Empirical Study

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# Stuck in the Middle: Overcoming Strategic Complexity through IT Flexibility

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## Abstract

*Firms have reacted to a recent surge in environmental volatility by turning to mixed business strategies as a way to protect their existing markets and to establish new markets. Rather than choose a single focus for their strategy, these firms pursue operational excellence, customer intimacy, and product leadership at the same time. Research shows that mixed strategies – a characteristic of so-called stuck in the middle firms – lead to lower firm performance than single or pure-strategies. Mindful of the potentially conflicting goals and complexities found in firms with mixed strategies, in this paper, we assess the role of IT flexibility in helping firms to overcome such complexity and to ultimately thrive in a volatile environment that calls for increasingly mixed strategies. Using data from matched surveys of executives in 241 firms, we reveal that IT flexibility (hardware compatibility, software modularity, and network connectivity) is highest in mixed strategy firms and that such firms predominate in volatile settings where flexible IT is more apt to provide the means of responding to sudden or unexpected market change. These findings help explain why mixed strategy firms have higher IT business value than pure strategy firms, a result noted in prior research. For firms trying to prosper under mixed strategies, our results confirm the importance of IT flexibility and the broader implications of using IT to pursue multiple strategic goals, as defines stuck in the middle firms.*

***Keywords:*** IT flexibility, market volatility, mixed strategies, strategic complexity, stuck in the middle

## Introduction

In a world that is increasingly volatile and economically uncertain, firms are asking whether their existing business strategy is viable or in need of revision. With new forms of global competition and amid fears of a recession, firms are trying to secure their market position by broadening their product mix or by developing new markets. From an information technology (IT) perspective, there is still some question as to whether IT allows firms to extend the life of an outdated or ineffective strategy or to instead facilitate a move to a new strategy. However, given the cost and risk of switching from one strategy to another, firms have instead opted to extend their current strategies into new areas. For example, full-fare airlines such as United and KLM have added low-cost carriers to their fleet as a way to counter the threat from rivals such as Southwest Airlines and Ryanair. Similarly, boutique brokerage firms are now offering low-cost, online trading as a way to contain customer defections to low-cost rivals such as Scottrade and Zecco while Dell, in parallel with its established build-to-order model, is now offering pre-configured computers through mass-market retailers such as Staples, Best Buy and Wal-Mart.

A concern with this form of diversification involves strategic complexity and its impacts on firm performance. Complexity arises from the possibility that in pursuing multiple strategies at the same time, conflicts will arise as business units compete for the same resources or as customers learn to trade off one strategy against the other. For example, when Merrill Lynch first offered online trading alongside its full service trading model, clients could obtain free advice from their traditional brokers but then place trades at a steep discount through the online channel. What this suggests is that firms that diversify their strategy to compete not just through low-cost offerings but through niche channels or innovation face considerably greater challenges than firms with a single strategy. Indeed, studies find that firms with mixed strategies – euphemistically described by Porter (1980) as being *stuck in the middle* – underperform those with a single strategy (Dess and Davis, 1984; Robinson and Pearce 1988; White 1986). Strategic complexity, even if it is a symptom of competition and changing economic times, comes at a steep cost to firms in terms of reduced profitability. Yet in a somewhat paradoxical finding, Tallon (2007) notes that stuck in the middle firms realize higher business value from IT than firms with single strategies. In effect, IT is helping firms to meet diverse goals and survive in an ever-more volatile world even if overall firm performance is likely to suffer. Our goal in this paper is to explore *why* IT business value is higher in stuck in the middle firms. Confirming arguments noted in Tallon (2007), we find that stuck in the middle firms possess significantly more flexible IT than single strategy firms. As such, flexible IT means that IT can, with relative ease and speed, scale or adapt to accommodate the strategic complexities associated with mixed strategy firms. In a

technical sense, IT flexibility is based on key characteristics such as reusable software that can enable the rapid development and deployment of IT applications, interoperability across different operating systems, and an ability to expand or contract essential IT resources such as network bandwidth and server capacity. Our results show the value of employing a flexible IT infrastructure, notwithstanding the higher cost of IT flexibility when firms are trying to diversify their strategy in order to survive in a turbulent environment.

***Firms are asking whether their existing business strategy is viable or in need of revision.***

The remainder of our paper is structured as follows. In the next section, we present a theory of IT flexibility for stuck in the middle firms. In section 3, we present data from a matched survey of executives in 241 firms. After analyzing these data, we review our results and their broader implications in the coming section.

