Performance Consequences of Fit between Financials and Strategy Descriptions in the Renewable Energy Industry: A contingent view on the business model consistency heuristic

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Konsistenz von Geschäftsmodellen, kontingenztheoretische Perspektive, Unternehmenserfolg, junge Industrien

A dimension that has received little attention in business model-performance assessments is consistency or "configuration as a quality". Business model consistency in this regard indicates the degree of fit of different business model elements. Managers and researchers seem to follow a business model consistency heuristic that regards a high degree of consistency superior to lower degrees of consistency. However, when considering costs of consistency within emerging industries we also find arguments in favor of a low degree of consistency. This paper explores contingency factors that determine whether consistency is rational or not. Our proxy for measuring consistency is the fit between financials and business descriptions within multi-year observations of 210 wind and solar firms in the renewable energy industry. We find that contingency factors such as industry, business model-themes or pattern of firm growth can impact the consistency-performance relationship positively as well as negatively. Based on our findings, we propose to account for the distinct contingencies of business model consistency rather than uncritically considering business model consistency as being rational per se. Implications for managers, investors and researchers apply.

Die Rolle der Konsistenz von Geschäftsmodellen auf den Unternehmenserfolg ist ein bisher wenig untersuchter Leistungsparameter. Die Konsistenz von Geschäftsmodellen beschreibt dabei, wie gut einzelne Elemente eines Geschäftsmodells zueinander passen und aufeinander abgestimmt sind. In Management und Forschung wird heute oft der einfachen Regel gefolgt, dass eine höhere Konsistenz eines Geschäftsmodells einer Geringeren überlegen sei.

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Wenn allerdings auch die Kosten für Geschäftsmodellkonsistenz in jungen Industrien berücksichtigt werden, lassen sich Argumente anführen, die für die Vorteile einer geringen Konsistenz sprechen. Der vorliegende Aufsatz erforscht Kontextfaktoren, innerhalb derer Geschäftsmodellkonsistenz als empfehlenswert oder nicht empfehlenswert erscheint. Dabei messen wir Konsistenz näherungsweise durch den Fit von Finanzkennzahlen mit der Geschäftstätigkeit innerhalb mehrjähriger Beobachtungen von 210 Wind- und Solar-Firmen. Wir zeigen, dass Kontingenzfaktoren wie Industrie, Geschäftsmodell oder Wachstumsmuster einen unterschiedlichen starken Einfluss auf das Verhältnis von Geschäftsmodellkonsistenz und Unternehmenserfolg haben können. Basierend auf unseren Ergebnissen empfehlen wir, diese Kontextfaktoren zu beachten und die Konsistenz von Geschäftsmodellen nicht per se als vorteilhaft einzuschätzen. Wir schliessen den Aufsatz mit Implikationen für Manager, Investoren und künftige Forschung.

1. Introduction: The Business Model Consistency Heuristic

Business models specify processes of value creation and value capture (*Baden-Fuller/Haefliger* 2013). In that sense, business models depict "a combination of resources which through transactions generate value for the company and its customers" (*DaSilva/Trkman* 2014, 383). In investigating what business models do, scholars find empirical evidence that business models impact firm performance (*Zott/Amit* 2007; *Zott/Amit* 2008). The literature on business models offers different explanations for this relationship: business models appear as a "mediator between a technology and economic value creation" (*Chesbrough/Rosenbloom* 2002), create value for investors (*Doganova et al.* 2009; *Shanley* 2004) and translate a technology into value for customers (*Chesbrough et al.* 2002; *Johnson et al.* 2009; *Lee et al.* 2012; *Morris et al.* 2005). In more recent studies, scholars define a business model as an "activity system" (Zott et al., 2010), which creates and captures value by orchestrating external activities (for example, interaction with customers and investors) and internal activities (hence activities within the firm itself). Such an understanding implicitly features the assumption that the different activities should be consistent and should fit to each other as best as possible. For instance *Johnson et al.* (2008, 53) claim that business model elements should "bond to one another in consistent and complementary ways" and *Morris et al.* (2005, 732) elaborate on the importance of business model consistency which "can be described in terms of both internal and external 'fit' where the former is concerned with a coherent configuration of key activities within the firm and the latter addresses the appropriateness of the configuration given external environmental conditions."

The basic assumption that consistency positively drives firm performance is hardly questioned in the literature. We see three reasons for that: First, psychologically, consistency and coherence were found to impact or rather facilitate decision-making (*Morewedge/Kahneman* 2010). Second, various studies in organization science inform us about the value of consistency. The analogous concept of fit, for example, is considered to be a "primary determinant of success" (*Galbraith 1977*, 6). Consistency has been an inherent argument for typologies such as the pattern applied by *Miles and Snow* (1984), for discussions on configurations (*Miller* 1996), and it is one of the building blocks of the contingency theory perspective (*Drazin/Van de Ven* 1995). Especially *Miller*, whose approach is closely associated with business model research (see *Zott/Amit* 2007; *Zott/Amit* 2008), offers a detailed discussion on the value of different "degrees of configuration" and the impact on

firm performance (*Miller* 1996). Finally, empirical evidence from various industries supports the overall value of consistency. Roca-*Puig* and *Bou-Llusar* (2007), for example, find evidence for the value of consistency in the hotel, dealership and transport sector. Overall it appears that managers and research follow the business model consistency heuristic, indicating that business model performance is positively associated with the degree of business model consistency.

