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Measuring growth of the firm: Theoretical considerations

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Abstract:

The reasons and sources of firm growth are a part of economic research since approximately 50 years. Studying various empirical studies all over the world, it is no doubt, that the problematic issue is just how to measure growth of the firm. The main objective of the paper is to discuss the measures of growth of the firm in economics and business studies. The article consists of two sections. The first section reviews basic measures of growth. The second section elaborates on a particular case of growth – measures of high-growth and hyper-growth. The articles is bases on in-depth literature review and its critics.

Keywords: growth; high-growth; hyper-growth; measures
JEL codes: F23, M00

1. INTRODUCTION

The reasons and sources of firm growth are a part of economic research since approximately 50 years. As a starting point the theory of firm growth can be identified which has challenged in 1950s the neo-classical research. Contrary to the neo-classical theory of the firm, the theory of firm growth views the company not only as a transformer of market-price signals into optimal cost structures. Instead, Penrose (1959) determines the firm as an autonomous entity which is not successful and growing due to optimal price-quantity adjustment but because of the development and the combination of firm-specific resources.

The main objective of the paper is to discuss the measures of growth of the firm in economics and business studies. The article consists of two sections. The first section reviews basic measures of growth. The second section elaborates on a particular case of growth – measures of high-growth and hyper-growth. The articles is bases on in-depth literature review and its critics.

2. MEASURES OF THE FIRM-LEVEL GROWTH

The models and theories discussed in the previous chapters could be distinguished into two classes: (1) the firm as a machine that is a product or a trivial input-output-machine of internal and external forces and can thus be more or less described with measurable parameters or modeled with a mathematical-economics approach to identify cause-effect relationships; and (2) the firm is a system of information and activities and can be described by metaphors and models, but cannot by modeled in a positivistic sense. In the case of the firm as a system, only patterns can be identified and described verbally.

However, Achtenhagen et al. (2010) remark that academic scholars and entrepreneurs do not mean the same as the term *business growth*. For practitioners, growth is a complex process of internal development; therefore, they prefer qualitative measures whereas academic literature uses mainly quantitative measures, which are derived from financial analysis. Therefore, the positivistic approaches are the only approaches that have developed concepts to accurately measure growth. Thus, stochastic models operationalize growth, for example, with variables such as (1) net sales or (2) employee growth (e.g., Laitinen, 1999) or even (3) R&D expenditures (e.g. Toivanen et al., 2010), etc. to identify or falsify causal relationships between distinct variables.

The most advanced theories in terms of measuring growth and statistical correlations are industrial-economics approaches. Deterministic and management views of growth measure growth by the growth of revenues, profits, profitably, market share, etc. and are thus based on variable sets for which financial research provides metrics, to measure quantitative and qualitative firm growth. Overall, Delmar (1997; 2003) found that turnover/sales is the most frequently applied growth measure: More than 30% of the studies they examined used turnover/sales as a growth measure and 29% used the number of employees. Shepherd and Wiklund (2003) examined firm growth literature and noted that 60% apply sales growth as a metric for growth, 12.5% apply employee growth, 12.5%, 14.5% apply profit and profitability ratios, and 14.4% apply other measures as growth metrics (Table 1).

Table 1. Examples for Measures of Firm Growth as Dependent Variable applied in various Research Projects (2005-2014)