## Theoretical Development

Using the resource-based view of the firm, research notes that the value of IT is less a function of ubiquity and more a function of complementarity with non-IT resources such as knowledge and expertise (Mata et al 1995; Powell and Dent-Micallef 1997; Ray et al 2005; Wade and Hulland 2004). At a time when there is broad acceptance of the value generated by IT, there is also an awareness that IT can foment rigidity traps that impede strategic change and other attempts to improve performance (Bharadwaj, 2000). Research has also investigated the alignment between IT and business strategy with the overall conclusion being that alignment enhances reputation, IT efficiency, market positioning, and firm performance (Chan et al 1997; Kearns and Lederer 2003; Tallon 2008). A weakness with the alignment and resource-based literature, however, is their inattentiveness to strategic complexity or the challenges of managing different and perhaps multiple strategies. Alignment studies rarely distinguish between strategies. Instead, firms are assigned to a single strategy category using generic labels such as defender, prospector or analyzer (Miles and Snow 1978), when in fact they may be more accurately described as having a mixed strategy (Palmer and Markus 2000; Sabherwal and Chan 2001). Hence, the question still remains: how should firms align IT with mixed business strategies at a time when firms are being driven to using multiple or multi-focused business strategies to protect their flanks from competitive attack? Some firms may elect to use separately managed IT resources (separate data centers, servers, and networks) for each business strategy but there is a very real risk of excess IT spending, resource redundancy, and limited knowledge spillover. Others may recognize the value of shared resources such that each business strategy draws from a central pool of data center resources and so IT resources are not just aligned to one business strategy but to a set of strategies.

### *IT Flexibility*

As firms have come to acknowledge the limitations of legacy systems, principally in terms of the lack of systems integration and an inability to respond easily and quickly to market change, there has been a surge in interest around flexible IT. Clearly, not all firms need to be flexible. In industries where change is relatively rare or predictable or where single-focused strategies can be adopted with impunity – sectors such as metals, mining or chemicals – there is less need for IT flexibility. However, in banking or fashion retail – sectors where change is frequent and disruptive – flexibility and an ability to respond to change is critical. Thus, firms with mixed strategies are more likely to look to IT to manage multiple and potentially conflicting business goals. Our belief is that mixed strategies are a deliberate response to the rapid pace of change found in the most volatile sectors of the economy, a belief that is supported by Miller and Friesen (1983) who argue that in a volatile environment, firms pursue a broader range of business activities. Thus, firms with single strategies are less likely to adopt or benefit from flexible IT since the relative stability of their industry means that their flanks are less likely to be assaulted by competitors seeking a market edge.

The case of the U.S. banking sector, after deregulation and the repeal of the Glass-Steagall Act in the 1990s, offers a useful illustration of this argument. At a time when banks were restricted to intra-state activities and when their revenues were legally confined to banking, there was little reason to use flexible IT. However, once banks could move out-of-state and profit from non-banking services such as insurance, real estate, and equity trading, the need for flexible IT rose as banks tried to realize a consolidated view of their market. Since each account holder has unique needs, a one-size-fits-all model based on standardized or undifferentiated IT is limiting and so flexible IT has become a primary differentiating factor in banking success. What we can also propose, based on the resource-based view, is that the sustainability of a mixed strategy may require a complex form of IT support. To the extent that the core aspects of IT infrastructure – hardware, software, and networks – can be easily replicated, the unique pattern of resource utilization is what will ultimately deliver a competitive advantage. The resource-based literature sees IT flexibility as a vital differentiating factor that cannot be so easily replicated (Byrd and Turner 2000; Wade and Hulland 2004). Accordingly, we capture these arguments in the following two hypotheses:

*H1: Firms pursuing mixed strategies have more flexible IT than firms pursuing a single strategy.*

*H2: Firms in volatile environments are more likely to pursue mixed strategies.*

## Methodology

In order to test these hypotheses, we devised a matched survey methodology to collect data on IT flexibility, environmental volatility, and business strategy. Given the technical nature of IT flexibility and the corresponding need for technical knowledge, the first part of our matched survey

