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Business model diversification: Demand relatedness, entry sequencing, and curvilinearity in the diversification-performance relationship

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ABSTRACT

This study integrates research on business model diversification (BMD) and demand-side theory to examine the relationship of BMD to performance and the sequencing of business model additions. We begin by explaining and demonstrating that the overall degree of BMD has an inverted U-shaped relationship with firm performance. We next highlight the particular role that demand relatedness plays in BMD. We first provide evidence that the inverted U-shaped relationship flattens in times of financial shocks, consistent with arguments that the benefits of BMD from consumers' willingness-to-pay for simultaneous use of multiple business models may diminish during shocks. Second, we argue that firms tend to sequence the addition of new business models based on demand relatedness, and we provide evidence that the degree of demand relatedness between a core and a target business model enhances the likelihood of diversification into that target business model.

1. Introduction

How does firm performance vary with the degree of business model diversification (BMD)? Examples of firms concurrently operating multiple different business models are commonplace. Newspaper companies offer ad-sponsored business models and traditional subscription-based models (Casadesus-Masanell and Zhu, 2010, 2013); airlines operate both full-service and discount carriers (Markides and Charitou, 2004); retailers conduct a variety of bricks-and-mortar approaches alongside e-commerce activities (Ahuja and Novelli, 2016; Kim and Min, 2015). Studies in this area provide insight into conditions under which the addition of one business model might affect performance (e.g., Kim and Min, 2015; Sohl et al., 2020). Recognizing, however, that many firms add more than only one business model (e.g., Aversa et al., 2021; Casadesus-Masanell and Tarziján, 2012; Sabatier et al., 2010; Snihur and Tarziján, 2018), a natural next question to extend this literature is to ask how the overall degree of business model diversification is associated with firm performance, where the degree of BMD reflects the number of business models in a firm's portfolio.

Failure to investigate the BMD-performance relationship across the addition of multiple models is problematic given that research

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on the choice of business model design and performance implications of single business models may be incomplete without consideration of how the focal model relates to other models within a firm's broader business model portfolio; it also leaves scholars with little insight into how firms sequence the addition of multiple models as they build a business model portfolio. Our efforts contrast to literature that has largely focused on the addition of one business model by theorizing about both the advantages and disadvantages of BMD across a fuller range of diversification and how firms might sequence the addition of multiple models.

To theorize about BMD performance and sequencing, we intersect the growing demand-side literature stream on diversification (e.g., Ye et al., 2012) with resource-based justifications of diversification that trace their lineage back to Penrose (1959). Demand-side research "looks downstream from the focal firm, toward product markets and consumers, rather than upstream, toward factor markets and producers" (Priem et al., 2012: 347). Our arguments highlight that demand-side synergies via increased willingness-to-pay due to a customer's concurrent use of multiple business models play a central role in BMD, as business models revolve around customer-focused value creation (e.g., Priem et al., 2018; Rietveld, 2018; Teece, 2010). As such, we explain how demand-side synergies may vary along the degree of BMD. We also explain how potential conflicts in activities and dominant logics may lead to increased costs as firms diversify business models. Combining the advantages and disadvantages leads us to develop a foundational hypothesis of a non-linear, inverted U-shaped relationship between the degree of BMD and performance.

We develop two additional hypotheses to illuminate the importance of demand-side factors in business model diversification. First, we contend that our arguments of the importance of demand-side synergies suggests that factors related to demand conditions should moderate the BMD-performance relationship. As such, we develop theory that explains how weakening of demand-side benefits during an environmental shock (i.e., a financial crisis) leads to a flattening of the BMD-performance relationship. Second, we argue that firms follow a prioritization approach in adding new business models, leading us to predict that demand relatedness is positively associated with the likelihood that a firm will diversify into a target business model. Two business models have a higher degree of demand relatedness when there are more opportunities for a customer to use the models in combination, rather than in isolation.

We utilize a unique panel dataset of 152 public retail firms from 25 countries over a thirteen-year period from 1998 to 2010 to test our ideas. The retail industry provides a particularly appropriate setting for our study because prior business model research has described a variety of different business models in this industry that firms may combine in their portfolios (e.g., Brea-Solís et al., 2015; Christensen and Tedlow, 2000; Kim and Min, 2015; Sohl et al., 2020).

In summary, our research aims to contribute to the growing literature investigating the concurrent operation of multiple business models in one organization. Our theory and evidence suggest that strategy scholars interested in the performance implications of business model choice should be cognizant of the importance of considering how a particular business model choice relates to the overall degree of BMD in the firm's portfolio. The interrelationship to other models within the portfolio is a significant determinant of performance. Our explication of these interrelationships highlights how demand-side synergies play an important role in understanding the performance and entry sequencing effects of BMD, and these efforts complement and extend prior empirical demand-side research (e.g., Mawdsley and Somaya, 2018; Uzunca, 2018; Vinokurova, 2019). Specifically, we illuminate how heterogeneity in customer preferences accounts for the decision to operate multiple business models and how to sequence those diversification moves. In doing so, we develop a systematic explanation of the inverted-U relationship between BMD and firm performance, and our analyses provide the first large-scale empirical evidence of how the degree of BMD relates to performance. This is an important addition to the literature given the amount of attention in strategy research to the performance implications of other forms of diversification, such as product and international diversification. We also contribute to this emerging literature stream by developing theory that begins to establish some boundary conditions of the performance effects of BMD. The moderation of the relationship between the degree of diversification and performance has proven to be an exceptionally fruitful area of inquiry in the product and international diversification literatures. Our work is a first step in this direction for the nascent business model diversification literature.

2. Theoretical background

2.1. The business model concept

Although the prior literature demonstrates some variance in the specific conceptualization of a business model, an emphasis on activity systems is a common, central theme across these conceptualizations (Zott et al., 2011). For example, Zott and Amit (2010) describe a business model as a system of interdependent activities connecting factor and product markets. According to Teece (2010), the essence of a business model is its definition of how the firm delivers value to a customer and convinces the customer to pay for that value. Because most business model definitions "take customers and consumers explicitly into account" (Demil et al., 2015: 4), willingness-to-pay is a fundamental element of value creation in business model research (e.g., Priem et al., 2018). Relatedly, a strong consensus has developed in the literature that the business model emphasizes customer-focused activities and value creation at the demand side (for reviews, see Demil et al., 2015; Massa et al., 2017; Zott et al., 2011).

Along with defining the concept, previous research has described several *types* of business models (e.g., Baden-Fuller and Morgan, 2010). What differentiates business model types is diversity in the constituent activity systems. For example, in traditional industries such as airlines, retail, and hotels, "discount" or "no-frills" business models focusing on low-price value propositions have been regarded as belonging to a distinct business model type, as they are "well documented and regularly referred to as a coherent set of choices that offer the potential for superior performance" (Demil and Lecocq, 2010: 228). With the emergence of Internet-related industries, one of the most widely discussed business model types is the "e-business" model (Zott et al., 2011), describing how businesses sell products and services directly to customers using the Internet, instead of a "bricks and mortar" model featuring physical stores.

The literature on business models has argued that "the business model is a new unit of analysis that is distinct from the product, firm, industry, or network" (Zott et al., 2011: 1020). It has also provided multiple examples showing that businesses can target the same product market but do so by employing different business models, and vice versa (e.g., Chesbrough and Rosenbloom, 2002; Markides and Charitou, 2004; Teece, 2010; Zott and Amit, 2008).

2.2. Business model diversification

Business model diversification (BMD) involves the concurrent operation of multiple different activity systems to create and capture value. Examples include airlines that operate both full-service and no-frills or discount carriers (Casadesus-Masanell and Tarziján, 2012; Markides and Charitou, 2004); newspaper companies may include ad-sponsored business models alongside traditional subscription-based models (Casadesus-Masanell and Zhu, 2010, 2013); and retailers may operate both bricks-and-mortar locations in addition to e-commerce (Ahuja and Novelli, 2016; Kim and Min, 2015).

A common theme in existing descriptions of the phenomenon of business model diversification is highlighting that there are both advantages and burdens of operating multiple business models. That is, the diversity in activity systems across business models creates opportunities, e.g., potential synergies, but also has downsides, e.g., conflict from differences in dominant logic. We believe this presence of both advantages and disadvantages suggests that a systematic examination of how firm performance may vary with the degree of BMD is a natural next step to extend knowledge in this area. The below material follows a point of emphasis in the recent literature that argues "business models, by their very nature and scope, begin to integrate the resource and demand sides of the strategy equation" (Priem et al., 2013: 481). As such, we consider resource-based advantages of diversification alongside our emphasis on demand-related benefits and how they may vary with the degree of BMD. We also discuss the disadvantages incurred as a function of increasing degrees of BMD; combining the advantages and disadvantages leads us to predict an inverted U-shaped relationship between the degree of BMD and performance. Subsequent hypotheses delve into the particular role played by demand-related factors in BMD. More specifically, we extend our theorizing to propose an important demand-related contextual factor that flattens the overall inverted U-shaped relationship between degree of BMD and performance. We conclude by explaining how firms sequence additions of new business models to their portfolios.

