced by both previous profitability and previous growth. Meaning that firms who are either profitable or experience growth during downturns, are likely to experience both growth and profitability during retrievals. This is because these firms pass the “test” of negative economic climates and prove robustness, but it is interesting as especially previous growth affected HGFs negatively during the three former phases, and previous profitability generally had adverse effects on growth.

A firm that was profitable, or grew during the retrieval appears to be older than the average of the sample, and have both less leverage and less liquidity. The effect of leverage was expected, but the negative influence of liquidity on growth and profitability during the downturn was very unexpected. The buffer stock behavior, described in section 3.6 does not appear to apply to HGFs. A reason may be that HGFs on general has insufficient liquidity to let these shocks absorb stochastic shocks. Figure 23 show how liquidity levels of HGFs declined from approximately 1.21 in 2005 to 0.89 in 2008, and shocks may have been absorbed in this period. As growth of HGFs peak prior to growth in GDP, figure 16, HGFs growth may function as a leading economic indicator, thus effects from a general downturn may influence HGFs earlier than the general economy.

The population of HGFs seems to be somewhat divided between “super-growers” and profitable firms, and I find that several characteristics can be attributed to each of the two categories. Super growers seem to be younger, larger, and less profitable, have larger debt levels and less liquidity. Profitable firms are, on the other hand, older, smaller, have less leverage and larger bases of liquidity. This categorization is somewhat representable for firms in general, with the exception of the influence from age and size. As I find it reasonable to assume that firms grow larger over time, I expected these characteristics to have similar effects on HGFs. It appears, however, that the two had opposite effects on HGFs, and especially on growth in both revenues and labor costs. A reason for the division may be that HGFs, in general, are relatively small and needs to meet a certain size requirement to be able to fully support growth.

Lastly, the splayed effects of growth in revenues and growth in labor costs support the arguments of Delmar, Davidsson, & Gartner (2003) regarding how method of measurement influence research results. Growth in revenues did, in line with expectations, and previous research, indicate negative growth during the downturn. Growth in labor costs, on the other hand, was positively influenced. This indicate that the two growth rates are caused by different factors. Growth in revenus show alot more variation (table 3) than growth in labor costs. Growth in employments is typically influenced by managers’ views on future prospects, or a response to increased activity. This is likely why growth in revenues during the downturn is positively influenced by previous growth in labor costs (figure 20). Growth in labor costs hence appear to be a more robust measure of firms performance than growth in revenues.

This thesis have examined the behavior of HGFs throughout the business cycle on a general level, thus laying the basis for further research on a more detailed plane. I have in this section outlined the findings that I believe to be of most importance to further research, and I believe it would be especially interesting to examine the significance of the splayed effects from growth in revenues and growth in labor costs, as well as the opposing effects from size and age. The buffer stock effect may be observable if the relationships are examined over a longer period of time. Lastly, as I have characterized two groups of HGFs, further characterization and detailed research within these should provide further insight in the differences between HGFs and firms in general.