targeted CIOs as the most knowledgeable informant; the second part of our match targeted a strategic planner or someone with strategic planning responsibility who could accurately evaluate the pace of change in the environment. In order to assess business strategy, we devised a measurement approach based on the Treacy and Wiersema (1995) typology. Under this typology, firms are described as *operationally excellent* with an emphasis on low-cost operations, throughput, and productivity, *customer intimate* with a focus on providing a superior level of service at a premium price, or *product leaders* with a focus on delivering innovative products and services that may, on occasion, purposefully undercut existing product/service offerings in order to ensure market leadership. Unlike rival typologies by Porter (1980) – low-cost leadership, differentiation, niche – or Miles and Snow (1978) – prospector, defender, analyzer, reactor – Treacy and Wiersema (1995) utilize distinct labels with far less ambiguity. A further advantage of this typology is its ability to identify the use of mixed strategies. For example, Fidelity Investments is regarded as a product leader in the management of retirement assets (their freedom funds automatically rebalance to adjust for risk and changes in age) but their brokerage model is operationally excellent to the extent that trades must be executed quickly and at a competitive price compared with other more established brokers. FedEx is equally operationally excellent in the delivery of overnight packages but its acquisition of Kinkos – a retail chain – recognizes the need to be more customer focused and to move the supply chain closer to the point where documents are created. To the extent that research has found a degree of consensus in executives' perceptions of value disciplines in the same firm (Tallon and Kraemer, 2006), all executives are equally capable of using this typology to assess their strategy. In this study, we use CIOs to specify and weigh their firm's mix of value disciplines.

### Survey Measures

IT flexibility was measured using a set of 12 measures drawn from previous research by Byrd and Turner (2000). Using research by Keen (1991) that views IT flexibility in terms of reach (scalability) and range (adaptability), Byrd and Turner (2000) view IT flexibility through hardware compatibility, software modularity, and network connectivity. These three constructs capture the extent to which IT resources can be shared across different platforms, whether software can be adapted to provide customized applications, and whether networks can be combined to facilitate data sharing. In combination, these constructs identify whether IT resources can scale to ensure IT support for the business strategy, and whether IT can adapt to the changing needs of that strategy. All items adapted from Byrd and Turner (2000) were validated in past research by Byrd and Turner (2001a; 2001b) and Byrd et al. (2004). Respondents were asked to state their agreement with each item on a seven point scale anchored on "do not agree" and "agree completely"; the text of all twelve IT flexibility survey items is shown below:

***Strategic complexity comes at a steep cost to firms in terms of reduced profitability.***

#### Hardware Compatibility

Software applications can be easily transported and used across multiple platforms

Our user interfaces provides transparent access to all platforms and applications

Our firm offers multiple interfaces or entry points (e.g., web access) to external users

Our firm makes extensive use of middleware to integrate key enterprise applications

#### Software Modularity

Reusable software modules are widely used throughout our systems development unit

Legacy systems within our firm do not hamper the development of new IT apps.

Functionality can be quickly added to critical applications based on end-user requests

Our firm can easily handle variations in data formats and standards

#### Network Connectivity

Our company has a high degree of systems inter-connectivity

Our systems are sufficiently flexible to incorporate electronic links to external parties

Remote users can seamlessly access centralized data

Data is captured and made available to everyone in the firm in real time

Environmental dynamism or volatility has traditionally been measured using perceptual measures although there is some doubt as to whether perceptions can accurately detect differences in volatility from one industry to the next. For this reason, we use three objective measures taken from research on industry clockspeed by Fine (1998) and Mendelson and Pillai (1998). These items evaluate the percent of revenues earned from recently launched products/services, the rate of customer turnover, and the lifecycle duration (in months) for a flagship product or service. Customers in a high clockspeed setting where product lifecycles are short, where customer turnover is high and where a large percentage of sales comes from recent innovation – fashion retail, for example – indicate a turbulent environment. If, instead, product lifecycles are long, customer turnover is low, and innovation is not a significant source of sales, then what would be described as low clockspeed is indicative of a more stable and predictable environment.

Finally, as noted earlier, business strategy was evaluated through value disciplines. Following the approach used in

Tallon (2007), strategic planners were asked to allocate 100 points across the three value disciplines, with their primary value discipline receiving the highest allocation. This permits executives to signal, if necessary, a single strategy (100-0-0) or a mixed strategy (33-33-34). It must be noted that while Treacy and Wiersema (1995) encourage firms to use a single value discipline, firms should be competent in all areas. This suggests that firms not allocate zero points to any of the three value disciplines; indeed, we noted only nine firms with a zero allocation from the 723 (241x3) allocations (1.2%) made by the 241 firms in our sample; remarkably, eight of these nine allocations occurred in the area of product leadership.

***Stuck in the middle firms possess significantly more flexible IT than single strategy firms.***

### *Data Collection and Analysis*

Data was collected by randomly surveying 1,600 firms from a population of 2,826 publicly traded firms with 2001 revenues in the range $100 million to $3 billion. CIOs were identified from the Directory of Top Computer Executives, published by Applied Computer Research; names of strategic planners were taken from Hoovers.com (CFOs were used if strategic planners could not be identified). Matched surveys were received from 241 firms; the resulting 13% response rate is on a par with similar matched surveys in the literature (Chan et al 1997). Analysis of variance tests on firm size, response times, and performance confirm the absence of sample response bias. A summary of our sample responses is provided in Table 1.