3. Hypotheses

3.1. The direct effect of degree of business model diversification on performance

Advantages of BMD: Supply-side synergies. Drawing on ideas originally proposed by Penrose (1959), resource-based explanations of diversification argue that firms benefit by utilizing excess resource capacity. Firms have an incentive to diversify in order to use resources that have multiple applications but are subject to market failure (Teece, 1982). Applying these resources across multiple uses allows the firm to achieve cost-reducing synergies. Prior literature suggests that such synergies are a source of benefit in business model diversification. Scholars such as Casadesus-Masanell and Tarziján (2012) suggest that the ability to share major assets along with the complementarity of resources and capabilities across models are central questions in determining the success of business model diversification. Although BMD involves operation of a different system of activities, certain activities within each system will naturally overlap, leading to sharing opportunities. For example, consider a retailer engaged simultaneously in the differing business models of physical stores and online commerce. Both require the activity of distribution, and the two models could achieve lower costs by sharing resources such as warehousing facilities (i.e., economies of scope). Airlines operating both no-frills and full-service business models share a need for the activity of taking reservations and managing inventory; computerized reservation systems may be shared across the two models, reducing costs.

While the creation of resource-based synergies has been extensively studied in the strategy literature, previous research has recognized another, much less explored mechanism for synergy creation—the creation of "demand-side synergies" (e.g., Ahuja and Novelli, 2017; Mawdsley and Somaya, 2018; Ye et al., 2012). For example, Ye et al. (2012: 208) argue and show that "consumer-based synergies can create value independently from producer-side synergies." We note an interesting juxtaposition in the nature of supply-versus demand-side synergies. As can be seen from the examples above, supply-side synergies are most often tied to the firm's ability to engage in similar activities (e.g., distribution, managing inventory) across businesses. In contrast, as we explain below, demand-side synergies typically flow from the presence of differences in activities across business models (e.g., offering products for purchase in stores versus online, which is associated with different front-end activities in areas such as information technology, customer services, and customer relationship management).

Advantages of BMD: Demand-side synergies. The nascent demand-side perspective on diversification emphasizes achieving greater consumer utility as the objective of diversification strategies, allowing firms to create demand-side synergies via increased willingness to pay (WTP). This emphasis is consistent with increasing attention to demand-related factors across a variety of topics in the strategy literature (e.g., Mawdsley and Somaya, 2018; Uzunca, 2018; Vinokurova, 2019). For example, Mawdsley and Somaya (2018) identify relational capital between a firm and its clients as a source of demand-side synergies across different service lines. This source of benefit should apply to the context of BMD as well, where firms may create relational capital via greater loyalty and customer-lock in effects across business models. In fact, we expect that demand-side benefits of diversification are particularly relevant to BMD, as business model definitions typically emphasize the importance of customer-facing relationships and value creation through increased WTP as part of the model (e.g., Chesbrough and Rosenbloom, 2002; Rietveld, 2018; Teece, 2010). Sohl et al. (2020) illuminate the operation of demand-side benefits in their recent study of firms that add an additional business model. They argue that a critical

distinction is the degree of relatedness of the added business model; more related models should provide greater benefits, and this relatedness depends on demand complementarities across customer-facing activities. For example, if two business models serve the same customers, firms can offer complementary services and convenience benefits for which customers are willing to pay more. Consider the combination of online and offline models in an increasing number of industries (e.g., Amit and Zott, 2001). Many firms such as consumer product manufacturers, software producers, or retailers combine traditional store-based models with online models to improve their overall value proposition to their target customers. Specifically, differences in customer-focused activities such as information searching, ordering, delivery, and return between online and offline models allow customers to combine these activities in their interactions with the firm. Sohl et al. (2020) compare the performance implications of adding a single demand-related model versus a demand-unrelated business model for retailers operating traditional store models. Their results suggest that differences in demand-side synergies can explain why demand-related additions tend to be more profitable than demand-unrelated additions. However, as their study focuses on the addition of just a single business model, they did not investigate the relationship between the degree of BMD and performance or the sequencing of business model additions.

In sum, because the overall *system* of activities differs across business models, customers can combine complementary front-end activities providing the potential for demand-side synergies. At the same time, because some back-end activities will inevitably overlap between business models, firms can also create supply-side synergies across the models. This attention to both demand- and supply-side benefits in our theorizing is consistent with recent work. Shaheer, Li, and Priem (2020: 22) argue that "the interplay between demand-side and supply-side factors can offer important theoretical mechanisms to more comprehensively explain digital internationalization," and we similarly expect they are both relevant to developing theoretical understanding of business model diversification. In a study on entry deterrence, Uzunca (2018) similarly argues for the importance of considering both the demand- and the supply-side. We expect that the above-described supply- and demand-side benefits result in increasing advantages as the firm expands its portfolio of business models, although we do anticipate that the total benefits are subject to diminishing marginal returns as the models become less related. Prior to hypothesizing the implications of these advantages for performance outcomes, one must consider possible disadvantages of BMD.

Disadvantages of BMD: A clear theme in the prior diversification literature is that diversification is not a costless activity. This theme has been reflected in the business model literature as well; in fact, scholars have largely focused on the burdens of operating multiple business models. Costs may flow from such simple facts that portions of the multiple diverse underlying activities or value chains conflict with each other (Markides and Charitou, 2004). For example, the supply chain operations of a big-box retailer might emphasize the efficient delivery of batched inventory, a set of activities that would conflict with the needs of convenience stores requiring more regular delivery of smaller, just-in-time batches of inventory. Moreover, previous research argues that "the business model can be considered a dominant logic – a current thinking pattern or established belief or cognitive schema held by managers in organizations" (Massa et al., 2017: 82). Firms' simultaneous operation of multiple different types of business models therefore implies that different dominant logics can exist in their business portfolios, increasing the likelihood of less effective, costly deployments and redeployments of organizational resources and capabilities (Prahalad and Bettis, 1986).

Net performance effect: Predicting the overall effect requires that we consider the nature of the constituent mechanisms of both advantages and disadvantages (Haans et al., 2016). As argued above, we expect that total benefits increase with the overall degree of diversification but with diminishing marginal benefits (i.e., a monotonically increasing non-linear relationship), and that the demand side is an important source of benefits in BMD beyond supply-side benefits. Diminishing marginal benefits result from the fact that firms first add the models that offer the greatest benefit. Less-related models that are added later offer positive but lower benefits. Costs also increase with the degree of diversification. A combination of increasing, but marginally diminishing benefits along with increasing costs implies a net inverted-U relationship[1]

Hypothesis 1. There is an inverted U-shaped relationship between the degree of business model diversification and firm performance.

3.2. The moderating role of demand-related factors: financial crises

The above material explains how both supply-side and demand-side factors affect performance. One explanation in the literature on product diversification is that diversified firms may benefit from risk reduction during financial crises due to uncorrelated cash flows across the firm's various product-market divisions (e.g., Kuppuswamy and Villalonga, 2016). In the context of BMD, however, such risk-reduction benefits might be less significant as the effect of a financial crisis on multiple business models should be more positively correlated (i.e., a negative demand shock within a particular country should lead to a reduction in sales across each of the firm's business models).[2] In this paper, our interest is to spotlight the demand-side and provide evidence that customer-focused value creation is an important factor in business model diversification beyond supply-side effects. To do this, we first consider how the performance implications of business model diversification might vary depending on demand conditions. More specifically, we argue that the nature of demand is a key factor that influences the magnitude of demand-related benefits firms experience when engaging in

[1] As Haans et al. (2016) describe, the inverted U-shape would result if costs increase either linearly or in a non-linear, marginally increasing fashion (e.g., an exponential relationship).

[2] We note that the correlation of cash flows between models should depend on the type of economic shock investigated, a point we will explain in more detail in the discussion section.

business model diversification. Of the various demand factors that we could consider, we focus on the occurrence of demand shocks due to financial crises. An examination of negative demand-side shocks complements prior research that typically investigates positive demand-side shocks (e.g., Aggarwal and Wu, 2015; Argyres et al., 2015; Wang et al., 2020). It is important to examine negative shocks in addition to positive shocks, as consumers may react differently to potential losses compared to gains (Kahneman and Tversky, 1979).

During times of high demand and strong economic growth, consumers are less price sensitive and their consumption choices are more heterogeneous (Deleersnyder et al., 2004), implying greater opportunity for various value propositions and the associated business models featuring complementary customer-focused activities. In comparison, uncertainty surrounding economic downturns leads to reduced opportunities to realize the value associated with demand-side synergies. Reductions in wealth, income, and confidence lead preferences to converge around satisfaction of more basic needs. As just one example, Lamey et al. (2007) describe how consumers tend to reduce spending on differing varieties of manufacturer brands in tougher economic times. Kamakura and Du (2012) argue that consumers reduce expenditures in the area of "positional" spending, which include products or the ways of purchasing those products that signal consumers' relative position in society.