While there is research on the positive impact of high degrees of consistency, little research exists on configurations that might require or reward less consistent set-ups. *Miller's* statement (1996, 511) that "the more changing and uncertain the environment, the more loosely coupled the elements of an organization may have to be" gives an indication of how relevant a reinvestigation of consistency is, especially when looking at firms in emerging industries that need to respond to uncertainty and change. *Brown* and *Eisenhardt's* notion on "competing on the edge" suggests that within turbulent environments non-consistent configurations can also be beneficial (*Brown/Eisenhardt* 1998). However, it is unclear what the performance consequences of business model consistency are. Especially in emerging industries like the renewable energy industry this is a problem as managers do not know when it is rational to focus on business model consistency and when not. However, the renewable energy industry is only one emerging sector among others that is characterized by high uncertainty and change. In these industries, business model consistency might not only be beneficial but may also be associated with substantial costs that lead to unclear performance consequences: i.e., business model consistency could result in less flexible activity systems once changes in the industry context come up. Deciding on the right level of business model consistency is also a challenge for managers in a broad range of other industries. Thus, the question we address in this paper is: what is the value of business model consistency for firm performance in emerging industries? We argue that while there is generally a benefit of consistency on performance, this varies depending on the contingency factors firm growth, business model theme and industry. We study our question within the context of two entrepreneurial and fast growing renewable energy industries: wind and solar. The rationale for choosing these industries is twofold. First, the renewable energy industry is at the leading edge of the most expansive economic transitions in the near future. The International Energy Agency calls for investments in low-carbon electricity generating technologies such as wind and solar to be heavily increased in order to reduce energy related CO2 emissions (IEA 2010). In this context, firm performance and investor attractiveness are particularly important enablers of the proposed fundamental change in energy production (IEA 2012). Hence, it is timely and necessary for research to better understand drivers of firm performance in the renewable energy industry. Second, due to their emerging stage, findings from the renewable energy industry are also transferable to other young industry sectors that face similar dynamics and change.

To assess our research question we look at business model consistency from a contingency perspective. In this regard, we mainly draw on discussions on degree of configuration and fit. We then introduce our model of how business model consistency impacts firm performance and discuss firm growth and business model theme as moderating factors. Based on this model, we develop hypotheses, create new consistency measures, and perform hierarchical OLS regressions. A discussion of our results follows. Finally, we discuss the implications of our findings for management and investors of firms in emerging indus-

tries; and we conclude by examining the limitations of our study and the implications for future research. Overall, the paper contributes to the literature on business model consistency and firm performance in emerging industries. We also state particular contribution to the emerging understanding of the contingencies of managerial heuristics. For management and investors, we aim to shed light on the question of when a consistent business model set-up is beneficial for firm performance and when investments for establishing consistency outweigh the value of consistency.

2. Business Model Consistency and Firm Performance in Emerging Industries

Business model consistency hereafter is referred to as the internal fit of business model activities with an overarching theme. This understanding of business model consistency is informed mainly by two different streams of organization theory: discussions of fit, on the one hand, and discussions of configurations which have later been adopted from the business model literature, on the other. Thus, the concept of fit is mostly associated with a contingency theory perspective (*Drazin/Van de Ven* 1985). Nevertheless, the question of whether a high degree of fit is beneficial for firm performance has always been of interest to management scholars. Fit, moreover, has been an important aspect in strategy research within debates of strategy and structure dominated by *Chandler* (1962), *Miles* and *Snow* (1986) and others. While *Drazin* and *Van den Ven* (1985, 535) find that "fit is a significant predictor of [unit] performance", *Miles* and *Snow* (1984, 10) claim that "tight fit, both internally and externally, is associated with excellence", and *Galbraith* (1977, 6) even argues that coherence or fit "is the primary determinant of success".

It was *Danny Miller* who further developed ideas of consistent organizational forms and introduced the concept of configurations. He presented a logic of grouping firms and discussed three distinct criteria to classify configurations (1996, 21): typology, taxonomy and configuration as a quality. Especially the third approach with configuration as a quality is of interest to us as it outlines that firms actually differ in their degree of configuration (ibid.). Based on the idea of fit, the explanation for "degree of configurations", for the first time, points to the fact that firms can actually vary according to how closely their elements fit together; hence, how consistent organizations are. This notion in a first step argues for a variance within this dimension without indicating that highly consistent firms are superior to others. *Miller* mainly outlines positive aspects of consistency, for example that it helps to create synergies and coordinate stakeholder activities (1996, 6). At the same time it becomes clear that consistency requires costs to be established. Management needs to allocate time to establish, monitor and maintain consistency. Markets may reward inconsistent business models over consistent business models when uncertain environments require an equally flexible organizational design. On contrast to the advantages of a high degree of consistency, the costs that come with it can be a burden, depending on internal and external contingencies. Threats of high consistency include, for example, organizational processes that become too static and are inefficient in handling environmental dynamism (*Brown/Eisenhardt* 1998). Thus,

H1: Performance consequences from business model consistency are contingent upon context.

2.1. The Role of the Industry Context for Consistency-Performance Relationships

The first determinant of the consistency-performance relationship we discuss is the industry context. In contrast to arguments that point to a benefit of consistency, especially for emerging industries we find arguments that point to optimal levels of consistency, rather than praising consistency per se. As *Miller* (1996, 511) argued, an appropriate level of configuration needs to be in line with the environmental conditions of an organization – especially in uncertain and volatile contexts, such as in emerging industries. The higher the external uncertainty and change, the more flexible business models are required. In fact recent research points to different types of business models that process different types of change, such as creation, extension, revision and termination (*Cavalcante et al.* 2011). There is good reason to believe these business model types fit differently to various industry contexts. Basically, we assume that a variance in industry context leads to a variance in the value of business model consistency. In particular, when assessing industries in different development stages, we assume that within separate emerging industry stages business model configurations would impact firm performance differently (*Phaal et al.* 2011). While emerging industry segments require a lower degree of consistency due to faster changes, the value of consistency is expected to be higher within more mature industries (*Sabatier et al.* 2012). Our second hypothesis is therefore:
H2: The value of business model consistency is higher in more mature industries

2.2. The Role of Firm Growth for Consistency-Performance Relationships in Emerging Industries

We further expect consistency-performance relationships to be moderated by firm growth. From an investor perspective, firm growth sends positive signals (*Davidsson et al.* 2009) as it is often seen as a sign of successful future performance. In regard to consistency-performance relationships, growth could reinforce positive effects of consistency on performance and gild negative effects. In addition, to further fuel growth prospects and gain scale, a minimum degree of consistency could be a prerequisite as consistency drives efficiency e.g. in providing orientation and guidance for stakeholders. However, firms that grow might also be innovative and flexible rather than mature. For instance, for firms that operate business models that process change (e.g. *Cavalcante et al.* 2011) we would anticipate that growth could have a negative impact on the consistency-performance relationship. Such business models would grow flexible activity systems for which consistency could result in constraints. Overall we submit that firm growth is an important aspect when looking at the consistency-performance relationship. Firm growth is consequently used as our first moderator and the following hypothesis is proposed.
H3: Firm growth moderates the consistency-performance relationship.