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10. Appendices

APPENDIX A: Norwegian CPI-Index 2000-2010

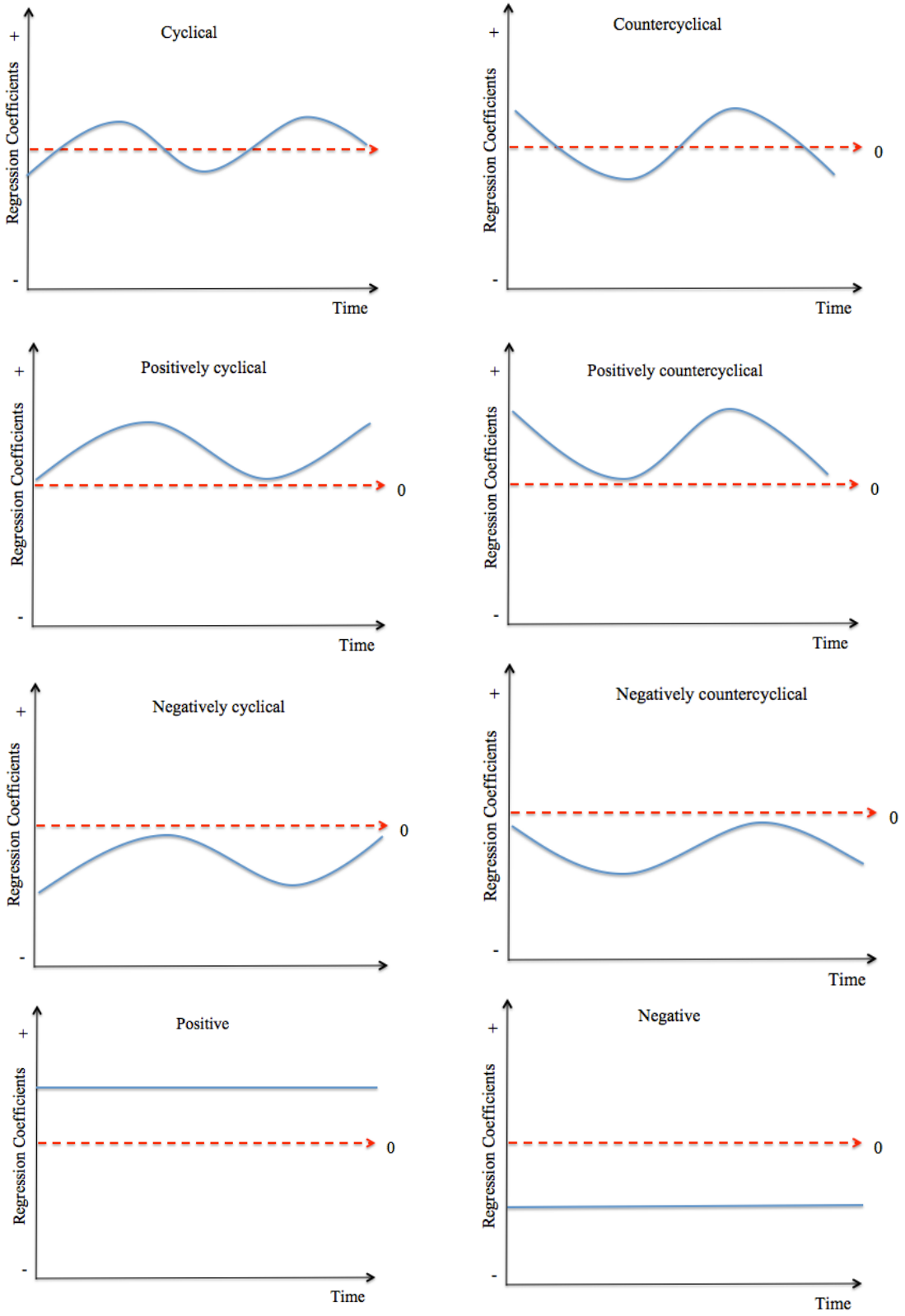
Consumer price index, over time, and after statistical variable

Consumer Price Index (1998=100)				
2001	*2002*	*2003*	*2004*	*2005*
108.7	110.1	112.8	113.3	115.1
2006	*2007*	*2008*	*2009*	*2010*
117.7	118.6	123.1	125.7	128.8

Consumer price index, over time, and after statistical variable (adjusted)

Consumer Price Index (2007=100)				
2001	*2002*	*2003*	*2004*	*2005*
91.7	92.8	95.1	95.5	97.0
2006	*2007*	*2008*	*2009*	*2010*
99.2	100.0	103.8	106.0	108.6