We contend that the uncertainties induced by financial crises similarly reduce consumers' willingness-to-pay for the conveniences offered by firms operating multiple business models. That is, the magnitude of demand-side synergies generated from BMD should be lower during times of financial shocks. In essence, the slope of the benefits curve is reduced during these shocks, suggesting a moderation of the overall relationship. A reduction in the strength of the non-linear benefits curve implies a flattening of the relationship between business model diversification and performance.

Hypothesis 2. Financial shocks moderate the inverted U-shaped relationship between business model diversification and performance such that the inverted U-shape is flatter during times of financial shocks.

As a final step in establishing that the demand side plays a role in business model diversification, we next explain how the degree of demand relatedness explains how firms will sequence the addition of new models as they engage in business model diversification.

3.3. The sequencing of business model additions: the role of demand relatedness

As argued in the development of Hypothesis 1, we expect that the total benefits increase with the overall degree of BMD but with diminishing marginal benefits. If the demand side is an important source of benefits in BMD, diminishing marginal benefits should result from the fact that the business models become less demand related as firms expand their business model portfolio. In particular, firms should first add the most demand-related models that offer the greatest benefits to customers; less-related models that are added later should offer positive but lower benefits.

The diversification literature has linked entry behavior to the potential for synergies between existing and new lines of business, largely tying these arguments to levels of resource relatedness. For example, Montgomery and Hariharan (1991) argue and show that firms are more likely to diversify into industries that have similar R&D, advertising, and capital expenditure intensities. Similarly, Silverman (1999) demonstrates the preference shown by diversifying firms for industries that have a higher degree of technological relatedness, arguing that such relatedness would foster creation and capture of synergies between the existing and new business.

We expect that firms engaging in BMD also prioritize particular business models over others. However, given the "strong consensus that the business model revolves around customer-focused value creation" (Zott et al., 2011: 1031), we anticipate that the prioritization may be based on factors beyond just resource relatedness. A core premise of our work is that a driver of business model diversification moves is the demand relatedness of a potential new business model. The demand relatedness of two business models is greater when customers have more opportunities to utilize the business models in combination, rather than in isolation. Firms will prioritize these opportunities because they can create and exploit demand-side synergies by combining and integrating customer-focused activities across these demand-related business models. This concurrent use of business models by customers leads to higher customer utility and associated higher willingness to pay. In sum, more demand-related BMD offers greater potential benefits relative to less demand-related BMD. Moreover, the empirical results of Sohl et al. (2020) demonstrating the superior profitability of demand-related BMD suggests that these superior benefits are not offset by cost disadvantages. Anticipating that firms respond to this greater profit potential, we predict that among any given choice set of target business models, the level of demand relatedness between an existing business model and a target business model enhances the likelihood of diversification into that target business model.

Hypothesis 3. The level of demand relatedness between a firm's existing business model and a target business model is positively associated with the likelihood that the firm will diversify into that target business model.

4. Methods

4.1. Empirical context

Our analysis is based on firms from the global retail sector. This empirical context provides a particularly appropriate setting to test our hypotheses for several reasons. First, the literature has frequently used examples of retail firms to describe different types of business models, such as e-commerce, discount, and traditional retail models (e.g., Brea-Solís et al., 2015; Christensen and Tedlow, 2000). Second, prior studies emphasize that firms coexist in retailing that focus either on a single business model or operate multiple business models in parallel (e.g., Kim and Min, 2015; Sohl et al., 2020). Third, retail firms tend to focus any diversification to related parts of the retail sector and engage in little or no unrelated diversification outside the retailing sector, which reduces potential

confounding effects of industry diversification. And finally, a focus on the global retail sector allows us to capture demand shocks that vary by country and year to analyse how the BMD-performance relationship of firms located in affected countries might vary relative to firms located in unaffected countries.

4.2. Data and sample

The data come from Edge Retail Insight (formerly Planet Retail), a leading private retail research company. Previous research has used this database to examine topics of market entry and business models in retailing (e.g., Gielens and Dekimpe, 2007; Sohl et al., 2020). We obtained unbalanced panel data on the 152 globally largest publicly-held retail corporations tracked by Edge Retail Insight, totalling 1362 firm-year observations for the time period from 1998 to 2010.[3] Of these observations, 41.6% (567 obs.) are firm-years of firms with a single business model (BM), 29.8% (406 obs.) with two BMs, 20.8% (283 obs.) with three BMs, and 7.8% (106 obs.) with four BMs.[4] This sample was used for the performance analyses (H1 and H2). Following the approach of previous studies (e.g., Silverman, 1999), we further modified the sample for the analysis of diversification decisions (H3), as described below.

4.3. Business models in the retail sector

To identify the various business models that make up a firm's business model portfolio, we combined perspectives from industry experts, prior academic research, and practicing managers. To begin, the industry analysts who compile the Edge Retail Insight data distinguish among retail firms' operations in the categories of e-commerce (including mail order), discount, traditional small-store, and traditional big-box retail models.[5] Prior research set in the retailing context validated our choice to adopt these four distinct models. As mentioned above, numerous studies have referred to one or several of these four types of retail models. Our interviews with several senior managers of retail corporations to discuss commonly used retail models also verified these distinct models. First, the interviewed retail managers identified e-commerce and discount business models as distinct types of business models in retailing. Beyond the categorization into e-commerce and discount business models, the interviewees distinguished between the groups of traditional small-store and traditional large-store (big-box) retail models. Of our sampled 152 retail firms, 93 firms (61.2%) have their core business model in traditional large-store, 50 firms (32.9%) in traditional small-store, 8 firms (5.3%) in discount, and 1 firm (Amazon) (0.7%) in e-commerce retailing.[6] Considering that firms may operate additional models beyond their core model, our data indicate that 28.9% of firms have experience operating the traditional large-store model, 39.5% the traditional small-store model, 19.1% the discount model, and 44.7% the e-commerce model.[7]

4.4. Firm performance (Hypotheses 1 and 2)

Dependent variable. To make our results comparable to prior research on the diversification-performance relationship, we used return on assets (ROA) as performance measure (e.g., Ahuja and Novelli, 2017). We obtained annual information from Compustat North America and Global to compute ROA as a retail firm's earnings before interest and taxes (EBIT) expressed as a percentage of its total assets. In robustness checks, we also used return on sales (ROS) and total firm sales, producing consistent results.

Independent variable. To operationalize the degree of business model diversification (BMD), we used a count of the number of business models that a retail firm operates in a given year, ranging from 1 to 4 business models. Given that each type of business model is characterised by a distinct activity system, a larger number of business models in the portfolio implies greater diversity in terms of business logics. For example, the logic of how the discount model creates and captures value stands in contrast to the logic of traditional retail models, which focus more on differentiation (e.g., Casadesus-Masanell and Ricart, 2010; Markides and Charitou, 2004; Porter, 1980). Similarly, the logic of doing business via the Internet is distinct from the logic of physical store-based distribution models, relying on different value propositions and key activities (e.g., Amit and Zott, 2001; Osterwalder and Pigneur, 2010). Finally,

[3] Specifically, we obtained panel data on the top 300 public and private retail firms based on Edge Retail Insight's ranking list of 1997 and 2010. Of the top 300 firms, 152 were public firms. We focused on public retail firms because profitability information (from Compustat) was only available for those firms.

[4] Our sampled retail firms generate on average 98.7 percent of their sales in retailing and originate from 25 countries across the world, including those based in the US (e.g., Barnes & Noble, CVS, and Wal-Mart), Europe (e.g., Ahold, Carrefour, and Tesco), Japan (e.g., Aeon, FamilyMart, and Seven & I Holdings), and China (e.g., Dairy Farm, Gome, and Lianhua Supermarket). Specifically, 49% of the sampled firms originate from North America, 24% from Asia Pacific, 23% from Europe, 2% from South America, and 2% from (South) Africa.

[5] The Edge Retail Insight data is categorized into e-commerce, discount, and traditional retailing. Following industry analyst descriptions of Edge Retail Insight, we applied a cut-off value of 1000 square meters of selling area to distinguish between traditional small-store and large-store models.

[6] For multi-BM firms, core business model refers to a firm's largest business model. We note that none of the sampled firms changed their core business model over the time period studied. Typical examples of our sampled firms and their core business models include Amazon for the e-commerce model, Save-A-Lot for the discount model, 7-Eleven for the traditional small-store model, and Carrefour for the traditional large-store model.

[7] While our interest is in examining the potential for demand-side synergies via BMD beyond the value creation potential of any single model in isolation, we note that demand-side synergies can be created not only between business models, but also within business models. For example, in music distribution, Apple's business model combines the iPod (a product) and iTunes (a service) to create value at the demand side as customers may perceive greater benefits from using the product and service in combination.

small- and large-store retail operations differ in their business logics. For example, while small-store models focus on unique locations in the city center and limited assortments with personal services, big-box models focus on suburban areas and broad assortments with limited services, requiring different systems of value chain activities such as real estate, supply chain, human resource, and marketing management (e.g., Levy and Weitz, 2009). As such, the degree of BMD captures greater diversity in activity systems and business logics.