2.3. The Role of Business Model Theme for Consistency-Performance Relationships in Emerging Industries

The business model classifies a firm's activities for value creation (*Sabatier et al.* 2012) and is often used as a communication device to investors and other stakeholders (*Doganova et al.* 2009). In addition, through their contribution to customer value creation and competitive positioning, business models have an effect on firm performance. This effect has been studied for instance by *Zott* and *Amit* (2007), who assess the performance impact of busi-

ness model designs in entrepreneurial firms. *Patzelt et al.* (2008) elaborate on the moderating effect of business models on the relationship between top management team composition and firm performance. In addition, *Zott* and *Amit* (2008) highlight the moderating effect of business models on the relationship between product market strategy and firm performance. Within their assessments of business models and firm performance *Zott* and *Amit* (2007, 2008) selected in reference to *Miller* (1996) innovation- and efficiency-driven business models as contrary, yet encompassing and complementary themes. Following *Baden-Fuller* and *Morgan* (2010) we regard business models as models. The notion of business models as models has a history in meaning that reaches back to *Max Weber's* concept of ideal-types (*Weber* 2011/1904). In such innovation- and efficiency-driven business models are two exemplars of business model ideal-types. There might be other types, however, business model type as a moderator and the corresponding effects seem to be important to consider when investigating performance consequences from business model consistency.

As the main source of value creation, innovation-driven business models focus on novelty and the creation of new goods, technologies or services, while efficiency-driven business models encompass (transaction) cost reduction through, for example, improvement of information transparency and information flows or process optimization (ibid.). *Sánchez* and *Ricart* conduct multi case studies to reveal contingency factors that enable differentiation of two other types of business models: isolated and interactive business models (*Sánchez/Ricart* 2010). These types are especially different in regard to their underlying behavior: a firm operating an isolated business model "individually identifies and exploits the opportunity as fast as possible", whereas a firm that operates an interactive business model "creates the opportunity jointly with local actors and partners through an iterative learning process" (*Sánchez/Ricart* 2010, 148).

For the research at hand we follow *Zott* and *Amit's* approach when comparing efficiency- and innovation-driven business models because we expect those two business model themes to moderate the consistency-performance relationship differently. While in efficiency-driven business models a high degree of consistency is expected to be especially beneficial as it allows for specialization, cost reduction or optimization, for example, this is not the case in innovation-driven business models. Innovation may require less standardized structures and can be established within organizations with lower levels of consistency. *Lee at al.* (2012, 832), for example, define innovativeness as "ever changing environment-responsive strategies […]" – a definition that inherently argues against consistency. Our last hypotheses are therefore:

H4: The business model theme moderates the consistency-performance relationship

H4a: Efficiency-driven business models moderate the consistency-performance relationship positively

H4b: Innovation-driven business models moderate the consistency-performance negatively

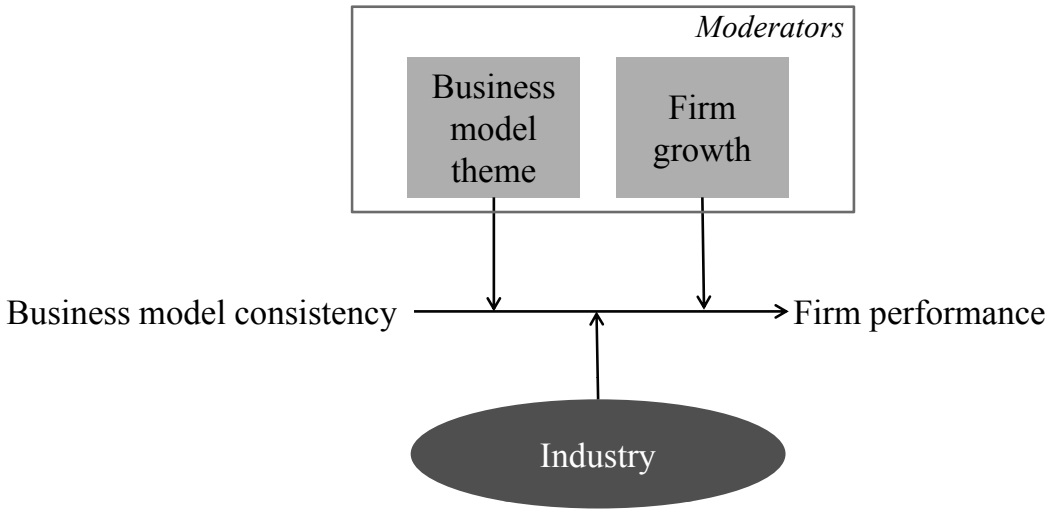

Figure 1: Consistency-performance model

3. Method

To test our hypotheses we first created a dataset for wind and solar companies from Worldscope (Thomson Reuters, 2012) and OneSource databases (OneSource, 2012). Based on this dataset we conducted content analyses. In the content analysis we identify necessary information from business descriptions for business model classifications and independent variables. We are confident with this approach since the use of coded textual and/or survey information for a representation of business models has been applied in the past, for example by *Zott* and *Amit* (2007, 2008) and *Casadesus-Masanell et al.* (2010). Second, we derived a set of independent variables based on our theoretical discussions to measure consistency of business models. Third, we ran – together with a set of control variables – a hierarchical OLS regression analysis as applied by *Zott* and *Amit* (2007, 2008) to assess the relationship between consistency and firm performance.