Table 1: Sample Characteristics (N=241)

| | Frequency | Percent |
|---|---|---|
| ***Revenues (2001)*** | | |
| Less than $100 million (M) | 15 | 6.2 |
| $100 M - $250 M | 75 | 31.1 |
| $250 M - $500 M | 54 | 22.4 |
| $500 M - $1 billion (B) | 44 | 18.3 |
| $1 B - $2 B | 36 | 14.9 |
| More than $2 B | 17 | 7.1 |
| ***Industry Categories*** | | |
| Electronics and Computing Machinery | 65 | 27.0 |
| Wholesale and Retail | 46 | 19.1 |
| Financial Services | 43 | 17.8 |
| Software Services | 25 | 10.4 |
| Metals and Plastics | 17 | 7.1 |
| Pharmaceuticals and Health Care | 12 | 5.0 |
| Other | 33 | 13.6 |
| ***Respondents (matched surveys)*** | | |
| IT Executive Survey | | |
| Chief Information Officer | 116 | 46.2 |
| IT Director | 50 | 20.7 |
| SVP / VP, Information Technology | 49 | 20.3 |
| IT Manager | 26 | 10.8 |
| ***Business Executive Survey*** | | |
| SVP / VP Corporate Development | 113 | 46.9 |
| Business Development Officer | 60 | 24.9 |
| VP Strategic Planning | 37 | 15.3 |
| Chief Financial Officer | 31 | 12.9 |

To begin formal data analysis, we first performed a confirmatory factor analysis on the twelve IT flexibility items using EQS, a structural modeling tool. Using reflective indicators and allowing correlated first order factors, we obtained the following fit statistics showing a well-fitting model: $\div^2$ ratio = 2.5, NFI = 0.91, CFI = 0.94, RMSEA = 0.08. All path estimates were highly significant at $p<0.001$ and above 0.50. A second order factor incorporating all three first order reflective factors was also tested and was found to have similar fit statistics. What this illustrates is that the three primary constructs underlying IT flexibility (hardware compatibility, software modularity, network connectivity) can be seen independently or can be merged into a single *meta* IT flexibility construct. Next, we tested all IT flexibility factors for validity and reliability. As seen in Table 2, each factor passes tests for convergent and divergent validity. Convergent validity evaluates whether items load higher on a common factor than on rival factors and is measured by ensuring that the square root of the average variance explained (AVE) exceeds 0.71. Discriminant validity asks if factors share greater variance internally than with rival factors and is assessed by testing that inter-factor correlations are less than the values obtained for convergent validity. Lastly, we show that for each factor, composite reliability comfortably exceeds a recommended minimum of 0.8 (Nunnally 1978).

Table 2: Validity and Reliability Evaluation

| IT Flexibility Factors | Composite Reliability | 1. | 2. | 3. |
|---|---|---|---|---|
| 1. Hardware Compatibility | 0.854 | 0.773 | | |
| 2. Software Modularity | 0.893 | 0.696 | 0.823 | |
| 5. Network Connectivity | 0.876 | 0.640 | 0.754 | 0.799 |

Main diagonal data reflect measures of convergent validity, as measured by the square root of the average variance extracted or the variance shared between each factor and its reflective indicators. Off-diagonal elements represent the correlation between each factor-pair, values that are used in testing for discriminant validity.

In order to determine the extent to which firms have pursued mixed strategies, we again adapted a procedure from Tallon (2007). Where firms had assigned fifty or more points to a single value discipline, their strategy was labeled operationally excellent (OE), customer intimate (CI) or product leadership (PL) depending on which discipline has the highest points allocation. This approach helps to identify firms that have chosen a single value discipline to serve as the foundation for their business strategy. All other firms have some combination of value disciplines which allows them to be described as having mixed strategies or as being *stuck in the middle*. A review of the allocated points within each category (OE, CI, PL, mixed) is shown in Table 3. Of the 241 firms in our sample, 74 have mixed strategies. Table 3 also shows that the points allocated for these 74 firms are

almost evenly distributed across each of the three value disciplines; data for the single strategies (OE, CI, PL) show that each has a clear stake within a single value discipline. As a further assessment of the technique used to label firms as having single or mixed strategies, we used a discriminant analysis, the results of which confirm 98.8% or 238 of our initial strategy labeling choices.