As explained above, we expect that firms add business models sequentially (i.e., with diminishing marginal benefits), and that this sequencing approach is in part based on demand relatedness, implying that the first additions tend to be more demand related and later additions less demand related. As such, we expect this measure reflects well the *degree* of BMD while incorporating the concept of demand relatedness. In a robustness check, we also used the sales-based entropy index (Palepu, 1985) and found consistent results. The entropy index encompasses a firm's BMD in terms of both breadth (number of business models) and depth (relative importance in terms of sales of each business model).

Moderating variable. To operationalize financial shocks, we used financial crises that vary by country and year. We obtained this information for the period between 1998 and 2010 from the systemic banking crises database (Laeven and Valencia, 2013), which includes start and end years at the country level of all major financial crises such as the 1998 Asian financial crises and the 2008 global financial crisis. We coded a dummy variable, which equals "1" for crisis years in a retailer's home country, and "0" otherwise.[8]

Control variables. One advantage of our focus on the relatively homogenous group of retail firms is that we reduce potential endogeneity problems of omitted variable bias arising from unobserved heterogeneity across industry sectors. To further reduce potential issues of omitted variable bias, we included several variables to control for observable differences among our sampled firms as discussed in prior work on the diversification-performance relationship (e.g., Ahuja and Novelli, 2017). First, we controlled for firm size with the natural logarithm of a firm's sales. Second, we controlled for firm growth with a firm's percentage change in sales from the last to the current year. Third, we used the sales-based entropy index to control for a retail firm's degree of product diversification across two-digit Standard Industrial Classification (SIC) retail industries (Palepu, 1985). Because the literature typically found an inverted U-shaped relationship between product diversification and firm performance (Palich et al., 2000), we also included the squared term of the product diversification variable in the performance analysis. Fourth, we also used the sales-based entropy index to control for a retail firm's degree of international diversification across countries (e.g., Hitt et al., 1997). Fifth, we used country-level information provided by the World Bank to control for GDP per capita (logged), GDP growth, and the number of Internet users per 100 people in a retailer's home country. As mentioned before, we used the home country because on average, our sampled firms realized 89 percent of their sales in the home country. Sixth, by using information on all firms in the Edge Retail Insight database, we also controlled for several salient characteristics of the core BM in the given home country: similar to prior studies on diversification decisions (e.g., Diestre and Rajagopalan, 2011), we included measures of core BM growth and concentration (sales-based Herfindahl index).

And finally, we included year dummies and lagged the explanatory variables by 1 year.

Statistical method. We used an ordinary least squares (OLS) model to estimate performance implications of BMD. Results of the Hausman test indicated that our predictor variables were correlated with time-invariant firm characteristics, suggesting that a fixed effects (FE) rather than a random effects model should be used to condition out all time-invariant, firm-specific features that can affect BMD and firm performance. Standard errors are clustered at the firm level. Robustness checks include an instrumental variables analysis to address possible BMD endogeneity.

4.5. Diversification decision (Hypothesis 3)

While we used panel data analysis to estimate the performance implications of BMD, we used cross-sectional analysis to estimate diversification decisions. In particular, following the approach of previous studies on the relationship between resource relatedness and diversification propensity (e.g., Silverman, 1999; Diestre and Rajagopalan, 2011; Neffke and Henning, 2013), we estimated the likelihood of diversification into new business models during the full 1999–2010 window as a function of demand relatedness and control variables in 1998.[9] Thus, the unit of analysis is the firm-target BM dyad. For example, our sample would include three observations for a retailer operating a single business model at the start of our observation window, where each observation represents a possible new business model to add.

Dependent variable. The dependent variable $Diversification_{ij}$ is coded as a dummy variable that equals "1" if firm i enters business model j at any point in time during the 1999–2010 window, and "0" otherwise. We measured existing business models of firm i in 1998 or the first year in which the firm appears in the Edge Retail Insight database.[10] Any business model j that firm i did not operate is a potential target business model during the period from 1999 to 2010. There were 229 existing firm-target BM observations and 371 potential entries.[11]

[8] We chose the home country because on average, our sampled retail corporations achieve 89 percent of their sales in the home country and typically add new business models first in the home country.

[9] We chose this approach because our independent variable (demand relatedness) is time invariant.

[10] Note that we obtained unbalanced panel data from Edge Retail Insight. If a given firm appears after 1998 in our dataset and/or disappears before 2010, we consider potential entries from the second year until the last year in which the firm is listed in the database.

[11] There were no observations for two firms (Japan-based Aeon and Australia-based Woolworths), which already operated all four BMs in 1998. So, the potential entries are 600–229 existing firm-target BM observations.

Independent variable. To operationalize the degree of demand relatedness, we categorized pairs of business models based on the extent to which a particular customer may perceive a greater benefit from using the business models in combination, rather than in isolation. This categorization approach is inspired by a long tradition in the strategy literature on diversification, which uses a hierarchical system to categorize industries based on their relatedness. In particular, based on the seminal works of Rumelt (1982) and Palepu (1985), strategy research typically focuses on product diversification, using the SIC code system to measure the degree of resource relatedness between industries. While we use the same logic of relatedness, we focus on demand relatedness between business models in the retail sector. Table 1 illustrates the categorization of demand relatedness for all possible core BM-target BM combinations in our setting. Our independent variable *Demand relatedness* is an ordinal variable, with a value of "1" for combinations with a low degree of demand relatedness, a value of "2" for combinations with an intermediate degree of demand relatedness, and a value of "3" for combinations with a high degree of demand relatedness. Our explanation of the categorization begins from the perspective of traditional (big-box and small-store) retailers, (i.e., the first two rows of Table 1); we discuss the high and low levels first and then the intermediate level.

Previous research set in the retail context (e.g., Sohl et al., 2020) suggests that traditional retailers' addition of online (or e-commerce) BMs can be conceptualized as highly demand related (i.e., complementary from the perspective of consumers). Consumers have a number of opportunities to utilize these business models in combination. For example, a customer shopping at a physical Barnes and Noble location can visit bn.com while shopping in order to view book reviews from other customers. A Home Depot customer can order a product online and arrange for pickup from a local store. Loyalty program points earned shopping at Office Depot.com can be redeemed by a customer when purchasing office supplies at a nearby store.

In contrast to this high degree of demand relatedness, the combination of a traditional model with a discount model is largely demand unrelated (i.e., substitutes from the perspective of consumers).[12] Demand-side synergies tend to be customer-specific in that their effectiveness depends on whether the firm serves the same customers across multiple models. Discount and traditional models largely target different customers; given the lower-end focus of discount models, an inherent tension in quality levels exists when attempting to share brands or integrate customer-facing activities across discount and traditional models (Porter, 1980). In sum, the lack of customer overlap means a discount model generally provides relatively few opportunities for demand-side benefits for a traditional retailer.

A traditional retailer achieves an intermediate level of demand relatedness with the addition of the other type of traditional model (i.e., a traditional big-box retailer's addition of a traditional small-store model, and vice versa). On the one hand, combining big-box and small-store traditional models should offer greater potential for demand-side synergies than combining traditional and discount models. Given the greater consistency of quality levels between the two traditional models relative to between traditional and discount models, there is some potential for demand-side synergies because firms can share brands and customer-perceived benefits such as loyalty programs between traditional business models (Christensen and Raynor, 2003). On the other hand, combining big-box and small-store traditional models offers less potential for demand-side synergies than combining traditional and online models. Differences in the way activities (e.g., information search, ordering, delivery, and return) may be completed are key to the potential for demand-side synergies; these activities are largely conducted similarly in big-box and small-store traditional retail meaning that customers likely perceive a higher degree of substitution among these activities in this context, rather than seeing them as complementary.

Moving down the rows of Table 1, we turn next to the perspective of a discount retailer. Using the same logic as above, the addition of online retailing can be considered highly demand related as complementary activities may be combined by customers using both models, while the addition of traditional retailing is associated with a low degree of demand relatedness. Finally, from the perspective of an e-commerce retailer, this logic implies that all three store-based models can be considered as highly demand related as customers would perceive any of the three store-based models as complementary to the activities of the original e-commerce model.

Control variables. The control variables of the entry analysis are as described above, but measured in 1998 or the first year in which the firm appears in the Edge Retail Insight database.[13] We also included industry dummies at the four-digit SIC code level (e.g., grocery store (SIC 5411) and shoe store (SIC 5661)) and world region dummies in the cross-sectional analysis.

Statistical method. Following previous research (e.g., Silverman, 1999; Diestre and Rajagopalan, 2011; Neffke and Henning, 2013), we used a logit model because our dependent variable is discrete and we were interested in an entry event's likelihood but not in its specific timing. We clustered standard errors at the firm level because we have multiple observations per firm.

5. Results

Of the 152 sampled firms, 89 firms (58.5%) entered the sample as single-BM firms. During the time period studied (1998–2010), 39 firms made a first diversification move (from 1 to 2 BMs), 29 firms made a second diversification move (from 2 to 3 BMs), and 13 firms made a third diversification move (from 3 to 4 BMs).