3.1. Data Collection

We produced an expansive list of wind and solar companies from Worldscope and OneSource. This approach is widely applied for aggregating larger, multi-year datasets (see for example Laamanen et al., 2008; *Wan et al.* 2003). Our data covers the period from 2006 to 2009. We looked at this particular time period between 2006 and 2009, as it was a relatively stable time-period in the industry, which provides sufficient control for externalities. In particular the years 2006-2009 are characterized by a stable high importance of the European renewable energy market. For instance if we look at the share of German PV capacity in global cumulative installed PV capacity, we see that between 2006-2009 the share ranges on a constant level between 38% and 44%, after a phase of strong growth before this period and a drop after this period (*Hoppmann et al.* 2014). Given the high relevance of the European market at that time, this time period also controls for greater structural changes from 2009 onwards. For instance if we look at the history price ex-

tremes in the day-ahead market as an indicator, we see differences in peaks of weekly maximum and minimum prices after 2009 compared to the period until the year 2009 (*Mayer* 2014). Additionally, the relevant policy frameworks such as the renewable energy related policies in Germany remain relatively stable within the given period, before they start to change and result in the first legislation for the amendment of the Renewable Energy Sources Act in 2010 (*Hoppmann et al.* 2014). For this dataset we identified all publicly listed companies that contained "solar" or "wind" in their business description and derived an initial list of 1,144 companies (624 wind and 522 solar). Subsequently, we excluded entries due to data availability issues or misleading business descriptions and arrived at a final sample size of 210 firms (93 wind; 117 solar). The regional split is similar for both sectors. In the total sample the geographical distribution is 28% in Europe and Africa, 28% in the Americas and 56% in APAC. In our sample the average size of firms (based on annual revenue) in the wind sector is USD 2,120 million, in the solar sector USD 1,463 million (mean over the period from 2006 to 2009). Moreover, the wind firms in our sample are more profitable (mean return on sales 0.07, s.d. 0.10) than the solar firms (mean return on sales -0.01, s.d. 0.17). Compounded annual growth is 10% for solar and 28% for wind firms over our analysis timeframe.

After aggregating this cross-sectional dataset we conducted a two-step content analysis of the Worldscope business description. We categorized the firms according to their business model theme (innovation-driven or efficiency-driven) (*Loock* 2011). The codes for the business model themes were based on items suggested by *Zott* and *Amit* (2008, 23-26) with adoptions due to the particularities of the renewable energy sector (for example, we added "turnkey" and "patent" which are particularly relevant in technology driven industries).

	Business description
Innovation-driven	(innovation, invent, novel, patent, design, research, development, exploration)
Efficiency-driven	(marketing, brand, selling, sale, promotion, service, support, turnkey, large scale, low cost)
Not-clear	)innovation, invent, novel, patent, design, research, development, exploration, marketing, brand, selling, sale, promotion, service, support, turnkey, large scale, low cost(

Table 1: Code definition for business model themes

We then performed a computer-aided word count of the respective codes and clustered the companies based on the frequency of the respective codes into three categories of business model themes: innovation-driven or efficiency-driven. If themes were mentioned equally frequently or if neither theme was mentioned, the business model was classified as "not clear". This procedure resulted in 28 innovation-driven and 24 efficiency-driven firms in the wind and 29 innovation-driven and 51 efficiency-driven firms in the solar sector.

3.2. Dependent Variable

To measure firm performance we selected – congruent with prior management and organizational research (see *Chung et al.* 1994; *Dowell et al.* 2000; *Lindenberg et al.* 1981; *Villalonga* 2004) – Tobin's q, defined as a company's market value over replacement cost of

its tangible assets. Tobin's q is widely used as a measure of expected returns (*Villalonga* 2004, 211). Additionally Tobin's q enables us to also depict qualitative signals sent from consistency of business descriptions with financial figures to stakeholders, such as investors. As such Tobin's q also allows us to cover such kind of "intangible" performance consequences. For Tobin's q a value greater than 1 indicates high expectations of future performance, while a value smaller than 1 indicates low expectations by investors.

We collected all necessary information from Worldscope and calculated the market value from the sum of market capitalization, long-term debt, and current liabilities (*Dowell et al.* 2000). Finally, we derived the mean over the time period from 2006 to 2009 following the proposition by *Dowell et al.* (2000) to account for possible extreme values over the time period.

3.3. Independent Variables

To assess the consistency of business models we created two proxy variables that were aggregated into the overall consistency measure of our analysis. The two proxy variables are financial and descriptive consistency. They allow us to measure the alignment of publically available quantitative and qualitative data with the respective business model theme of the firms.

Financial consistency: Financial consistency was measured by two separate financial ratios that should show characteristic levels for the respective business model theme. Furthermore, a selection criterion for the ratios was data availability for all firms in our sample on a comparable basis (R&D expenses, for example, are not reported in a standardized form). We always compared the ratio achieved by an individual firm (over our time period from 2006 to 2009) to its industry cluster peers[1] and used a 3-point-Likert scale to assign the consistency values. 3 points were assigned for more than 20% deviation from the industry mean, 2 points for more than 10% deviation from the industry mean, 1 point for less than 10% deviation.

The ratio used for innovation-driven business models is intangibles / total assets. In our perspective, the share of intangibles in total assets is a suitable variable to assess consistency in an innovation-driven business model because intangibles comprise intellectual property created by a company itself. Intangibles can include, for instance, patents, copyrights and trademarks. A high share of capitalized intangibles in a firm's balance sheet thus indicates a strong innovative performance that can only be achieved through an internal, consistent alignment of research and development activities (*Canibano et al.* 2000; *Fernandez et al.* 2000).

The ratio used for efficiency-driven business models is inventory turnover. Inventory turnover is defined as cost of goods sold over the mean of the current and last year's inventory, and can be interpreted as the number of times a company's inventory is sold over a period of 12 months. A high turnover stands for high efficiency levels in terms of optimized internal production, purchasing and logistics processes, and is therefore characteristic for efficiency-driven firms (*Jahnukainen et al.* 1999).

1 We calculated the mean per ratio within the industry clusters from Worldscope (see section on control variables) to account for potential differences in cost structures, raw material prices, etc. within our sample.

Descriptive consistency: Based on *Doganova* and *Eyquem-Renault's* line of argumentation (2009) business models also operate as narrative devices that help outsiders understand the business activities of a firm. We therefore also incorporated a qualitative measure in our analysis to assess consistency in this dimension. The descriptive proxy variable was derived through a content analysis of the individual OneSource (OneSource 2012) strategy reports. We developed the same number of codes per business model theme (see Table 2 for an overview), again based on the concepts used by *Zott et al.* (2007, 2008, 2010) that describe structural and procedural dimensions of the firm's business activity. The resulting independent variables are named "Consistency Efficiency" and "Consistency Innovation" for the respective business model types. In a next step, we assigned consistency if a firm had an above average word count compared to its industry cluster peers.