***Flexible IT means that IT can scale or adapt to accommodate the strategic complexities inherent in mixed strategy firms.***

Table 3: Analysis of Value Disciplines Points Allocation

| Strategy Labels | N | Operational Excellence | Customer Intimacy | Product Leadership |
|---|---|---|---|---|
| Single strategies | | | | |
| Operational Excellence | 96 | 60.36 | 22.34 | 17.70 |
| Customer Intimacy | 38 | 25.26 | 55.27 | 19.47 |
| Product Leadership | 33 | 24.09 | 22.27 | 53.64 |
| Mixed strategies | 74 | 36.09 | 33.84 | 30.07 |

To test our first hypothesis that firms with mixed strategies have more flexible IT than those with single strategies, we used the results of our confirmatory factor analysis to develop factor scores using the mean of the items loading on each factor. We next used a one-way analysis of variance test to compare IT flexibility measures between single and mixed strategy firms. The results of this test are shown in Table 4 where we find that, while there are significant differences between firms with single and mixed strategies, those with mixed strategies report the highest level of IT flexibility for hardware, software, and networks. Since analysis of variance tests can be distorted by small sample size cells, a non-significant Levene's test statistic was used to validate our overall findings. Welch's statistic was also considered to take account of unequal group sizes, the results of which again overwhelmingly indicate support for H1.

To test our second hypothesis of differences in environmental volatility between firms, we used a second analysis of variance test on the three clockspeed measures (lifecycle duration, customer turnover, and percent of sales from recently launched products/services). The results of this test are seen in Table 5. We notice first that there are significant differences for two of our three clockspeed measures and, second, that environmental volatility is highest for firms with mixed strategies. For example, lifecycle duration for these firms is shortest at 36 months and so new products are launched with greater frequency. At the other extreme, operationally excellent firms have a five year product lifecycle. Firms with mixed strategies rely more on recent innovations (41% of sales come from recently launched products/services); they also have the highest rate of customer turnover (15%). Levene's statistic again validates our results while Welch's statistic helps to alleviate concerns based on unequal group size. In summary, we also find support for H2. As a way to reflect further upon the differences between single and pure strategy firms and the likelihood that firms with mixed strategies are more likely to exist in dynamic or volatile industries while those with single strategies are more likely to exist in more stable industries, we offer a simple descriptive review of single and mixed strategy firms by industry. As seen in Table 6, the highest percentage of mixed strategy firms occurs in software services (which includes software design, application hosting, and outsourcing). We also note that the lowest concentration of mixed strategy firms is seen in the metals and plastics sector where, as one might expect, product lifecycles are long and where cost-based strategies are preferred over customer intimacy or product innovation. We similarly note that pharmaceuticals and healthcare firms are primarily seen as product leaders, as one might expect from firms that are focused on discovering the next breakthrough drug. Lastly, a significant chi-square test implies that it is unlikely that industry and strategy type are independent and so we can reject the null hypothesis that these variables are unrelated. What this suggests is that some industries, by virtue of their propensity towards change, are inclined to favor mixed strategies while others, by virtue of their relative stability, favor firms pursuing single strategies. We next discuss our overall research findings and their broader implications for research and practice.

Table 4: IT Flexibility by Strategy Type (H1)

| Strategy type | N | Hardware Compatibility | Software Modularity | Network Connectivity | Overall IT Flexibility |
|---|---|---|---|---|---|
| Single strategies | | | | | |
| Operational Excellence | 96 | 2.97 | 3.12 | 3.67 | 3.25 |
| Customer Intimacy | 38 | 3.24 | 3.31 | 3.97 | 3.51 |
| Product Leadership | 33 | 2.93 | 2.78 | 3.45 | 3.05 |
| Mixed strategies | 74 | 3.64 | 3.80 | 4.31 | 3.92 |
| Analysis of variance: | | | | | |
| F statistic | | 2.877 | 0.037 | 3.847 | 0.010 |
| sig. | | 3.518 | 0.016 | 4.191 | 0.006 |
| Welch's statistic | | 3.123 | 0.030 | 3.861 | 0.012 |
| sig. | | 3.508 | 0.018 | 4.302 | 0.007 |
| Levene's statistic | | 0.356[NS] | 0.278 [NS] | 0.030 [NS] | 0.157[NS] |

NS: not significant. Overall IT flexibility is an average of hardware compatibility, software modularity, and network connectivity.