Measures	Authors
Net sales, turnover, revenue, sales growth	Mishina et al. (2004); Shaw, Duffy, Johnson, and Lockhart (2005); Gardner (2005); Simsek, Veiga, Lubatkin, and Dino (2005) Zatzick & Iverson (2006); Sine, Mitsuhashi & Kirsch (2006); Arthaud-Day et al. (2006); Moreno & Casillas (2007) Hölzl (2009); Anaydike-Danes et al. (2009); Evangelista & Vezzani, (2010); Cassia & Minola (2012); Murmann et al. (2014); Beers & Zand, (2014); Coad et al. (2014)
Operating income, Net income, Earnings, EBITDA	Shaw, Gupta & Delery (2005);
Market share	None
Employment growth	Shaw, Duffy, Johnson, and Lockhart (2005); Hölzl (2009); Murmann et al. (2014); Anaydike-Danes et al.(2009); Carz-nitzki & Delanote (2013); Barbaro et al. (2014)
Basic earning power (BEP)	None
Productivity	Boer & During (2001); OECD, 2006; Rocchina-Barrachina et al. (2010); Urgal et al. (2013)
Return on Equity (ROE)	Shaw, Gupta & Delery (2005); Westphal & Bednnar (2005)
Return on investment (ROI); return on invested capital (ROIC)	Luo & Chung (2005); Tan & Tan (2005)
Return on assets (ROA)	Miller & Eden (2006); Arthaud-Day, Certo, Dalton & Dalton (2006); Sanders & Tuschke (2007); Goerzen & Beamish (2005)
Total shareholder return (TSR), stock return; price/book ratio	Kumar (2005); Johnson, Ellstrand, Dalton, Dalton (2005)
Value-added measures such as EVA (economic value-added), etc.	None

Source: Own study based on a selective evaluation of *Management Journal*, *Administrative Science Quarterly* and *Strategic Management Journal* (2005-2014) as well as on Achtenhagen, Naldi & Melin (2010, p. 293) and own research in the field of high-growth-companies literature.

Therefore, it can be stated that the overwhelming number of studies on firm growth use financial measures and ratios, which leads to the conclusion that firm growth in scientific studies is generally measured in its quantitative dimension. According to a literature review of Achtenhagen et al. (2010), almost 50% of scientific studies measure firm growth in turnover and 30% measure growth in staff numbers both in Europe and America (see Table 2).

Achtenhagen et al. (2010) reviewed 55 articles published between 1997 and 2008 in selected journals[1] to compare metrics and concepts of growth in academic literature with 'entrepreneurial concepts' of growth (see Table 2). They interviewed 2,034 CEOs of Swedish companies. Their objective was to problematize "*the gap that exists between how growth is discussed and measured in entrepreneurship*

[1] Entrepreneurship Theory and Practice (ETAP), Journal of Business Venturing (JBV), Entrepreneurship and Regional Development (ERD), and International Small Business Journal (ISBJ).

studies and how it is perceived by entrepreneurs themselves" (Achtenhagen et al., 2010, p. 309). Their conclusion is that growth indicators and measures in academic literature are mainly quantitative whereas in entrepreneurial or management practices, growth is generally measured in metrics of internal development and thus more in its qualitative dimension (Achtenhagen et al., 2010). Instead, quality measures in academic literature are seldom. Only a few studies apply qualitative measures, such as innovation performance, as a measure for qualitative growth

Table 2. Most commonly used indicators for measuring economic development of SMEs in scientific studies

Variables	U.S.-based/Europe-based journals	Total	Percent
Growth measure			
Sales/turnover	17/6	23	41.8
Employees	10/5	15	27.3
Growth willingness/Growth intention	6/4	10	18.2
Profitability	3/1	4	7.3
Combinations of the previously mentioned measures	5/4	9	16.4
Growth strategies (e.g., diversification; product extension; internationalization)		9	16.4
Others (e.g., assets; value added)	0/4	4	7.3
Not reported	4/1	5	9.0
N	38/17	55*	
Motivation for choice of measure			
(−)	19/13	32	58.2
(+)	15/3	18	32.7
Partial, referring to prior studies	4/1	5	9.1
N	38/17	55*	
Growth definition/conceptualization			
(−)	24/12	36	64.3
(+)	15/5	20	35.7
N	39/17	56	
Time frame			
Cross-sectional	16/6	22	40.0
Longitudinal	22/11	33	60.0
N	38/17	55*	
Source of data			
Primary data	19/9	28	50.9
Secondary data	12/4	16	29.1
Both	7/4	11	20.0
N	38/17	55*	
Theoretical basis			
(−)	17/11	28	50.0
(+)	22/6	28	50.0
N	39/17	56	
Type of paper			
Qualitative	9/7	16	28.6
Quantitative	29/8	37	66.1
Mixed method	0/2	2	3.6
Conceptual	1/0	1	1.8
Total	39/17	56	

Note: * n = 55, because the conceptual article is not included. (−), not made explicit; (+), made explicit.