Business model	**Financials**	**Strategy descriptions**
Innovation-driven	Intangibles/ total assets	flexible, innovative, invention, innovation process, freedom, creativity, vision, inspiration, knowledge, patent, design, concept, pioneer, R&D
Efficiency-driven	Inventory turnover	specialization, formalization, control, reduction, rule, procedure, coordination, efficient, effective, optimization, transaction cost, systematic, plan, complexity

Table 2: Applied financial ratios and codes for consistency assessment

After we aggregated the individual consistency measures we summed them up to an overall proxy variable. The respective values were measured on a 5-point-Likert scale with 1 representing low consistency and 5 representing high consistency.

Business Model Consistency = Financial Consistency + Descriptive Consistency

Measuring business model consistency as the sum of financial consistency and descriptive consistency provides major advantages: the financial figures and the descriptive elaboration on the business model refer to two distinct activities within a firm. One activity concerns accounting, such as disclosing numbers, the other activity concerns qualitative reflection on what the firm is actually doing. This variance of two distinct activities allows us to actually depict consistency of a business model from an activity system perspective. This approach results in the highest consistency levels only for those firms that have the highest consistency level in the financial dimension and are consistent in the descriptive dimension as well. See Figure 2 for an overview of the procedure.

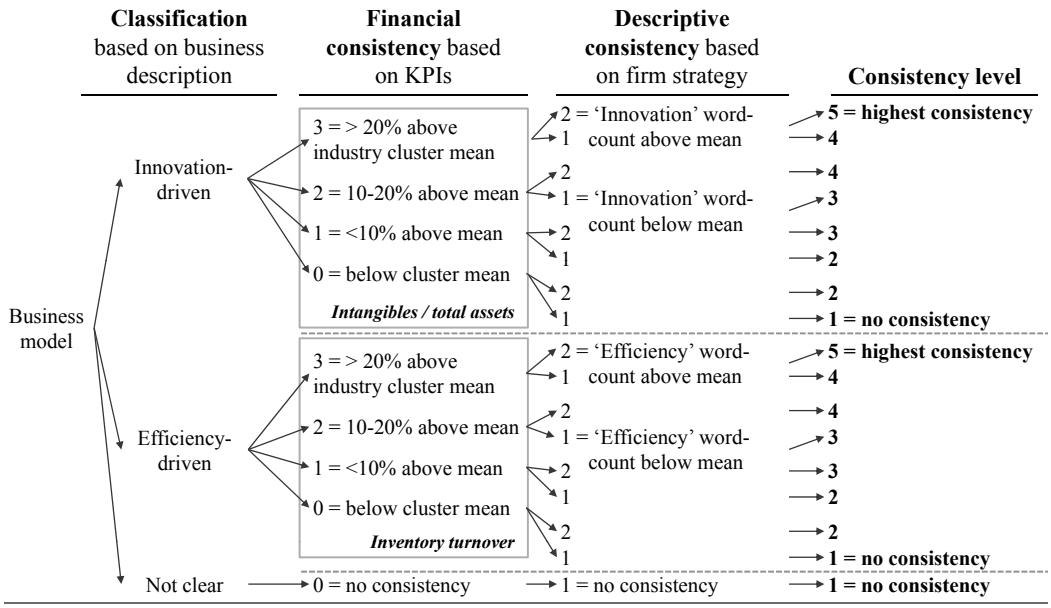

Figure 2: Consistency level measurement

3.4. Control Variables

We included several control variables in our analysis (*Zott/Amit* 2008) that in previous studies were shown to influence Tobin's q: company size, measured by the normalized mean of revenues from 2006 to 2009, profitability, measured by the normalized mean of return on sales from 2006 to 2009, and growth, measured by compounded annual sales growth from 2006 to 2009. In addition, we included region and industry cluster, based on the classification from Worldscope (Thomson Reuters 2012).

3.5. Analytic Procedure

To test our hypotheses we analyzed our data using multivariate regression techniques. We analyzed the wind and the solar sample separately since we assume that different industry stages and business activities in these industries lead to different revenue models, accounting procedures and cost structures which would limit the comparability of the applied financial measures in a joint regression. Furthermore, as stated in our fourth hypothesis, we expect the industry context to have an influence on the consistency-performance relationship. The moderating effects in hypotheses 2 and 3 were assessed by addition of interaction terms. We furthermore validated our models in a two-step process. First, to fulfill the conventional requirement of normally distributed variables, we conducted a logarithmic transformation of the dependent as well as two independent variables (sales and profitability). Second, we tested for multicollinearity among the independent variables (see Table 3 and 4 for Pearson's correlations). The variance inflation factors (VIF) were calculated among first-order terms as well as among first- and second-order terms when interaction terms were introduced. In all cases the VIF levels were smaller than the threshold level 10 (*Kleinbaum et al.* 1998).

4. Results

Our results show no plain consistency-performance relationship per se. However, there are differences in the consistency-performance relationship in the wind and solar industry. Efficiency- and innovation-driven business models were found to have an impact on the relationship as well. Furthermore, we find instances were growth moderates the relationship.

4.1. Descriptive Statistics

In our sample the average size of firms in the wind sector is USD 2,120 million, in the solar sector USD 1,463 million (mean over the period from 2006 to 2009). Moreover, the wind firms in our sample are more profitable (mean return on sales 0.07, s.d. 0.10) than the solar firms (mean return on sales -0.01, s.d. 0.17). Compounded annual growth is 10% for solar and 28% for wind firms over our analysis timeframe.

4.2. OLS Regressions

In model 1a we test the influence of consistency on firm performance by only including these variables, along with growth and our controls, into the regression. We are not able to measure a significant result for a consistency-performance relationship per se. Thus, claims in previous studies that consistency is directly linked to performance cannot be supported by our analysis. We find, however, a significant relationship of consistency and performance that is negatively moderated by growth in model 1b (addition of interaction term 'consistency*growth'; $p<0.01$). This effect only occurs in the solar sector. With these results we cannot confirm hypothesis 3, but we find a first indication that results vary among our two industry sectors as stated in hypothesis 2.