## Discussion and Implications

In an era where globalization, regulation, rapid innovation, and fickle consumers have ushered in a new and increasingly volatile environment, firms have struggled to maintain their margins in the face of expanded competition. In response, firms have had to make significant changes to their business strategy. For example, in the telecommunications sector, firms have diversified from fixed line competition toward data, voice-over-IP, and mobile businesses. Brokerage firms have similarly revised their business strategy at a time when stock trading has become a commodity exercise. While many firms have retreated from an increasingly volatile environment by focusing on a single

Table 5: Environmental Volatility by Strategy Type (H2)

| Strategy type | N | Lifecycle Duration (months) | Customer Turnover (%) | Percentage of New Sales (%) |
|---|---|---|---|---|
| Single strategies | | | | |
| Operational Excellence | 96 | 65.74 | 13.63 | 31.46 |
| Customer Intimacy | 38 | 48.55 | 10.79 | 29.97 |
| Product Leadership | 33 | 44.97 | 9.89 | 44.94 |
| Mixed strategies | 74 | 36.29 | 15.28 | 41.54 |
| Analysis of variance: F statistic | | 1.103 | 0.349 | 3.453 |
| sig. | | 0.029 | 2.747 | 0.044 |
| Welch's statistic | | 1.325 | 0.271 | 3.981 |
| sig. | | 0.022 | 2.799 | 0.045 |
| Levene's statistic | | 3.557* | 1.370 NS | 0.980 NS |

NS: not significant; * $p < 0.05$.

Table 6: Strategy-type by Industry

| Industry | Operational Excellence N | Percent | Customer Intimacy N | Percent | Product Leadership N | Percent | Mixed Strategies N | Percent |
|---|---|---|---|---|---|---|---|---|
| Electronics and Computing | 22 | 33.8% | 10 | 15.4% | 14 | 21.5% | 19 | 29.2% |
| Wholesale Retail | 22 | 47.8% | 06 | 13.0% | 03 | 06.5% | 15 | 32.6% |
| Financial Services | 14 | 32.6% | 13 | 30.2% | 03 | 07.0% | 13 | 30.2% |
| Software Services | 10 | 40.0% | 03 | 12.0% | 02 | 08.0% | 10 | 40.0% |
| Metals and Plastics | 11 | 64.7% | 01 | 05.9% | 03 | 17.6% | 02 | 11.8% |
| Pharmaceuticals and Healthcare | 02 | 16.7% | 01 | 08.3% | 05 | 41.7% | 04 | 33.3% |
| Other | 15 | 45.5% | 04 | 12.1% | 03 | 09.1% | 11 | 33.3% |
| Total | 96 | 39.8% | 38 | 15.8% | 33 | 13.7% | 74 | 30.7% |

$x^2 =$ 31.433, 18 degrees of freedom, p = 0.026

business strategy – Scottrade (low-cost trading), Southwest Airlines (low-cost travel), Nike (innovation), Tiffany (differentiation) – others have resorted to mixed strategies.

As discussed previously, mixed strategies have been criticized as giving less than stellar financial performance compared to single strategies and yet for many firms, the choice of mixed strategies is a necessity. Where agility is judged in terms of the breadth and depth of business actions (Ferrier et al 1999; Sambamurthy et al 2003), firms with mixed strategies are seen as more responsive to market shifts since their strategy is all-encompassing or broad rather than narrowly focused. Mixed strategies mean that firms can compete in different ways, whether based on price, product innovation or customer service. The flipside, however, is that mixed strategies introduce complexity into how resources are allocated and how competition is defined. Unless firms use segmentation to define and separate their markets, customers can become confused and upset by the sheer variety of business models and pricing options. If firms face little alternative but to pursue a mixed strategy, and how to prosper under that strategy, our results suggest that flexible IT may be a primary factor allowing firms to satisfy multiple goals and to better manage resource allocation in a way that benefits the firm as a whole.