APPENDIX B: Definitions of cyclicality



APPENDIX C: Regression results

C-1 A: HYPOTHESIS 1: ROA

Hypothesis 1: ROA	*Responsive Variable*	2007	2008	2009	2010
Previous ROA Vs.	ROA	**.495**	**.12**	**.000**	**.217**
R-squared		*.245*	*.014*	*.000*	*.047*
Significance		*.000*	*.000*	*.979*	.000
ROA 3-yr avg. Vs.		**.449**	**.103**	**-.001**	**.232**
R-squared		*.202*	*.011*	*.000*	*.054*
Significance		*.000*	*.000*	*.975*	*.000*
ROA Vs.	EBITDA margin	**.277**	**.102**	**.034**	**-.007**
R-squared		*.052*	*.010*	*.001*	*.000*
Significance		*.000*	*.000*	*.046*	*.712*
ROA 3-yr avg. Vs.		**.222**	**.101**	**.002**	**.021**
R-squared		*.049*	*.010*	*.000*	*.000*
Significance		*.000*	*.000*	*.899*	*.223*
ROA Vs.	Growth in Revenues	**-.024**	**-.068**	**-.029**	**-.034**
R-squared		*.001*	*.000*	*.001*	.001
Significance		*.152*	*.005*	*.085*	*.056*
ROA 3-yr avg. Vs.		**-.018**	**-.0.62**	**-.014**	**-.010**
R-squared		*.000*	*.004*	*.000*	*.000*
Significance		*.297*	*.000*	*.402*	*.568*
ROA Vs.	Growth in Labor Costs	**-.001**	**.041**	**.027**	**.004**
R-squared		*.000*	*.002*	*.001*	*.000*
Significance		*.939*	*.015*	*.114*	*.837*
ROA 3-yr avg. Vs.		**-.008**	**.011**	**.044**	**.003**
R-squared		*.000*	*.000*	*.002*	*.000*
Significance		*.648*	*.639*	*.010*	*.185*
ROA Vs.	D/A	**-.254**	**-.283**	**-.263**	**-.185**
R-squared		*.064*	*.080*	*.069*	*.034*
Significance		*.000*	*.000*	*.000*	.000
ROA 3-yr avg. Vs.		**-.238**	**-.292**	**-.237**	**-.221**
R-squared		*.057*	*.086*	*.056*	*.049*
Significance		*.000*	*.000*	*.000*	*.000*
ROA Vs.	Current ratio	**.043**	**.006**	**.-040**	**-.020**
R-squared		*.002*	*.000*	*.002*	*.000*
Significance		*.011*	*.715*	*.020*	*.267*
ROA 3-yr avg. Vs.		**.024**	**.011**	**-.031**	**-.006**
R-squared		*.001*	*.000*	*.001*	*.000*
Significance		*.148*	*.534*	*.069*	*.733*

C-1 B: HYPOTHESES 1: EBITDA margin

Hypothesis 1: EBITDA	*Responsive Variable*	2007	2008	2009	2010
EBITDA margin Vs.	ROA	**.037**	**.157**	**-.002**	**.010**
R-squared		*.001*	*.025*	*.000*	*.000*
Significance		*.027*	*.000*	*.896*	.566
EBITDA margin 3-yr avg. Vs.		**.044**	**.045**	**.001**	**.024**
R-squared		*.002*	*.002*	*.000*	*.001*
Significance		*.009*	*.007*	*.957*	*.167*
EBITDA margin Vs.	EBITDA margin	**.329**	**.502**	**.091**	**.114**
R-squared		*.108*	*.252*	*.008*	*.013*
Significance		*.000*	*.000*	*.000*	*.000*
EBITDA margin 3-yr avg. Vs.		**.484**	**.553**	**.050**	**.147**
R-squared		*.234*	*.306*	*.002*	*.022*
Significance		*.000*	*.000*	*.004*	*-000*
EBITDA margin Vs.	Growth in Revenues	**-.140**	**-.165**	**-.445**	**-.118**
R-squared		*.020*	*.027*	*.198*	*.014*
Significance		*.000*	*.000*	*.000*	.000
EBITDA margin 3-yr avg. VS.		**-.083**	**-.086**	**-.150**	**-.127**
R-squared		*.007*	*.007*	*.023*	*.016*
Significance		*.000*	*.000*	*.000*	*.000*
EBITDA margin Vs.	Growth in Labor Costs	**-.006**	**-.015**	**.024**	**.002**
R-squared		*.000*	*.000*	*.001*	*.000*
Significance		*.722*	*.380*	*.154*	*.925*
EBITDA margin 3-yr avg. Vs.		**-.005**	**-.029**	**-.005**	**.003**
R-squared		*.000*	*.001*	*.000*	*.000*
Significance		*.748*	*.082*	*.762*	*.867*
EBITDA margin Vs.	D/A	**.043**	**-.070**	**-.028**	**-.001**
R-squared		*.002*	*.005*	*.001*	*.000*
Significance		*.011*	*.000*	*.105*	.939
EBITDA margin 3-yr avg. VS.		**.040**	**.017**	**-.004**	**-.005**
R-squared		*.001*	*.000*	*.000*	*.000*
Significance		*.017*	*.320*	*.822*	*.767*
EBITDA margin Vs.	Current ratio	**-.070**	**-.011**	**-.041**	**-.008**
R-squared		*.005*	*.000*	*.002*	*.000*
Significance		*.000*	*.518*	*.017*	*.642*
EBITDA margin 3-yr avg. Vs.		**-.049**	**-.002**	**-.012**	**-.010**
R-squared		*.002*	*.000*	*.000*	*.000*
Significance		*.004*	*.929*	*.482*	*.575*