To test the impact of business model theme, we analyze three different models per theme in a next step. First, we only add consistency and business model (models 2a and 3a), then we add the interaction term 'business model theme*consistency' (models 2b and 3b), lastly we add the interaction with growth (interaction term 'business model theme*consistency*growth', models 2c and 3c). When looking at differences for business models and consistency, we only find a positive effect of consistency in innovation-driven business models in the wind sector (models 3a to 3c, $p<0.01$). The interaction effects of consistency and business model as tested in models 2b and 3b are not significant. We therefore reject hypothesis 4.

Hypothesis 3 is further tested in models 2c and 3c by adding the interaction terms with growth. In the wind sector, we find a slightly significant, positive moderation for efficiency business models (model 2c, $p<0.1$) and a negative moderation for innovation business models (model 3c, $p<0.01$). We do not find any significant results linked to business models and growth in the solar sector. Combined with the negative moderation by growth in model 1b, we can therefore only confirm hypothesis 3 in one model: for growing wind firms with efficiency business models.

To test hypothesis 2 we analyze our samples in two different regressions. As the results vary between our two sectors, and because we find a stronger impact of consistency in the wind than in the solar sector, we see support for hypothesis 2. The consistency-performance relationship therefore depends on industry contingencies and industry maturity could be an explanatory factor. We discuss this question in more detail below.

Variables	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12
Business model gestalt themes														
1. Efficiency	0,26	0,44	1,00											
2. Innovation	0,30	0,46	-0.39***	1,00										
Dependent variable˜														
3. ln (Tobin's Q average 2006-2009)	1,74	1,32	-0,06	-0,03	1,00									
Indepentent variables														
4. Consistency	1,33	1,57	0.47***	0.37***	-0,05	1,00								
5. Consistency_Efficiency	2,61	1,29	-0,01	-0,02	-0,12	0,12	1,00							
6. Consistency_Innovation	1,98	1,34	0,05	0,12	0.26*	0.42***	-0,05	1,00						
7. Growth (revenue CAGR 2006-2009)	0,28	0,43	0,01	0,09	0.47***	0,12	-0,08	0,10	1,00					
Control variables														
8. Region	2,19	0,63	-0,06	0,06	0,02	0,12	-0,08	0.30**	-0,17	1,00				
9. Age	35,81	33,95	-0,06	-0,05	-0.30**	-0,01	0,04	0,14	-0.30**	0.21*	1,00			
10. Industry cluster	3,10	1,56	0,01	-0,06	0,00	-0,05	-0,03	-0,05	0,15	-0,12	-0,01	1,00		
11. ln (average revenues 2006-2009)	2120,24	4913,24	0,11	-0,14	-0.29**	0,12	0,07	-0,09	-0.26*	-0,02	0,17	0,06	1,00	
12. ln (average return on sales 2006-2009)	0,07	0,15	0,06	-0,11	-0,09	0,02	0,06	-0,04	-0.40***	0,00	0,03	-0,12	0.34**	1,00

Note on descriptive statistics:
Mean of Tobin's q, revenues and return on sales in USD millions (not normalized)
***p <0.001, **p < 0.01, *0.01 <= p < 0.05, †0.05 <= p <= 0.1

Table 3: Pearson´s correlation table for the wind sample

Variables	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12
Business model gestalt themes														
1. Efficiency	0,44	0,50	1,00											
2. Innovation	0,25	0,43	-0.51***	1,00										
Dependent variable˜														
3. ln (Tobin's Q average 2006-2009)	1,61	0,95	-0,18	0,02	1,00									
Indepentent variables														
4. Consistency	1,62	1,57	0.57***	0,10	-0,13	1,00								
5. Consistency_Efficiency	2,45	1,28	0,13	-0,08	0,03	0.42***	1,00							
6. Consistency_Innovation	2,12	1,43	0,10	-0,09	0,05	0,15	-0,09	1,00						
7. Growth (renvenue CAGR 2006-2009)	0,10	0,26	0,06	-0,11	0,17	0,02	0.18*	0,00	1,00					
Control variables														
8. Region	2,06	0,67	0.23*	-0,02	-0.19*	0.18*	0,11	0,06	0,16	1,00				
9. Age	32,02	25,90	0.20*	-0.27**	0,02	0,05	0,08	0,09	-0,07	0,10	1,00			
10. Industry cluster	2,55	1,44	.21*	-0,01	0,02	0.33***	0.18*	0.25**	0,07	0,09	0.19*	1,00		
11. ln (average revenues 2006-2009)	1463,97	4871,80	0.20*	-0,11	-0.19*	0,18	0,08	0,15	-0,02	0,10	0.26**	0,10	1,00	
12. ln (average return on sales 2006-2009)	-0,01	0,32	0.20*	-0,04	-0,01	0,06	-0,08	0,02	0.25**	0.25**	0,09	-0,01	0.28**	1,00

Note on descriptive statistics:
Mean of Tobin's q, revenues and return on sales in USD millions (not normalized)
***p <0.001, **p < 0.01, *0.01 <= p < 0.05, †0.05 <= p <= 0.1