***IT can foment rigidity traps that impede strategic change and other attempts to improve performance.***

Since IT flexibility is so critical to mixed strategy firms, it is useful to explore how the individual elements of IT flexibility (hardware compatibility, software modularity, network connectivity) assist these firms. Arguably mixed strategy firms may need to pool data from disparate sources, as is the case at banks pursuing a strategy of relationship or one-stop banking. Interoperability permits applications to look past operating system peculiarities although this is an issue that continues to plague legacy mainframe systems and their choice of operating systems. For example, Meditech – a Massachusetts-based health information systems provider with a 25% market share in the U.S. – continues to design proprietary applications using its Magic operating system, a factor that limits interoperability to other non-Meditech systems. Software modularity is similarly a key factor for mixed strategy firms as it allows applications to be easily altered if market needs suddenly shift direction. This was a critical ingredient in Merrill Lynch's ability to compete with Charles Schwab by allowing their high value clients considerable latitude in how their accounts were managed. Network connectivity is similarly critical, not just in how internal systems are configured to be accessible over the web but in how network traffic is managed as happens at brokerage firms when equity trades must be routed to markets providing the best bid or ask prices. Network connectivity also speaks to issues of bandwidth and scalability. Mixed strategy firms may find that the volume of data traffic on their networks spike in ways that single strategy firms do not. For example, in order to counteract airfare sales by JetBlue or Southwest Airlines, traditional full-fare carriers such as United may need to tweak the fares on their low-price routes, a move that could cause an unexpected spike in pricing and booking requests. If networks cannot cope with the extra traffic, these mixed strategy firms could suffer acute financial losses.

If the challenges of strategic complexity are so severe then, as our results indicate, IT flexibility is an essential coping resource. Our analysis reveals that mixed strategies are prevalent in more turbulent or unpredictable environments but that firms with mixed strategies can turn to IT to help manage the myriad challenges that define a turbulent environment. The strategic management literature describes stuck in the middle firms as *muddling through* and lacking in strategic planning (Porter 1980), but the reality is likely to be less complex if IT flexibility can bring a sense of order to what might otherwise be a highly complex management issue. The intent of IT flexibility is that IT support can be channeled to different areas of the business, to different activities or users, often with minimal marginal effort and cost, or that resources can be adapted to multiple purposes. In cases where firms pursue mixed strategies, IT support needs may vary widely. Pressures to cut costs, to improve customer service, or to bring products to market at a faster pace require very different forms of IT investment but as stuck in the middle firms are likely to encounter such pressures simultaneously, either IT spending

must be higher in order to build IT support for each aspect or focus of the business strategy (something we did not observe in our data) or IT flexibility must be higher, something that is decisively confirmed by our empirical analysis.

### Managerial Implications

Legacy IT systems and their ability to create rigidity traps are likely to be anathema to solving the many challenges faced by stuck in the middle firms. Instead, as our analysis shows, IT flexibility can be a key survival resource. Combined with the results in Tallon (2007) where it is seen that stuck in the middle firms earn the highest business value from IT, we can conclude that firms with mixed strategies are likely to realize higher value from IT because of their superior IT flexibility. From a managerial standpoint, we know from prior research that IT flexibility is itself a consequence of other management practices such as strategic planning, IT-business partnership, and an ongoing evaluation of IT (Byrd et al 2004). Certainly, mixed business strategies will likely require specific IT skills, not just in how IT is technically architected and configured, but in how IT is managed on an ongoing basis. As noted earlier, the resource-based literature reveals how the combination of technical IT resources and managerial skills adds a critical element of differentiation to firms, enabling IT to create a sustainable competitive advantage (Mata et al 1995; Ray et al 2004; Ray et al 2005). What this likely means is that while the technical aspects of IT flexibility – scalable and adaptable hardware, software, and networks – are key to supporting mixed strategies, there is an equally critical role for managerial IT skills. To the extent also that the primary locus of alignment between IT and business strategy is at the process-level, coinciding with the primary locus of value from IT (Barua et al 1995; Kohli 2004; Tallon 2008), we may argue that the role of IT management is to ensure that the use of IT in supporting process activities is open to the need for flexibility in how those activities react to environmental change and how the demands on IT might subsequently change.

***As firms have come to acknowledge the limitations of legacy systems, there has been a surge in interest around flexible IT.***

Hence, the managerial implications of our results is to not only signal to firms that IT flexibility is a competitive imperative but to confirm that IT flexibility is a means to reverse the negative performance effects that typically accompany strategic complexity. If the reality for firms in a progressively turbulent world is to broaden their strategies to appeal to as many market segments as possible, flexible IT is what will enable them to survive and perhaps thrive in this situation. In contrast, firms with rigid IT (legacy IT, fixed capacity networks, proprietary software or systems that resist interoperability) will likely struggle to present a single face to the market. Rigidity is also likely to absorb high levels of IT expenditure at a time when spending might be better used elsewhere. The lesson, therefore, for management is to recognize the value of IT flexibility and to think carefully about how flexibility can be embedded in critical processes.