C-2 A: HYPOTHESES 2

Hypothesis 2: Revenues		2007	2008	2009	2010
Previous Rev-growth Vs.	ROA	**-.012**	**-.004**	**-.009**	**.010**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*0.505*	*.824*	*.598*	.571
Rev-growth 3-yr avg. Vs.		**-.011**	**-.005**	**-.001**	**.054**
R-squared		*.000*	*000*	*.000*	*.003*
Significance		*.529*	*.778*	*.963*	*.002*
Previous Rev-growth Vs.	EBITDA margin	**-.020**	**-.009**	**.007**	**-.011**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.266*	*.609*	*.692*	*.544*
Rev-growth 3-yr avg. Vs.		**.005**	**-.010**	**-.005**	**-.004**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.766*	*.557*	*.756*	*.824*
Previous Rev-growth Vs.	Growth in Revenues	**-.001**	**.021**	**-.054**	**-.075**
R-squared		*.000*	*.000*	*.003*	.006
Significance		*.977*	*.205*	*.002*	*.000*
Rev-growth 3-yr avg. Vs.		**-.003**	**-.006**	**-.022**	**.010**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.877*	*.737*	*.517*	*.569*
Previous Rev-growth Vs.	Growth in Labor Costs	**.002**	**.019**	**.051**	**.011**
R-squared		*.000*	*.000*	*.002*	*.000*
Significance		*.895*	*.269*	*.003*	*.538*
Rev-growth 3-yr avg. Vs.		**-.001**	**.019**	**.003**	**-.001**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.957*	*.251*	*.864*	*.963*
Previous Rev-growth Vs.	D/A	**.012**	**.014**	**-.055**	**-.011**
R-squared		*.000*	*.000*	*.003*	*.000*
Significance		*.492*	*.386*	*.001*	.518
Rev-growth 3-yr avg. Vs.		**.005**	**-.005**	**-.003**	**.001**
R-squared		*.000*	*000*	*.000*	*.000*
Significance		*.790*	*.768*	*.858*	*.939*
Previous Rev-growth Vs.	Current ratio	**-.014**	**-.058**	**-.039**	**-.014**
R-squared		*.000*	*.003*	*.002*	*.000*
Significance		*.420*	*.001*	*.025*	*.435*
Rev-growth 3-yr avg. Vs.		**-.012**	**-.003**	**-.001**	**-.040**
R-squared		*.000*	*.000*	*.000*	*.002*
Significance		*.466*	*.865*	*.960*	*.026*

