FSG OUTLOOK

Decision making under extreme uncertainty: Blending quantitative modeling and scenario planning

By Peter J. Kennedy and Robert J. Avila

Sometimes the best view of the future requires an odd pair of bifocals: quantitative modeling and scenario planning. Quantitative modeling is designed to support relatively near-term, tactical decision making, while scenario planning is a planning tool to develop insights about the longer term. These two analytical approaches to decision making are typically not used together. But some planning challenges justify using both to get a better read on possible discontinuity. For example, this case study of a subsidiary of a multinational automotive firm operating in extremely uncertain market conditions shows how the two approaches were successfully blended – producing some important lessons during the process.

If done rigorously, quantitative modeling is an unquestionably useful and necessary decision-support tool for short- and medium-term market and operational planning. This is especially true in the automotive industry, where many executives come from engineering or finance backgrounds.

In contrast, scenario planning is normally used for longer-term decision making – actions that need to be considered now, but have an impact tail reaching out beyond five years and as far out as 50 years. Scenario planning is essentially qualitative. It is not predictive. Scenarios don't "come true." They are meant to provide realistic alternative frameworks for business analysis, strategy and decision making. Occasionally, scenarios are uncannily prescient about an event or a trend, though their real purpose is to accurately describe the range of operating environments an organization must be prepared to cope with. Thus, if researched and constructed rigorously, they will effectively anticipate risks, threats, challenges and enduring areas of uncertainty facing an organization.

SCENARIO PLANNING: A DEFINITION

Scenario planning is a strategic planning process that explicitly considers a range of plausible alternative business environments and the issues critical to the organization's success as a way to manage longer-term risks, identify hidden opportunities and prioritize alternative courses of action. Scenario planning should not be confused with "spreadsheet scenarios" in which numeric baseline forecasts are tweaked with alternative assumptions. Unlike strategic planning scenarios, spreadsheet scenarios by themselves do not yield strategies, though they can deliver strategic insights.[1]

BACKGROUND TO THE CASE: MANAGING AMID EXTREME TURBULENCE

"BrasilAuto, Incorporado"[2] is a subsidiary of a large, global automotive enterprise, with many years of experience in Latin America. In years immediately prior, BrasilAuto was struggling under challenging conditions in Brazil, and circumstances were growing increasingly uncertain, as political actors debated the merits of economic liberalization at a time of chronically high inflation and stagnant purchasing power. On one end of the political spectrum were reformers who wanted the nation to open up its economy to the world as many other emerging market nations had done, and to remove stifling regulations that tended to favor large domestic producers and labor elites. On the other end were nationalistic and populist interests urging more gradual change that ensured labor rights and consumer protections. Neat "left" versus "right" divisions didn't exist here, and many businesspeople, government officials and politicians found themselves agreeing with elements of both perspectives. Given this dynamic situation, it was impossible to see where the nation was headed.

Against this confusing, unpredictable politico-

economic backdrop BrasilAuto's management team, both in country and at headquarters, faced a range of complex decisions related to capacity, vehicle mix, pricing, distribution, dealer relationships, exports, labor and government relations. There was no consensus around either long- or short-run prospects for the nation or the vehicle market. BrasilAuto expatriate executives tended to be pessimistic, possibly because they felt overwhelmed by an unfamiliar business culture and arcane financial practices that had taken root in the inflation-ravaged nation. Their thinking could be summed up by the aphorism, "Brazil is the country of the future – and it will always be." The company's Brazilian executives tended to be somewhat more optimistic, insisting that the nation's large market, human talent, and determination in the face of adversity assured an eventual upside. But even the optimists were hard pressed to predict when circumstances would improve. Meanwhile, the pressure to resolve key business decisions was growing.

EMBRACING A SCENARIO PLANNING SOLUTION

A team of consultants[3] from the U.S. was called in to provide an independent evaluation. They had experience working with BrasilAuto and had several ongoing projects in the U.S. and Europe with the firm's parent. The consultants proposed a short-term scenario-planning approach because of the extreme nature of the uncertainty facing the country and pressures facing management to quickly come to terms with the threats and opportunities.

The consultants had experience with scenario planning as a qualitative tool to build sturdy strategies in complex and highly uncertain business environments and also with econometric modeling in the automotive industry. Though it was rare for clients to request the two tools be applied in an integrated process, this is precisely what BrasilAuto wanted. The core analytical need articulated by the company was for the project to answer two questions:

- Where is Brazil headed?
- How many cars can we sell?

Most importantly, the company wanted results delivered in less than 12 weeks, a difficult goal given the need for interviews on three continents, extensive market analysis and model building and the integration of outputs from processes.