### Research Implications

Information systems research has shown an increased interest in applying resource-based theories to understand how IT can generate a sustainable competitive advantage (Melville et al 2004; Piccoli and Ives 2005; Wade and Hulland 2004). Research has also shown an interest in dynamic capabilities theory, looking at how particular capabilities allow firms to regenerate and sustain a competitive advantage in the face of environmental change (Eisenhardt and Martin 2000; Teece et al 1997). Against broad academic consensus that IT can be a source of dynamic capabilities, our results show that strategic complexity is an important contextual variable. The reason that dynamic capabilities matter is because firms in volatile and unpredictable settings resort to mixed strategies to protect their competitive positioning and to secure their flanks against competitors. A related question perhaps is why single strategies remain in some of the most volatile industries such as air travel. While Southwest Airlines and Ryanair are clearly successful in their respective geographic markets, their business models are not competing directly with rivals in all markets. For instance, neither airline flies transatlantic and so their strategy of being a low-cost carrier might not be sustainable in a more direct head-to-head comparison with mainstream international carriers.

A number of unresolved questions emerge from our findings that warrant further research. First, it is not entirely clear how firms embed IT flexibility into their business process in order to deliver a greater level of IT business value. Possible avenues for resolving this question include portfolio approaches to IT investment and real options, the key factor being that firms must forecast their IT needs and then engineer a suitable IT infrastructure to support a business strategy that will almost certainly evolve in unpredictable ways. The question of how to cost-justify IT flexibility is also worthy of interest at a time when firms are being pushed to create more insightful business cases for IT projects and when there is renewed interest in post-implementation reviews that determine, ex-post, whether IT is truly delivering what is expected of it.

### Research Contribution and Limitations

This research contributes to the literature in two key respects. First, we show that firms in volatile settings are more likely to resort to mixed business strategies, despite the fact that firm performance tends to be higher in firms with pure or single-focused strategies. Second, we show that flexible IT – defined in terms of hardware compatibility, software modularity, and network connectivity – is an essential factor in how firms successfully manage mixed strategies. Time and again, researchers and consultants have called for firms to pick a single strategic focus and to execute against it, rather than become caught up in a maze of interlocking and potentially conflicting strategies that can squander essential

resources and confuse the marketplace (Miles and Snow 1978; Porter 1980; Treacy and Wiersema 1995). The reality, of course, is that firms are often unable to retreat to the relative safety of a single strategy unless their industry is stable and predictable. In an era of global competition and supply chain connectedness, fewer sectors will enjoy this level of predictive stability. If mixed strategies or strategic complexity is the new reality, it behooves executives to identify how their operating procedures and processes should adjust and whether IT is going to support the management of strategic complexity or add to the problem. Many firms have already begun to adopt new forms of IT to create a flexible infrastructure. Through web services, open systems, service-oriented architectures, middleware, and grid computing, firms have been able to devise an expandable and adaptable infrastructure that is more reactive to change and variably priced to reflect the use of actual IT resources. Such innovations also recognize the historical impediments of legacy systems.

It should also be noted that certain limitations in our data, variables, and methods may undermine out results. For example, we used IT respondents to identify value disciplines. Our IT flexibility measures are also limited as they were adapted from a larger set of items in Byrd and Turner (2000). We could also question the simple rules applied to our value disciplines data for defining single or mixed strategy firms. Lastly, environmental volatility could be evaluated used a broader set of measures than the ones we use.

## Conclusion

Few market observers would dispute the fact that environmental volatility and instability is on the rise and that firms must either adapt or fade into obscurity and eventual irrelevance. Mixed strategies are a response favored by many firms in lieu of specialization as indicated by a pure or single-focused strategy. A concern, however, is that mixed strategies create tremendous complexities, an outcome that historically has led to less than stellar financial results. The paradox, noted in previous research, is that mixed strategy firms have *higher* business value from IT. Our analysis helps to explain why this is. So-called *stuck in the middle* firms use IT flexibility to manage and redirect the flow of IT resources to various parts of the firm, according to what might otherwise be seen as conflicting business goals. While our analysis does not call for all firms to consider mixed strategies as a response to increased environmental uncertainty, our results draw attention to the increasing importance of flexible IT and the attendant need to avoid, where possible, rigidity traps that might inadvertently lock firms into an outdated and ineffective business strategy. Future research can take note that IT flexibility must be managed in a way that meets evolving business goals. If mixed strategies are the new reality of competing in the twenty-first century, IT flexibility may emerge as a competitive necessity and so gain in importance and stature in the eyes of researchers and practitioners.

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## Key Questions

Q1. What are some coping mechanisms for firms that are increasingly drawn towards diverse business strategies in volatile markets?

Q2. Do firms in relatively stable environments benefit from IT flexibility?

Q3. What is the value of maintaining a flexible IT infrastructure?

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