C-2 B: HYPOTHESIS 2

Hypothesis 2: Labor Costs		2007	2008	2009	2010
Previous Labor-growth Vs.	ROA	**-.002**	**-.019**	**-.009**	**.029**
R-squared		*.000*	*.000*	*.000*	*.001*
Significance		*0.505*	*.266*	*.618*	.105
Labor-growth 3-yr avg. Vs.		**-.016**	**.010**	**-.003**	**.006**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.342*	*.537*	*.842*	*.713*
Previous Labor-growth Vs.	EBITDA margin	**-.003**	**-.007**	**.008**	**000**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.879*	*.694*	*.638*	*.983*
Labor-growth 3-yr avg. Vs.		**-.009**	**.001**	**.003**	**.000**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.599*	*.938*	*.865*	*.990*
Previous Labor-growth Vs.	Growth in Revenues	**-.001**	**.009**	**.061**	**.-009**
R-squared		*.000*	*.000*	*.004*	.000
Significance		*.972*	*.608*	*.000*	*.594*
Labor-growth 3-yr avg. Vs.		**-.002**	**.023**	**.017**	**-.008**
R-squared		*.000*	*.001*	*.000*	*.000*
Significance		*.921*	*.171*	*.327*	*.669*
Previous Labor-growth Vs.	Growth in Labor Costs	**-.002**	**-.001**	**.058**	**-.010**
R-squared		*.000*	*.000*	*.003*	*.000*
Significance		*.924*	*.968*	*.001*	*.565*
Labor-growth 3-yr avg. Vs.		**-.003**	**.007**	**.015**	**-.004**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.874*	*.670*	*.379*	*.823*
Previous Labor-growth Vs.	D/A	**.032**	**.010**	**-.018**	**-.001**
R-squared		*.001*	*.000*	*.000*	*.000*
Significance		*.056*	*.536*	*.282*	.969
Labor-growth 3-yr avg. Vs.		**.002**	**-.004**	**-.010**	**-.010**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.893*	*.832*	*.559*	*.579*
Previous Labor-growth Vs.	Current ratio	**-.015**	**-.078**	**-.055**	**-.033**
R-squared		*.000*	*.006*	*.003*	*.001*
Significance		*.384*	*.000*	*.001*	*.064*
Labor-growth 3-yr avg. Vs.		**-.001**	**-.002**	**-.003**	**-.068**
R-squared		*.000*	*.000*	*.000*	*.005*
Significance		*.960*	*.922*	*.865*	*.000*

C-3: HYPOTHESIS 3

Hypothesis 3: Age		2007	2008	2009	2010
Age Vs.	ROA	**.041**	**.018**	**.024**	**.051**
R-squared		*.002*	*.000*	*.001*	*.003*
Significance		*.017*	*.287*	*.155*	.004
Age Vs.	EBITDA margin	**.027**	**.002**	**-.027**	**.016**
R-squared		*.001*	*.000*	*.001*	*.000*
Significance		*.122*	*.905*	*.116*	*.363*
Age Vs.	Growth in Revenues	**.012**	**-.086**	**-.047**	**.012**
R-squared		*.000*	*.007*	*.002*	.000
Significance		*.503*	*.000*	*.006*	*.479*
Age Vs.	Growth in Labor Costs	**-.040**	**-.090**	**-.035**	**.018**
R-squared		*.002*	*.008*	*.001*	*.000*
Significance		*.021*	*.000*	*.043*	*.296*
Age Vs.	D/A	**-.110**	**-.090**	**-.064**	**-.056**
R-squared		*.012*	*.008*	*.004*	*.003*
Significance		*.000*	*.000*	*.000*	.002
Age Vs.	Current ratio	**.016**	**.018**	**-.007**	**.003**
R-squared		*.000*	*.000*	*.000*	*.000*
Significance		*.351*	*.287*	*.690*	*.883*

C-4: HYPOTHESIS 4

Hypothesis 4: Size		2007	2008	2009	2010
Size Vs.	ROA	**-.008**	**.031**	**-.049**	**.117**
R-squared		*.000*	*.001*	*.002*	*.014*
Significance		*.615*	*.060*	*.004*	.000
Size Vs.	EBITDA margin	**-.074**	**-.105**	**-.071**	**-.028**
R-squared		*.006*	*.011*	*.005*	*.001*
Significance		*.000*	*.000*	*.000*	*.0107*
Size Vs.	Growth in Revenues	**.068**	**.111**	**.161**	**.090**
R-squared		*.005*	*.012*	*.026*	.008
Significance		*.000*	*.000*	*.000*	*.000*
Size Vs.	Growth in Labor Costs	**-.006**	**.108**	**.142**	**.090**
R-squared		*.000*	*.012*	*.020*	*.008*
Significance		*.743*	*.000*	*.00*	*.000*
Size Vs.	D/A	**-.166**	**-.153**	**-.102**	**-.142**
R-squared		*.028*	*.023*	*.010*	*.020*
Significance		*.000*	*.000*	*.000*	.000
Size Vs.	Current ratio	**.147**	**-.015**	**-.035**	**-.029**
R-squared		*.022*	*.000*	*.001*	*.001*
Significance		*.000*	*.387*	*.045*	*.000*