[12] Accordingly, retailers typically integrate customer-facing activities such as information searching, ordering, delivery, and return between offline and online models but separate these activities between traditional and discount models. However, retailers might integrate back-end activities such as purchasing and warehousing not only between online and offline models but also between traditional and discount models (e.g., Jacobsen et al., 2017), suggesting that the potential for supply-side synergies is independent from the degree of demand relatedness. As such, we have no reason to expect that supply-side synergies vary systematically with the degree of demand relatedness.

[13] Using mean values of the control variables for the period from 1997 to 1998 or for the period from 1998 to 2010 produced consistent results.

Table 1
Operationalization of demand relatedness.

	Degree of demand relatedness (DR)		
Core BM/target BM	*Highest (DR=3)*	*Intermediate (DR=2)*	*Lowest (DR=1)*
Traditional big box	E-commerce	Trad. small store	Discount store
Traditional small store	E-commerce	Trad. big box	Discount store
Discount store	E-commerce	n/a	Traditional
E-commerce	Traditional/discount store	n/a	n/a

Notes: n/a denotes not applicable. BM denotes business model.

To provide initial insight into whether the data support our theory, Table 2 reports descriptive statistics exploring whether there is a natural "sequence" of the target business models that firms follow as they diversify. Results are quite striking: firms tend to first diversify into the business model with the highest degree of demand relatedness (DR) (this BM was added in 74.4% of the first diversification moves), then into the business model with the intermediate degree of DR (48.3% of the second diversification moves), and finally into the BM with the lowest degree of DR (76.9% of the third diversification moves). This pattern is consistent with our expectation that firms tend to prioritize the addition of new business models based on the degree of demand relatedness beyond any resource relatedness.

5.1. Regression results for performance implications (Hypotheses 1 and 2)

Table 3 presents descriptive statistics and summarizes the correlations for the variables in our performance analysis sample. Table 4 reports the coefficients from the fixed effects (FE) model.

Model (1) shows the results of the control variables. The results in Model (2) test the inverted U prediction of Hypothesis 1, showing that the coefficient of the linear BMD variable is positive and significant ($\beta = 0.029, p < 0.01$) and the coefficient of the quadratic BMD variable is negative and significant ($\beta = -0.006, p < 0.05$). The slope of the BMD variable at the low end of the BMD range (between 1 and 2 BMs) is positive and significant ($\beta = 0.018, p < 0.01$), while it is negative and significant ($\beta = -0.015, p < 0.05$) at the high end of the BMD range (between 3 and 4 BMs), consistent with the conclusion of an inverted-U relationship (cf., Haans et al., 2016). Taking these results together, we conclude that Hypothesis 1 is supported. In terms of effect size of the estimated coefficients, the first diversification move (from 1 to 2 BMs) is associated with an increase in ROA by 1.24 percentage points, the second diversification move (from 2 to 3 BMs) increases ROA by 0.14 percentage points, and the third diversification move (from 3 to 4 BMs) decreases ROA by −0.96 percentage points.[14]

Model (3) tests the moderation prediction of Hypothesis 2 that the inverted U-shaped relationship is flatter during times of financial crisis. The coefficient of the linear BMD variable interacted with the crisis dummy is negative and significant ($\beta = -0.031, p < 0.05$) and the coefficient of the quadratic BMD variable interacted with the crisis dummy is positive and significant ($\beta = 0.007, p < 0.05$), indicating that the inverted U-shape is flatter during times of economic crises (Haans et al., 2016). Thus, our results support Hypothesis 2. As an example of effect size, the first diversification move (from 1 to 2 BMs) is associated with an increase in ROA by 1.59 percentage points in non-crisis times relative to 0.44 percentage points in crisis times.

Fig. 1 illustrates the estimated direct and moderated effects estimated in Models (2) and (3) when all other variables are kept at their sample means. As shown in Table 2 above, firms tend to add the BM with the highest degree of demand relatedness (DR) when they move from 1 to 2 BMs, the BM with the intermediate degree of DR when they move from 2 to 3 BMs, and the BM with the lowest degree of DR when they move from 3 to 4 BMs. This sequencing approach suggests that the positive part (from 1 to 2 BMs), intermediate part (from 2 to 3 BMs) and negative part (from 3 to 4 BMs) of the inverted U (as illustrated in Fig. 1) can be explained by the extent to which business models fit from a demand-side perspective.

Robustness checks and additional analysis. The OLS estimations reported in our performance analysis could potentially reflect endogeneity of the BMD activity; the identification issue arises from the fact that a firm's BMD can be endogenous to its performance. To address this concern, we used an instrumental variables (IV) approach (2SLS regression model). Following Campa and Kedia (2002), we developed our instruments to capture the overall attractiveness to diversify business models based on particular industry factors. First, we included the average degree of BMD in a given two-digit SIC code retail industry and year. The higher the average degree of BMD, the more attractive certain industry factors are for BMD. Our international dataset allowed us to use the worldwide average of BMD in each industry, limiting the correlation of the instrument with the error term in the second stage. Second, we used for each firm the annual fraction of sales by other firms in the two-digit SIC code retail industry accounted for by multi-business model firms (i.e., the worldwide average across all countries in our sample).[15] Using these instruments, we estimated a 2SLS regression model

[14] For reference, the mean ROA is 9.68 percent (standard deviation: 6.55 percent).

[15] As suggested by Angrist and Pischke (2009), we included the linear and squared term of these variables. Specifically, in our estimation of the main effect (replicating Model (2) in Table 4), we used a total of four instruments to predict BMD and BMD squared in the first stage; in our estimation of the moderating effect (replicating Model (3) in Table 4), we needed to also interact our instruments with the financial crisis dummy variable, giving us a total of eight instruments in the first stage, predicting BMD, BMD squared, BMD interacted with crisis, and BMD squared interacted with crisis. The instrumental variables were lagged by 1 year.

Table 2
Descriptive statistics for entry sequencing and demand relatedness.

		Diversifying entry into business model with			
	N	*highest degree of DR*	*intermediate degree of DR*	*lowest degree of DR*	Total
First diversification move (from 1 to 2 BMs)	39	74.4%	20.5%	5.1%	100%
Second diversification move (from 2 to 3 BMs)	29	37.9%	48.3%	13.8%	100%
Third diversification move (from 3 to 4 BMs)	13	15.4%	7.7%	76.9%	100%

Notes: DR denotes demand relatedness. BM denotes business model. Reading example: During the time period studied, 39 firms made their first diversification move (i.e., from 1 to 2 BMs). Among those 39 firms, 74.4% added the BM with the highest degree of demand relatedness, 20.5% added the BM with an intermediate degree of demand relatedness and 5.1% added the BM with the lowest degree of demand relatedness in the first diversification move.

with firm fixed effects (*xtivreg2, fe* command in *STATA*), including all other control variables described above. Unreported results showed that the instrumental variables were valid (i.e., the set of IVs was both relevant and exogenous), and the second-stage regression estimations were consisted with our fixed effects OLS results reported in Models (2) and (3) of Table 4, providing further support for Hypotheses 1 and 2.

To further test the robustness of our performance analysis, we used return on sales (ROS) from Compustat as an alternative profitability measure, computed as a retailer's earnings before interest and taxes (EBIT) expressed as a percentage of net sales. Using ROS as dependent variable provided evidence consistent with the results reported in Table 4. While we described how both cost- and revenue-based synergies may explain the inverted U-shaped relationship between BMD and performance, we were particularly interested in illuminating the role of demand-side synergies that increase WTP. Given that firm-level information on WTP data is not available in secondary datasets like ours, we elected to examine the moderating role of a demand shock, which we theorized to negatively influence the WTP mechanism. To provide additional insights, we used the natural log of total firm sales as an alternative dependent variable. This dependent variable captures consumer perceived benefits from demand-related BMD to the extent that consumers spend more money on the products of firms that diversify into demand-related models. As shown in Table 5, results of this robustness check were consistent with those reported in Table 4. Moreover, we performed a 99 percent winsorization of the dependent variables and found consistent results, suggesting that our results are not biased by outliers. And finally, as mentioned earlier, we used the entropy index to operationalize our independent variable (the degree of business model diversification); results were robust.

We performed supplemental analysis to shed additional light on the underlying mechanisms of the BMD-performance relationship. In the development of Hypothesis 2, we argued that financial crises may not only reduce wealth and income but also consumer confidence, leading consumer preferences to converge around satisfaction of more basic needs. Because GDP per capita captures the average income of people in a country, and is commonly used to measure living standards, we added to the variables used in Model (3) of Table 4 an interaction effect of the GDP per capita variable with BMD and BMD squared. Unreported results revealed that GDP per capita accentuates the inverted U-shaped relationship between BMD and firm performance ($p < 0.01$), as would be expected if one believes that income increases consumers' willingness-to-pay for using business models with complementary value propositions. Results also showed that the moderating effect of financial crisis in flattening the inverted U-shaped relationship between BMD and performance remained ($p < 0.01$) even after controlling for interactions with GDP per capita. This finding suggests that financial crises are indeed associated with psychological factors affecting consumer behaviour beyond a pure income effect.