Table 4: Pearson´s correlation table for the solar sample

Variables	Consistency		Efficiency			Innovation		
	Model 1a	Model 1b	Model 2a	Model 2b	Model 2c	Model 3a	Model 3b	Model 3c
Constant	0.84***	0.79***	0.81***	0.71**	0.79***	0.81***	0.83***	0.77***
Independent variables								
Consistency	-0,02	-0.01*						
Consistency_Efficiency			0,02	0,05	0,02			
Consistency_Innovation						0,03	0,02	0,03
Efficiency			-0,15	0,03	-0,12			
Innovation						0,06	-0,06	0,07
Growth (revenue CAGR 2006-2009)	0.34*	0.60**	0.33†	0.32†	0.44*	0.36*	0.37*	0.41*
Interaction terms								
Consistency*Growth		-0.14†						
Innovation*Consistency_Efficiency				-0,07				
Innovation*Consistency_Efficiency* Growth					-0,08			
Innovation*Consistency_Innovation							0,06	
Innovation*Consistency_Innovation* Growth								-0,17
Control variables								
Region	-0.14*	-0,14	-0.14*	-0.13*	-0.14*	-0.16*	-0.15*	-0.14*
Industry cluster	0,02	0,02	0,02	0,02	0,02	0,00	0,00	0,00
Age	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
ln (average revenues 2006-2009)	-0.05*	-0.05*	-0.05*	-0.05†	-0.05*	-0.06*	-0.06*	-0.06*
ln (average return on sales 2006-2009)	0,15	0,12	0,24	0,23	0,20	0,15	0,16	0,20
R2	0,12	0,15	0,14	0,15	0,15	0,13	0,13	0,13
Adj. R2	0,07	0,08	0,08	0,08	0,08	0,06	0,06	0,06
F	2.18*	2.30*	2.19*	2.08*	2.06*	1.95†	1.81†	1.85†
N	117	117	117	117	117	117	117	117

***p <0.001, **p < 0.01, *0.01 <= p < 0.05, †0.05 <= p <= 0.1

Table 5: Regression results from the wind sample

Variables	Consistency		Efficiency			Innovation		
	Model 1a	Model 1b	Model 2a	Model 2b	Model 2c	Model 3a	Model 3b	Model 3c
Constant	0,44	0,41	0.54†	0.59†	0.62*	0.46†	0,30	0,26
Independent variables								
Consistency	-0,03	-0,02						
Consistency_Efficiency			-0,03	-0,04	-0,04			
Consistency_Innovation						0.09**	0.12**	0.10**
Efficiency			-0,07	-0,18	-0,15			
Innovation						-0,13	0,12	0,02
Growth (revenue CAGR 2006-2009)	0.56***	0.68**	0.54***	0.52***	0.35*	0.49***	0.49***	0.68**
Interaction terms								
Consistency*Growth		-0,05						
Innovation*Consistency_Efficiency				0,04				
Innovation*Consistency_Efficiency* Growth					0.10†			
Innovation*Consistency_Innovation							-0,12	
Innovation*Consistency_Innovation* Growth								-0.24**
Control variables								
Region	0,11	0,11	0,09	0,09	0,10	0,05	0,08	0,08
Industry cluster	-0,01	-0,02	-0,01	-0,01	0,00	-0,01	-0,01	-0,02
Age	-0.00†	-0.00	0,00	-0.00†	-0.00†	-0.00*	-0.00*	-0.00*
ln (average revenues 2006-2009)	-0.05†	-0,05	-0.05†	-0.05†	-0.05†	-0.05†	-0.05†	-0,04
ln (average return on sales 2006-2009)	0,37	0,39	0,37	0,37	0,32	0,32	0,33	0,27
R2	0,32	0,32	0,31	0,31	0,34	0,36	0,38	0,44
Adj. R2	0,26	0,25	0,25	0,24	0,26	0,30	0,31	0,38
F	5.58***	4.93***	4.75***	4.21***	4.66***	5.83***	5.59***	7.14***
N	93	93	93	93	93	93	93	93

***p <0.001, **p < 0.01, *0.01 <= p < 0.05, †0.05 <= p <= 0.1

Table 6: Regression results from the solar sample

5. Discussion

We do not find a repeatedly positive or negative relationship of consistency and performance throughout our sample. The first instance in which we find significant results is when looking at the moderating role of growth. Hypothesis 3 proposed a moderating role of growth: Basically, we find a positive moderating effect for efficiency business models in the wind sector. In more established sectors, like the wind industry, for firms that follow an efficiency centered business model and are growing, consistency appears to be valuable as it leads to comparably higher performance. In contrast, we also find two cases of a negative moderation. The first is found in the solar sector, independently of the business model. It seems that the industry is a dominant contingency factor for consistency-performance relationships, and in emerging industries like solar the moderating role of growth hardly explains variance of the performance consequences from consistency. In the wind sector, we find a negative effect of firm growth for innovation-driven business models. This is interesting as it supports arguments that for some business model types consistency can actually become a burden as these firms grow and scale their business model.

The negative moderation of growth for only one business model theme leads us to the discussion on our fourth hypothesis. We argued that consistency is positively associated with efficiency-driven business models and negatively with innovation-driven models. However, looking at business model consistency-performance relationships, we need to reject our hypotheses. For efficiency-driven business models we find only one positive effect in connection with growth in the wind sector. In all other models there are no significant results. For innovation-driven business modes we find the opposite effect to our hypothesis: in the wind sector we find a positive effect from consistency. Our findings challenge discussions on innovativeness that argue for a high degree of flexibility to reach optimal performance (*Lee et al.* 2012) and it appears that consistency can also pay off for firms operating innovation-centered business models. As this finding only appears in the more mature wind industry, we propose the following explanation: when industry maturity increases and innovation becomes more incremental rather than disruptive, positive performance consequences emerge from business model consistency in innovation-driven firms.

Finally, when comparing our industry settings as in hypothesis 2, we find support for a higher value of consistency in more mature industries. For the solar industry we show that growth negatively moderates the consistency-performance relationship – regardless of the business model. Thus, we assume that within early-stage industries consistency does not have a value per se. In fact, for fast growing firms less consistent business models seem to be more advisable as they might enable firms to better account for and react to industry uncertainty and change. More granular results can be seen in the more established wind sector, where the industry characteristics (e.g. less uncertainty and change) lead to different consequences from business model consistency depending on business model theme and firm growth. These results add to the discussion by *Phaal et al.* (2011) on industrial emergence and related success factors and support a contingent view on the business model heuristic. We summarize our findings related to industry evolution in Figure 3. As the industry lifecycle continues, we expect the advantages of consistency discussed earlier to become more apparent (*Drazin et al.* 1985; *Galbraith* 1977; *Miles et al.* 1984). In younger industries than the solar sector, we expect the findings from the solar industry to be even more pronounced. In fact we conclude that industry as a contingent factor determines whether the business model heuristic appears irrational, as it leads to unclear or even neg-

ative performance consequences, or whether it can be regarded "strategic rational" (*Bingham/Eisenhardt* 2011) as it can be associated with positive performance consequences.