Notes: Concerning growth measures it is obviously that measures concerning the pure expansion of a firm in terms of sales and employees is the main metric to determine firm growth. Only one-fifth of the studies use qualitative financial metrics such profitability or value-added. Another one-fifth of the studies uses pure qualitative measures such as growth intention or diversification degree.
Source: Achtenhagen et al. (2010, p. 293).

(e.g, Beers & Zand, 2013). Wach (2012) notes that classic measures of performance and growth may not be sufficient to explain performance and growth. Classic measures are uni-dimensional, focused on isolated areas, and are not tracked in several independent areas, whereas the complexity of growth needs more complex systems of performance measurement systems (see Table 3).

Table 3. Traditional vs. Complex Performance and Growth Measurement Systems

Traditional performance measurement systems	Complex performance measurement systems
- Uni-dimensional focus on financial measures - Performance tracked in isolated areas - Prevalence on functional measures	- Multi-dimensional focus combining a variety of measures - Value-based - Performance tracked in several areas

Source: Own study based on Kanji et al. (2015, p. 51).

Beers and Zand (2014) or Frenz and Letto-Gilles (2009) measure firm growth in terms of share of innovative sales in total revenue. However, recent studies present no evidence for the relationship between innovation growth and firm growth (e.g., Acs, Parsons & Tracy, 2008). Therefore, it must be assumed that such growth measures may indicate growth in several areas of a company, but do not measure success-relevant factors because highly innovative firms are often not high-growth firms. Instead, serial entrepreneurs use in the meanwhile the term "*last mover advantage*" (Thiel, 2014, p. 44) to oppose the widespread belief that the first mover advantage is a success factor. Rather, also academic research accentuates more the risks of technology leaders or first movers and tends to pronounce the more likely success of second movers (e.g., Cleff & Rennings, 2011). Furthermore, it must be stated that such non-financial, qualitative research constructs are only second-order measures, measuring also only changes in isolated areas but cannot link qualitative measures with quantitative measures.

Other models mentioned in Table 3, such as corporate life cycle approaches and evolutionary approaches, provide only metaphors linked with assumptions concerning the change of financial variables (e.g., Churchill & Lewis, 1983). However, they do not provide approximate or even exact correlations between selected independent and dependent variables or the operationalization of variables, such as the *life cycle stage*, which seems arbitrary. Thus, for example, a company's age cannot be a valid proxy variable for qualifying the company's life cycle stage. Moreover, even positivistic approaches, such as industrial economics and managerial models, cannot deliver more than general statements such as that 37 independent variables explain about 80% of the ROI variance (Schoeffler, 1977, pp. 111-112).

Concluding it is necessary to state that for measuring the growth of the firm different scholars and researchers use mainly two measures, namely changes in (1) annual turnover or sales as well as (2) employment. This is a very pragmatic approach as it ensure slid comparisons among entities and it is more objective than other non-quantifying measures. What is more, even the high-growth and hyper-growth companies/entrepreneurship concept is based on these two measures.

3. MEASURES OF HIGH-GROWTH COMPANIES

Starting from Penrose's theory of firm growth as the "*only true classic*" of growth studies (Davidssson, Achtenhagen & Naldi, 2010, p. 7), the concept of 'gazelle companies' occurred in the 1970s in the field of business studies. The term and concept of 'gazelle companies' was coined by Birch (1979; 1987) in the 1980s and is now generally accepted for companies that show rapid growth rates of more than 20% in number of employees over a 3-year period in companies up to five years old (Audretsch, 2012, p. 3). However, this concept is now widely accepted, as it is mirrored in a definition by the Organisation for Economic Co-operation and Development (OEDC), which defines:

> *"High-growth enterprises, as measured by employment (or turnover), are enterprises with average annualized growth in employees (or in turnover) greater than 20% a year, over a three-year period, and with ten or more employees at the beginning of the observation period*" (OECD, 2011, p. 74).