In the following, we provide further insights into the relationship between demand relatedness and BMD beyond the descriptive statistics shown in Table 2 by using multivariate logit regression analysis.

5.2. *Regression results for diversification decisions (Hypothesis 3)*

Table 6 reports descriptive statistics and correlations for the variables used in the analysis of diversification decisions. Table 7 presents the logit estimations in Models (1) and (2). Entry occurred in 81 of the 371 potential entries (21.8%).

Model (1) shows the results of the control variables, which are generally consistent with those reported in previous studies. For example, as in prior work on industry diversification (e.g., Silverman, 1999; Diestre and Rajagopalan, 2011), results show that firm size increases the likelihood of business model diversification ($p < 0.01$). Similar to Silverman's (1999) result showing that target industry growth increases the likelihood of diversification, we also found that target BM growth increases the likelihood that a firm will diversify into that target BM ($p < 0.01$). Finally, while Diestre and Rajagopalan (2011) found a negative, insignificant effect of core industry growth on the likelihood of industry diversification, our results show that core BM growth is significantly negatively associated with the likelihood of BMD ($p < 0.05$).[16]

Model (2) tests Hypothesis 3 by adding the measure of demand relatedness. The coefficient of the *Demand relatedness (DR)* variable

[16] In addition to these prior studies focusing on a single country, we also included a set of country-level control variables. We found that GDP per capita tends to increase the likelihood of BMD ($p < 0.10$). This finding is consistent with the suggestion that income per capita increases consumers' willingness-to-pay for variety (Sohl et al., 2020), increasing the opportunity to create demand-side synergies via BMD. The only potential surprise in this regression is that the number of Internet users is negatively associated with the likelihood of BMD ($p < 0.01$). However, it is important to note that this control variable is specific to additions of the e-commerce model, which represents only 1 out of 3 potential BM additions.

Table 3
Descriptive statistics and correlations for firm performance.

	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13
1. ROA	0.10	0.07	−0.14	0.44	1.00												
2. Number of BMs (BMD)	1.95	0.97	1.00	4.00	−0.22	1.00											
3. BMD^2	4.72	4.43	1.00	16.00	−0.21	0.98	1.00										
4. Firm size (ln)	10.00	2.19	1.40	21.34	−0.20	0.35	0.33	1.00									
5. Firm growth	1.81	63.40	−1.00	2340.1	0.01	0.00	−0.01	−0.01	1.00								
6. Product diversification	0.25	0.31	0.00	1.50	−0.12	0.54	0.49	0.19	−0.02	1.00							
7. Product diversification^2	0.16	0.29	0.00	2.24	−0.11	0.44	0.41	0.12	−0.02	0.94	1.00						
8. International divers.	0.34	0.52	0.00	2.81	0.10	0.27	0.30	0.01	−0.02	0.15	0.09	1.00					
9. Financial crisis	0.20	0.40	0.00	1.00	0.05	−0.04	−0.03	−0.07	−0.02	−0.05	−0.04	0.11	1.00				
10. GDP per capita (ln)	10.46	0.68	7.48	11.24	0.11	−0.26	−0.23	−0.02	−0.11	−0.16	−0.12	−0.06	0.16	1.00			
11. GDP growth	2.35	2.93	−8.27	14.16	0.00	0.05	0.05	−0.10	0.08	0.02	0.03	0.01	−0.40	−0.51	1.00		
12. Internet users[a]	56.88	21.80	0.71	91.00	0.14	−0.20	−0.19	0.05	−0.08	−0.08	−0.03	−0.01	0.23	0.79	−0.45	1.00	
13. Core BM growth	0.02	0.38	0.00	13.81	−0.04	0.07	0.07	0.12	−0.01	0.08	0.07	0.01	0.02	−0.04	0.06	−0.14	1.00
14. Core BM concentration	0.21	0.20	0.03	1.00	−0.10	0.23	0.21	0.17	0.04	0.25	0.21	0.10	−0.14	−0.46	0.13	−0.49	0.08

Notes: $N = 1362$ firm-year observations. Correlations above $|0.06|$ are significant at $p < 0.05$. BM denotes business model. [a]per 100 people.

Table 4
FE regression results for firm performance.

DV: ROA	Model (1)	Model (2): H1	Model (3): H2
Number of business models (BMD)		0.029***	0.039***
		(0.011)	(0.011)
BMD^2		−0.006**	−0.008***
		(0.002)	(0.002)
BMD × financial crisis			−0.031**
			(0.012)
BMD^2 × financial crisis			0.007**
			(0.003)
Firm controls			
Firm size	−0.002*	−0.002**	−0.003**
	(0.001)	(0.001)	(0.001)
Firm growth	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Product diversification	0.005	0.006	0.004
	(0.024)	(0.024)	(0.024)
Product diversification^2	−0.002	−0.004	0.000
	(0.021)	(0.021)	(0.021)
International diversification	0.019***	0.019***	0.019**
	(0.007)	(0.007)	(0.007)
Country controls			
Financial crisis	−0.010***	−0.010***	0.019
	(0.004)	(0.004)	(0.012)
GDP per capita	0.032***	0.031***	0.028***
	(0.007)	(0.007)	(0.006)
GDP growth	0.001	0.001	0.001**
	(0.001)	(0.001)	(0.000)
Internet users	−0.000**	−0.000*	−0.000***
	(0.000)	(0.000)	(0.000)
Country-BM controls			
Core BM growth	−0.002	−0.003	−0.001
	(0.002)	(0.002)	(0.002)
Core BM concentration	0.000	0.002	−0.000
	(0.010)	(0.010)	(0.008)
Constant	−0.785***	−0.802***	−0.705***
	(0.209)	(0.209)	(0.164)
Firm dummies	Y	Y	Y
Year dummies	Y	Y	Y
R-squared	0.09	0.10	0.11
Observations	1362	1362	1362
Number of firms	152	152	152

Notes: Standard errors clustered at the firm level are in parentheses. BM denotes business model.
***, **, * indicate significance at 1%, 5% and 10% levels, respectively.

is positive and significant ($p < 0.001$), suggesting that higher demand relatedness enhances the likelihood that a firm will diversify into a target business model. Following the approach suggested by Hoetker (2007), we identified the marginal effect of demand relatedness on the likelihood of BMD by accounting for the nonlinear nature of our logit regression model. We used mean values for all covariates to calculate the predicted probability of BMD for each of the possible degrees of demand relatedness (i.e., lowest, intermediate, and highest degree of DR). The predicted probability of business model diversification is 3.4 percent when a target BM has a low degree of DR, 13.2 percent when a target BM has an intermediate degree of DR, and 29.0 percent when a target BM has a high degree of DR. Thus, we conclude that Hypothesis 3 is supported by the evidence, as was suggested in the descriptive statistics in Table 2.

Robustness checks. We checked the robustness of our results by using different specifications and variable operationalizations. While we focused on core BM-target BM combinations to calculate the degree of demand relatedness in the main analysis, we also considered the sales weighted average of all existing business models in the firm portfolio to calculate the degree of demand relatedness relative to a given target business model.[17] Results were consistent with those reported in our main analysis. Moreover, to check whether our results were driven by a specific type of business model addition, we excluded one by one each of the particular models from the choice set of target BMs. Under this approach, when a firm operates a single BM in 1998, it could potentially diversify into two new business

[17] For example, a firm might operate two business models and generate 90 percent of its sales with the core business model. If the demand relatedness of a given target BM is lowest (DR = 1) relative to the core BM and highest (DR = 3) relative to the other BM in the firm portfolio, the sales weighted average of DR for that target BM would be 0.9*1 + 0.1*3 = 1.2 (as opposed to 1 in the main analysis).

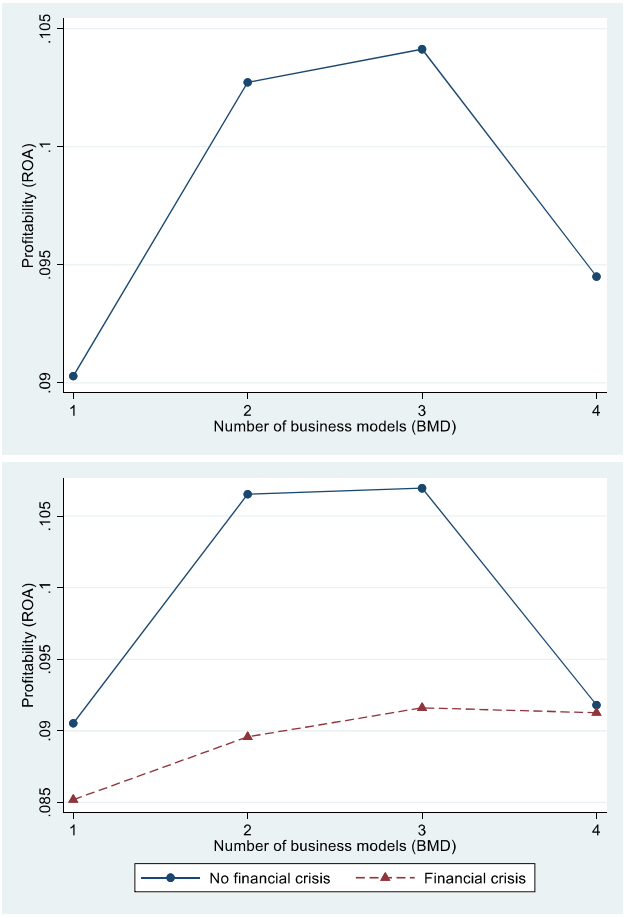

Fig. 1. Business model diversification and firm performance: direct and moderated effects.