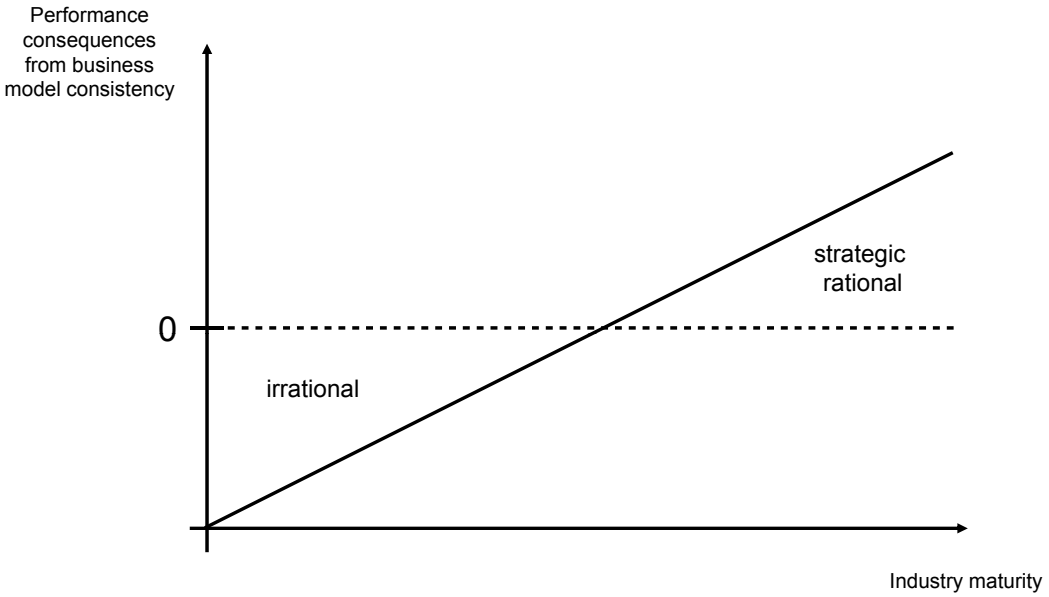

Figure 3: A contingent view on the business model consistency heuristic

6. Conclusion

Through our empirical investigation of renewable energy firm performance we found that firms differ according to the fit of business descriptions with financial measures and thus their business model consistency. We tested this variance of business model consistency for implications on financial performance as measured in Tobin's q with a sample of 210 firms in the renewable energy industry and investigated the impact of different degrees of consistency on firm performance. As fit is usually associated with superior firm performance (according to contingency theory), we expected a positive impact of consistency and renewable energy firm performance. However, our regression models do not identify a plain consistency-performance relationship.

These results have implications for managers as well as investors and bear potential for further research in different areas. When considering business model design, managers should weight the costs and benefits and need to be aware of the circumstances that drive the value of consistency. First, the business model theme itself has implications for the value of consistency and therefore requires attention when allocating financial means or deciding on activities to achieve consistency. Second, our findings show that it is important to consider the industry's evolutionary stage in order to determine if business model consistency is rational or not.

This work provides important contributions to recent discussions on management heuristics, which look at the heuristics that managers utilize for important strategic questions (*Bingham/Eisenhardt* 2011; *Vuori/Vuori* 2014; *Bingham/Eisenhardt* 2014). Rather than passing judgment on the overall rationality of heuristics, a contingent view on heuris-

tics specifies the "strategic rationality" (*Bingham/Eisenhardt* 2011) or "ecological rationality" (*Goldstein/Gigerenzer* 2002) of heuristics. In that sense, our work reveals the strategic rationality of the business model consistency heuristic and reveals contingency factors that moderate the performance feedback from business model consistency. In particular we point to the external environment, the industry, which defines rationality of the heuristic.

As we measure firm performance with Tobin's q, our discussion reflects the stock market and investors' perception of a firm's strategy. Our results therefore also have implications for investors. Investors should consider including business model consistency as a performance indicator into their investment analysis and actively monitor it. They should be cautious, though, with regard to the value they assign to consistency. Four aspects need to be considered, in particular: business model consistency, industry stage, business model type and firm growth. If consistency is used as a performance indicator, it is necessary to assess the fit between business model consistency and such contingency factors. The application of consistency as a performance indicator has also an additional implication for managers. They should be aware of their investors' preferences in regard to consistency. It is crucial to actively monitor and communicate consistency levels, costs, and underlying decisions.

The paper at hand also has limitations. First, our research focuses on particular types of business models (efficiency and novelty centered business models). While this focus has been motivated through earlier research (e.g. *Zott/Amit* 2007, 2008) it does not consider the role of consistency for other types, such as hybrid business models. However, some companies could possibly combine innovation and efficiency effectively, but our research does not test the performance consequences of consistency for such hybrid business models. Further investigation should take on this topic and test for the role of consistency within other types of business models, such as hybrid business models. Second, we see limitations in our sample selection. Although the selection allows us to report from a consistent data-set, and although the two sub-samples of wind and solar companies provides some confidence regarding the robustness of our results, we would like to encourage research that tests our model behaviour and the role of consistency within other emerging industries, different economic contexts, and other timeframes. Finally, our financial measures were chosen in accordance with earlier academic studies. Although we are confident that these measures reflect data that investors also consider, we suggest that future research should conduct case studies to observe which further cues investors do process to infer consistency and how such inference differs with data-availability or situational contingencies.

Drawing on our findings and limitations, we see different avenues for further research. First, since our study is an ex-post study, it would be interesting to elaborate on the impact of consistency within further settings. We propose a real-time investigation of the impact of consistency on investment preferences for that purpose (for example, within a conjoint experiment or a qualitative assessment). Second, we expect interesting insights from research that assesses other orchestrating themes than business models and other moderating effects beyond firm growth and business models. Finally, we suggest replication and in particular would like to encourage further analysis that tests our findings in other (e.g. more emerging and/or established) industries. This would potentially help to develop a

fine-grained model of how different external factors (such as industry dynamics) determine rationality of heuristics such as the business model consistency heuristic.

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