C-5: HYPOTHESIS 5: THE DEBT RATIO

Hypothesis 5: Debt Ratio		2007	2008	2009	2010
D/A Vs.	ROA	**-0.364**	**-0.413**	**-0.034**	**-0.353**
R-squared		*13.3 %*	*17.1 %*	*0.1 %*	*12.5 %*
Significance		*0*	*0*	*0.047*	0
D/A Vs.	EBITDA margin	**-0.056**	**-0.007**	**-0.014**	**0.042**
R-squared		*0.3 %*	*0.0 %*	*0.0 %*	*0.2 %*
Significance		*0.001*	*0.66*	*0.4*	*0.018*
D/A Vs.	Growth in Revenues	**0.013**	**0.042**	**-0.046**	**-0.003**
R-squared		*0.0 %*	*0.2 %*	*0.2 %*	0.0 %
Significance		*0.449*	*0.012*	*0.007*	*0.886*
D/A Vs.	Growth in Labor Costs	**0.035**	**0.036**	**-0.06**	**-0.02**
R-squared		*0.1 %*	*0.1 %*	*0.4 %*	*0.0 %*
Significance		*0.038*	*0.032*	*0*	*0.26*
D/A Vs.	Current ratio	**-0.193**	**-0.068**	**-0.032**	**-0.09**
R-squared		*3.7 %*	*0.5 %*	*0.1 %*	*0.8 %*
Significance		*0*	*0*	*0.064*	*0*

C-6: HYPOTHESIS 6: THE CURRENT RATIO

Hypothesis 6: Current Ratio		2007	2008	2009	2010
Current Ratio Vs.	ROA	**-.036**	**-.040**	**-.014**	**-.031**
R-squared		*.001*	*.002*	*.000*	*.001*
Significance		*.032*	*.018*	*.436*	.083
Current Ratio Vs.	EBITDA margin	**-.108**	**.002**	**-.019**	**-.026**
R-squared		*.012*	*.000*	*.000*	*.001*
Significance		*.000*	*.927*	*.271*	*.145*
Current Ratio Vs.	Growth in Revenues	**-.026**	**-.126**	**-.051**	**-.019**
R-squared		*.001*	*.016*	*.003*	.000
Significance		*.131*	*.000*	*.003*	*.280*
Current Ratio Vs.	Growth in Labor Costs	**-.026**	**-.174**	**-.129**	**-.074**
R-squared		*.001*	*.030*	*.017*	*.005*
Significance		*.125*	*.000*	*.000*	*.000*
Current Ratio Vs.	D/A	**-.241**	**-.180**	**-.056**	**-.114**
R-squared		*.058*	*.033*	*.003*	*.013*
Significance		*.000*	*.000*	*.001*	.000

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This paper investigates the behavior of high-growth firms throughout the different phases of the business cycle. The analysis is based on a large sample of accounting data from Norwegian firms, between 1999 and 2010. The research was performed on a detailed level, through analysis of inter-connected relationships between different firm characteristics. The relationships proved to be more complex than initially anticipated, and several surprising discoveries were made. The results show that there exists a division between “super-growers”, and profitable high-growth firms, as previous profitability negatively influence growth and previous growth negatively influence profitability, throughout the beginning of the business cycle. However, firms that showed profitability, or experienced growth in revenues during the downturn of 2009, were very likely to both grow and experience profitability during the retrieval of 2010. Furthermore, differing influences from age and size were unexpected, and size seems to positively influence growth in a cyclical manner. Lastly, the effects from previous growth in revenues and growth in labor costs were splayed, and indicate growth in labor costs as a more robust measure of intrinsic growth.

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