According to the OECD, high-growth companies are a 'minority'. They represent only 3.5% to 6% of the total population, when measured by employment growth of 20% and even more when measured by turnover (OECD, 2011, p. 71).

The term *gazelle* is a synonym for these types of companies and is used to distinguish fast-growing companies from large corporations ('elephants') and small and micro enterprises ('mice'). In the sense of Gibrat's law, these companies can be found in the extreme tail of the normal distribution of firm growth rates (Audretsch, 2012). The concept of gazelle companies is introduced to label the companies that can be found in the extreme tail of an intra-country distribution and normally are not included in the research of the stochastic approach, in which the data sets are generally distributed to larger enterprises (Audretsch, 20126). Accordingly, the high-growth approach confirms the views of critics of the stochastic view of firm growth such as Laitinen (1999), Reichstein and Jensen (2005), Bottazzi et al. (2003), and Duschl et al. (2011). High-growth company research, which investigates the group of gazelles, concludes that smaller and younger companies in knowledge-intensive industries have significantly higher growth rates than the rest of an intra-country population (Audretsch, 2012). Thus, the thesis of stochastic growth must be rejected because companies with higher growth ratios show distinct characteristics.

However, even now, high-growth patterns are not well understood in the literature. It is debated whether growth depends on strategic patterns (niche or mass market strategies, etc.) or single variables such as firm size, age or industry, type of governance, entrepreneurs' ambitions, etc. (Bastesen & Vante, 2014). Additionally, there is no uniform definition for high-growth companies. Frequently, high-growth is measured by employment or by turnover (OECD, 2011). However, Wach

(2012) identifies six classifications of high-growth small- and medium-sized enterprises (SMEs) used in recent research literature with partially overlapping definitions and characteristics (see Figure 1): (1) high-growth SMEs, (2) innovative high-growth SMEs, (3) gazelle SMEs, (4) high-tech SMEs, (5) innovative SMEs, and (6) hyper-growth SMEs (Wach, 2012, p. 42).

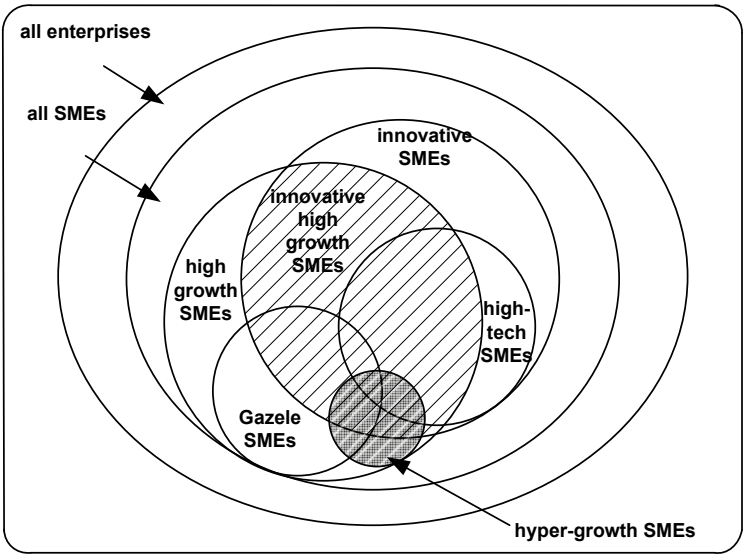

Figure 1. Typologies of High-growth Companies

Source: Wach (2012, p. 42).