Table 5
Robustness check: Using sales as dependent variable.

DV: LnSales	Model (1): H1	Model (2): H2
Number of business models (BMD)	1.423***	1.691***
	(0.282)	(0.289)
BMD^2	−0.269***	−0.325***
	(0.058)	(0.060)
BMD × financial crisis		−1.276***
		(0.314)
BMD^2 × financial crisis		0.267***
		(0.067)
Controls	Y	Y
Firm dummies	Y	Y
Year dummies	Y	Y
R-squared	0.104	0.116
Observations	1362	1362
Number of firms	152	152

Notes: Standard errors clustered at the firm level are in parentheses.
***, **, * indicate significance at 1%, 5% and 10% levels, respectively.

Table 6
Descriptive statistics and correlations for business model diversification decisions.

	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12
1. Diversifying entry	0.22	0.41	0.00	1.00	1.00											
2. Demand relatedness (DR)	1.92	0.84	1.00	3.00	0.26	1.00										
3. Firm size (ln)	9.81	2.39	5.40	21.34	0.35	−0.04	1.00									
4. Firm growth	0.15	0.29	−0.83	1.76	0.03	0.00	−0.03	1.00								
5. Product diversification	0.18	0.28	0.00	1.50	0.16	−0.08	0.20	−0.10	1.00							
6. International diversification	0.23	0.41	0.00	2.43	0.03	−0.02	0.00	−0.05	0.08	1.00						
7. GDP per capita (ln)	10.44	0.67	7.47	10.67	−0.26	0.00	−0.09	−0.12	−0.30	−0.27	1.00					
8. GDP growth	3.05	2.38	−7.82	1.48	−0.02	0.03	−0.24	0.04	−0.09	−0.02	−0.14	1.00				
9. Internet users[a]	38.07	22.13	0.71	83.89	−0.25	−0.05	0.02	−0.09	0.05	0.17	0.40	−0.29	1.00			
10. Core BM growth	0.65	4.54	0.01	33.31	−0.07	0.01	−0.12	−0.04	0.00	0.24	−0.01	−0.07	0.13	1.00		
11. Target BM growth	9.49	10.57	0.39	75.75	0.10	−0.02	0.00	0.08	0.24	−0.04	−0.32	0.20	0.02	−0.10	1.00	
12. Core BM concentration	0.41	0.25	0.15	1.00	0.18	−0.02	0.26	0.02	0.22	−0.02	−0.30	0.23	−0.16	−0.13	0.35	1.00
13. Target BM concentration	0.43	0.33	0.13	1.00	0.34	−0.03	0.65	0.02	0.18	−0.03	−0.30	−0.14	−0.05	−0.12	0.04	0.28

Notes: $N = 371$ firm-BM observations. Correlations above $|0.12|$ are significant at $p < 0.05$. BM denotes business model. [a]per 100 people.

Table 7
Logit regression results for business model diversification decisions.

DV: Diversifying entry	Model (1)	Model (2): H3
Demand relatedness (*DR*)		1.212***
		(0.225)
Firm controls		
Firm size	0.323***	0.414***
	(0.090)	(0.114)
Firm growth	0.317	0.385
	(0.401)	(0.466)
Product diversification	0.694	0.933
	(0.468)	(0.617)
International diversification	0.292	0.343
	(0.367)	(0.484)
Country controls		
GDP per capita	0.350*	0.495*
	(0.193)	(0.258)
GDP growth	0.016	0.046
	(0.059)	(0.064)
Internet users	−0.034***	−0.038***
	(0.008)	(0.011)
Country-BM controls		
Core BM growth	−0.146**	−0.192*
	(0.061)	(0.106)
Target BM growth	0.036***	0.051***
	(0.013)	(0.016)
Core BM concentration	−0.593	−0.702
	(0.533)	(0.658)
Target BM concentration	0.846	0.895
	(0.867)	(1.035)
Constant	−13.427**	−20.634***
	(5.501)	(7.642)
Industry dummies (four-digit SIC)	Y	Y
Region dummies	Y	Y
Pseudo *R*-squared	0.27	0.37
Log pseudolikelihood	−142.38	−122.73
Chi-square	242.35***	164.91***
LR-test vs. specification (1)		39.30***
Potential entries (observations)	371	371
Realized entries	81	81

Notes: Standard errors clustered at the firm level are in parentheses. BM denotes business model.
***, **, * indicate significance at 1%, 5% and 10% levels, respectively.

models (as opposed to three new BMs in the main analysis). Results were robust to the exclusion of any specific target BM, suggesting that for any choice set of target BMs, firms are more likely to choose the target BM with the highest degree of demand relatedness.

6. Discussion

A number of studies have observed that firms increasingly operate multiple business models at the same time, recognizing that the issue of which business models to combine under the corporate umbrella represents a significant question to an increasing number of firms. The primary motivation for our project was a desire to build upon and extend this research area by examining BMD across a fuller range of diversification activity. Our efforts result in new perspectives on this important phenomenon and a clearer understanding of the role of demand-side factors in business model diversification. More specifically, our work enhances insight into the role of these factors in not only the sequencing of business model additions but also in the performance implications of BMD. Our empirical analyses of 152 public retail firms from 25 countries revealed an inverted U-shaped relationship between the degree of BMD and performance, indicating that a moderate degree of BMD is the highest performing. Our analyses further indicated that firms do indeed sequence business model diversification moves, and an important factor driving these decisions is the demand relatedness of new models. Finally, we believe that researchers also now have clearer appreciation of the notable role contingent factors can play in the link between BMD and performance. Moreover, our work showing how crises are intertwined with the benefits of BMD demonstrates a previously unexamined effect of financial crises.

6.1. Research implications

To the best of our knowledge, our work provides the first large-scale investigation of how the overall degree of business model diversification is associated with firm profitability. The shape of the relationship between degree of diversification and performance has been a fundamental question in both the industry (Palich et al., 2000) and geographic (Cardinal et al., 2011) diversification literatures. We explain why a similar inverted U-shaped relationship exists for BMD; in doing so, we demonstrate the importance of integrating both supply- and demand-side benefits of diversification alongside potential costs of diversification in order to understand the overall BMD-performance relationship.

Our work also represents the first systematic evidence of how firms prioritize business model diversification decisions. In contrast to prior product diversification studies (e.g., Silverman, 1999) that typically emphasize the importance of resource relatedness to understanding diversification decisions and the resultant performance outcomes, our work highlights the importance of demand relatedness in understanding business model diversification. As such, it further demonstrates the value of establishing links between the business model and demand-side literatures, and it is consistent with recent calls in the business model and diversification literatures for greater focus on demand-side considerations (Ahuja and Novelli, 2017; Demil et al., 2015; Lanzolla and Markides, 2021; Massa et al., 2017; Priem et al., 2018).

We believe that our choice of moderator provides additional support to a conclusion that demand-related effects are important to the results we observe. This is because from a demand-side perspective, diversification should create less value in times of financial crises because greater income uncertainty should decrease consumers' willingness-to-pay premium prices for the concurrent use of multiple offerings from the same firm. In contrast, supply-side synergies are unlikely to differ substantially during times of economic shock. By revealing that financial crises flatten the inverted U relationship between BMD and firm performance, our findings suggest that demand-side synergies seem to be a driving mechanism of the benefits underlying the BMD-performance relationship.

Our study also complements prior empirical demand-side research. For example, Mawdsley and Somaya (2018) show that law firms tend to diversify in response to their customers' prior diversification moves. We add to this research by showing how another customer-related characteristic, namely heterogenous customer preferences, may provide an important explanation of decisions around operating multiple business models in a portfolio and the sequencing of diversification moves. Our focus on negative demand-side shocks also extends and complements prior work that has mainly examined effects of positive demand-side shocks (e.g., Aggarwal and Wu, 2015; Argyres et al., 2015; Wang et al., 2020). Given evidence from prospect theory that consumers react more strongly to losses than to gains (Kahneman and Tversky, 1979), it is important to investigate negative as well as positive shocks. Moreover, a focus on negative income shocks should be particularly appropriate to study customer-specific mechanisms such as how the BMD-performance relationship might depend on customers' WTP for variety.