According to Audretsch (2012), the new approach of gazelles occurred as firm growth studies began to include a broader spectrum of firm size and age. Thus, empirical evidence began to shift. Firm growth was found in most studies to be systematically related to certain specific characteristics (e.g., Geroski, 1995; Hall, 1987; Audretsch, 1995). Subsequently, studies including samples from European countries, supported initially U.S.-focused studies (Audretsch, 2012).

The particular interest in high-growth exists for at least four reasons:

1. Growth is typically equated with high performance and thus with higher returns for owners (Dobbs & Hamilton, 2007);
2. The second reason is the assumption that growing companies are twice as likely to survive compared to non-growing companies (Phillips & Kirchhoff, 1989);
3. Additionally, small firms have been identified as being responsible for 95% of radical innovations and 55% of all general innovations (Robbins et al., 2000), due larger firms focusing on products with stable and thus more predictable and less risky revenues;
4. High-growth companies provide a disproportionally higher number of jobs compared to other companies (e.g. Autio et al. (2000); Acs et al. (2008);

Anaydike-Danes et al.(2009)). Therefore, an increasing number of studies with SME focus have been carried out in the last 10 years, with each using different growth measures and explanatory variables (see Table 4).

Many other threshold values are available to distinguish high-growth and hyper-growth companies (Petersen & Ahmad, 2007). However, it must be questioned if the discussion about threshold values and new definitions has more than academically value-added in particular because Birch's intention was only to distinguish large businesses quoted on the stock market from slow-growing start-up firms and small fast-growing start-up firms (Birch et al., 1993).

Table 4. Definition of Different Growth-Levels in Terms of Financials

Term	Definition	Studies applying this Indicator
Diminishing Growth	Annual revenue growth (CAGR) <5% over a 3-year period	Own definition
Normal or moderate Growth	5% to 20% annual revenue growth (CAGR) over a 3-year period	Own definition
High Growth (Gazelles)	> 20% annual revenue growth (CAGR) over a 3-year period	e.g., Birch (1987); Birch & Medoff (1994); Schreyer & OECD (2000); Hoffmann & Junge (2006); Cassia et al. (2009); Sendervoitz et al. (2012);
Hyper Growth	Annual revenue growth rate (CAGR) >100% in a 5-year period (3000% in total!)	Fischer et al. (1997)
	≥ 500 revenue growth over a 5 year period	Markman & Gartner (2002);
	≥ 560% revenue growth over a 5 year period	Barringer & Jones (2004)

Note: Birch et al. (1987; 1994) and the other authors used the term *turnover*, Markmann & Gartner (2002) the term *income*. According to the IFRS/GAAP standard; here, the term *revenue* is used as synonym for both terms.
Source: Own study.

However, such threshold values are irrelevant for this study because a threshold value is always arbitrary und subjective, as it is evident regarding the manifold of different definitions presented above (see Table 4 above). In this study, however, companies are compared that perform above the total sample average in specific financial growth metrics with companies that perform below the average of the total sample. Thus, growth companies are not distinguished by arbitrary thresholds but are defined by the average of the total sample of all stock-listed companies of the three countries.

4. CONCLUSIONS

In overviewing the discussed models, theories, variables sets, etc., it is evident that firm growth is a very complex phenomenon that cannot be explained by a simple model or a simple linear model cause-effect relationship. Therefore, it is remarka-

ble that theories of many studies apply under-complex statistical methods such as bivariate or multivariate analyses. Only the PIMS study applies an explorative factor analysis to sort different variables into groups in a way that factor loadings can be determined with the result that a group of variables explains firm growth. However, the problem in this case is the missing transparency of the data set containing internal corporate data and not on financial data available from external sources, such as the income statement and balance sheet. Therefore, some industrial economics and managerial approaches to measure and explain firm growth are not reproducible or are, in the case of Porter's (1980) approach, based on a sum of individual case studies using mainly qualitative research constructs, which are more or less metaphors, such as: How, for example, can the 'height' of the market entry barrier be measured? This can always only be a subjective evaluation of a researcher or respondents.

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