We also complement the strategy literature on the measurement of diversification and relatedness. Based on the seminal works of Rumelt (1982) and Palepu (1985), strategy research has typically focused on product diversification, using the Standard Industrial Classification (SIC) code system to operationalize the degree of diversification and relatedness. Our study provides a first step towards the development of a business model classification from a demand-side perspective. In addition to the specific business models identified in our particular context, we hope that additional identification and definition of business models will lead to the development of a fine-grained business model classification system, which can be used for further theoretical development and empirical tests in the business model literature, including the constructs of business model diversification and demand relatedness.

Overall, our theory and evidence suggest that strategy scholars interested in examining business model choice and the associated performance implications should be aware of omitted variable bias if business models are examined in isolation without considering the overall degree of BMD in a firm's portfolio. The value creation mechanism of a business model depends in part on the model's interrelationships with the firm's other models in the portfolio, and the sequencing of a focal model's addition to the portfolio provides an important indicator of the extent of these interrelationships. As such, our findings also suggest that questions around business model design are likely influenced by the business model's position in the firm's overall BM portfolio.

6.2. Managerial implications

Business model diversification represents an important strategic decision for firms facing heterogeneous consumer needs and requirements. Our results suggest the existence of an optimal level of BMD; some diversification is beneficial to create and exploit synergies without incurring overwhelming costs. But, managers should be particularly wary of high levels of diversification where there are relatively diminished benefits of extending into less related models while costs continue to increase.

The example of two French-based grocery retailers, Carrefour and Auchan, is consistent with these practical cautions. Both generate their largest sales share with traditional big-box business models, and although Carrefour is larger in size, Auchan's profits exceeded those of Carrefour by roughly 25 percent in 2010 (Deloitte, 2012). They differ in their BMD approach, and the results of our study suggest that differences in the two retailers' BMD decisions could be an important explanation for the variation in their performance. While Carrefour diversified across all four types of business models (i.e., traditional big-box, traditional small-store, e-commerce, and discount), Auchan focused on adding the traditional small-store and e-commerce models. Consequently, Auchan's BMD strategy appears to have been superior. Carrefour's former CEO, Lars Olofsson, stated that the firm's strategy is to become leaner, stronger, and more focused on its core customers (Carrefour, 2011). Thus, Carrefour's decision to divest its discount business 'Dia' could be related to the firm's recognition that its BMD may have resulted in lower profitability relative to competitors.

Finally, managers should be also aware that the performance benefits of BMD depend on macro-environmental conditions. For example, managers should expect demand-side benefits of BMD to decrease during times of financial crises that negatively affect

consumers' willingness-to-pay for variety.

6.3. Limitations and future research questions

Our analysis is not without limitations, although these limitations suggest opportunities for future research in several instances. First, we were obviously constrained in the number of contingent factors that we could investigate. Deeper theoretical understanding will require developing greater knowledge of the boundary conditions of the primary relationship by identifying additional moderating characteristics. The more mature industry and international diversification literatures have followed growth paths featuring significant amounts of work dedicated to investigating such contingencies. Similar work lies ahead for the business model diversification literature. Our choice of economic shock was motivated by our interest in demand-side mechanisms and by calls for greater attention to demand-related factors in diversification and business model research. In particular, we believe our choice of financial crises was particularly appropriate to capture our mechanism of interest—demand-side synergies. While studies have shown that risk reduction can explain why unrelated product diversification creates more value during a financial crisis (Kuppuswamy and Villalonga, 2016), such benefits should be less salient in our context of BMD if cash flows are more correlated across business models than across industries during financial shocks. Future research interested in examining potential risk-reduction benefits of BMD could therefore focus on other types of negative shocks, such as the recent COVID pandemic. During periods of lockdown, firms operating both online and offline models may have a corporate advantage because they can meet the new demand structure more effectively than rivals with a lower degree of digitalization.

Future research could also complement our study by examining moderation effects of positive demand-side shocks (see, e.g., Argyres et al., 2015). Are the moderating effects of positive and negative demand-side shocks symmetric or asymmetric? If they are asymmetric, do customers react stronger to the occurrence of negative income shocks as predicted by prospect theory? We also invite future research to explore additional contingencies of the business model diversification-performance relationship. In addition to the external factor considered in our study, future research could also consider internal characteristics of firms such as organizational culture and structure that lead to variance in the performance benefits of BMD.

A second limitation is that our study largely takes customer preferences as given (exogenous); however, firm actions may affect those preferences over time. Recent research has begun to investigate how firms might "shape" demand-side landscapes (Vinokurova, 2019). We see promise in extending these ideas to the business model diversification literature. Specifically, future research could investigate the extent to which firms may be able to shape preferences via BMD (e.g., by combining customer-focused activities across demand-related models) and the tactics that are more or less effective in shaping those preferences.

Third, our net inverted U-shaped relationship between BMD and performance is explained by the underlying causal mechanisms of business model diversification. However, as with most large-scale empirical studies, our data do not allow us to directly observe these mechanisms. Additional research with more detailed benefit and cost measures would allow clearer verification of the underlying mechanisms. Similarly, following the approach of studies such as Snihur and Tarzijan (2018) and Snihur et al. (2018), future qualitative research could shed additional light on the theoretical mechanisms underlying the BMD-performance relationship. For example, how exactly do firms create and exploit synergies among business models? How do firms configure activities in order to benefit from demand-side synergies when they diversify across business models? Do firms experience additional benefits or costs of BMD, above and beyond the ones discussed in our study?

In addition to these primary areas of extension, we see a variety of secondary extension opportunities as well. The general phenomenon of business model diversification is obviously not limited to the retail sector, so we suggest future research build on our study by testing business model diversification in different empirical settings. This will help establish the generalizability of our findings on the BMD-performance relationship and sequencing of BMD.

We also see several additional opportunities for future research that arise at the intersection of our work and the growing spate of empirical demand-side research. For example, while Mawdsley and Somaya (2018, 2021) explain "client-led diversification" across product markets, future work can extend our study by focusing on a business-to-business (B2B) context to examine the extent to which BMD may be inspired by customers' diversification moves. Future research could also examine the interaction effects of supply- and demand-side synergies via BMD in reducing the threat of market entry, building on Uzunca's (2018) empirical work that shows how the combination of incumbents' supply- and demand-side capabilities can deter new entrants. Cozzolino and Verona (2022) examine how newspaper organizations adapted to Internet distribution by distinguishing three levels of adaptation (i.e., resources, demand, and ecosystem), suggesting a promising path for future work is using their three-level framework to illuminate how firms might build their business model portfolio. Similarly, extending recent work on incumbent responses to environmental changes, future research could examine how demand-side changes (Wang et al., 2020) or market information regime changes (Zanella et al., 2021) might inspire firms to adapt their business model portfolio, especially if these changes are long-term trends. Moreover, Visnjic et al. (2016) show how business model innovation and product innovation are tied to firm performance, suggesting an interesting area for future research is examining how BMD could be combined with product innovation and how such combinations affect performance.

Finally, an area for future research is considering how resource characteristics are linked to types of business models and BMD decisions. Levinthal and Wu (2010) distinguish between scale-free resources (e.g., knowledge that can be shared contemporaneously across markets) and non-scale free resources (e.g., employees that can only be used in one market at a given point in time). Because non-scale free resources have opportunity costs in their current use, Wu (2013) shows that diversification decisions can be inspired by changes in relative demand across markets. Since technology is a scale-free resource, e-businesses may tend to have a greater stock of scale-free resources than non-digital businesses. Recent research using a demand-side perspective to study international expansion has started to illuminate how firms can leverage digital assets across geographic markets (Shaheer and Li, 2020; Shaheer et al., 2020). This

raises some interesting questions around BMD decisions as well. For example, while an online shop might be easily scaled for expansion of a single model, it might be more costly to share such digital assets across models. In contrast, certain digital assets such as artificial intelligence might be less BM-specific and more fungible; thus, they could be more efficiently shared across business models. So, future research could identify digital assets that explain when e-businesses are more likely to favor single model expansion over BMD. Overall, such work will further extend this growing and important research stream that is developing deeper understanding of the antecedents and performance implications associated with the simultaneous operation of multiple business models in one organization.

In conclusion, by integrating research on BMD and demand-side theory, we developed several predictions of how firm performance may vary with the overall degree of BMD and how firms may sequence business model additions, and provided empirical evidence consistent with these predictions. Our findings have important implications for strategy research on business models, suggesting that questions around the choice of business model design and the performance implications of business models should consider the focal model's position within the firm's broader business model portfolio. Specifically, our results clarify how and under what conditions demand relatedness between business models can create value beyond the value creation potential of any single business model in isolation. By illuminating how negative demand shocks affect the BMD-performance relationship and how demand relatedness inspires firms to sequence business model additions, our study also contributes more generally to the development of demand-side theory in strategic management research. Overall, our effort to build understanding of the performance and entry sequencing effects of business model diversification further extends research recognizing the business model as a central concept in management research.

Author Statement

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