Besides needing results delivered quickly, there were several other key considerations:

1. The company sought a balanced, independent evaluation of the prospects of country and the market. To ensure a representative set of perspectives on the serious, structural problems that clouded the short- and medium-term outlooks, the consultants conducted nearly 50 double-blind[4] interviews in country, as well as in the U.S. and Europe, with government officials, business leaders, think tank analysts, Brazilian labor leaders and opposition politicians.

2. The company wanted to hear both good and bad news about what might be ahead for the nation, politically, economically and socially. This gave the consultants license to create a realistic set of scenarios that reflected the company's concerns, plus issues and strategic elements and that arose in the course of the interviews.

3. The scenario analysis needed to be tied to automotive demand, so the company would have reliable insight into capacity needs and financial implications.

CUSTOMIZING A NON-TRADITIONAL SCENARIO SOLUTION

The project scope and time constraints dictated a comparatively simple scenario structure. That is, the scenario "uncertainty space" was built around a rudimentary 2x2 matrix, with the axes being "Political Leadership" and "Level of Economic Reform." Note that this matrix did not include an external dimension, such as global economic growth or level of global trade. This would have been a grave omission if the company was making a long-term strategic assessment.

BRAZIL SCENARIOS AND THE CHALLENGES THEY HIGHLIGHTED

Four scenarios were chosen (see Exhibit) based on three decision criteria:

1. Events and conditions that could plausibly materialize within the company's five-year planning horizon.

2. Scenario conditions that could have the biggest impact on vehicle sales and competitive conditions in Brazil.

3. A set of at least four[5] scenarios that would together capture the range of threats, challenges and surprise that the company could plausibly face.

EXHIBIT: BRAZIL SCENARIOS

Each of the four scenarios contained both qualitative characteristics and quantitative indicators. The latter would serve as inputs to a vehicle forecasting model. The qualitative elements were expressed as an integrated narrative, looking back in time from five years out, and relating a logical story of how critical national events turned out. A sample of the strategic issues presented by the scenarios follows.

Downward Spiral combined bad, populist politics and extremely inept economic management with widespread loss of business and public confidence in the direction of the country. These conditions pointed to prolonged depression in consumer demand for durables, like cars.

Stumbling Along looked at piecemeal market reforms, including privatizations, but offered no consensus on future direction. This scenario represented an impossible environment for automotive production planning.

Orthodox Shock imagined that Brazil swallows the harsh medicine prescribed by its creditors after a foreign exchange crisis. As a result, demand plummets and unemployment surges. But with stabilization comes a robust recovery and the formation of a labor-left coalition that provides political cover to reformist elements.

Potential Realized represented success on both economic and political front, with Brazil embracing gradualist reforms and export-led growth. This scenario offered the best possibilities for sustained automotive market growth, but also the eventual challenges of competing in an open, global trading system.

BUILDING A SCENARIO-CONTINGENT FORECASTING MODEL

The first step in developing any econometric market analysis is to establish an understanding of the fundamental drivers of the market in question. For the executives of a global car company with extensive experience in "normal" markets, Brazil with its hyperinflation, wildly swinging economy and political instability seemed to be a place where none of the rules held true. For the local management team it was a given that Brazil was a special case. An initial objective of our econometric modeling would have to be a test of these assumptions.

Motor vehicles are durable goods that can provide many years of service. Thus, new vehicle sales are driven by both customers seeking to replace existing vehicles and new buyers. In countries with growing populations and rising income levels, growth tends to be a significant driver of new car sales. In lower growth, mature economies replacement demand tends to dominate. Over the business cycle the decision to replace a vehicle may be delayed or accelerated, a fact that can produce large swings in car sales.

Our first step was to build auto replacement models using basic economic and demographic data from over a dozen countries. These models clearly demonstrated that the fundamentals of motor vehi-

cle demand were not in any way unique in Brazil. Instead, the seemingly chaotic swings in motor vehicle sales were largely due to the fact that Brazil was a high growth market with a high degree of economic instability. As a result both replacement and growth demand could undergo significant and complex cyclical fluctuation. Thus, our scenarios, driven by the uncertainty around economic policy and the nature of the political leadership that would implement and carry them out, could be used to produce alternative scenario contingent economic forecasts, which in turn could drive credible motor vehicle forecasts.

Annual econometric models for each of the major categories of motor vehicle sales based on about 30 years of data were built; factors included urban adult population, non-agricultural GDP, investment, the total stock of vehicles, and the inflation rate. Critically, one key factor for which we could get no historical data was vehicle price. Essentially, we had no time series on vehicle prices to work with at all. Thus, there was no way to estimate the price elasticity of demand. We were told, however, that in Brazil's high inflation environment, a major concern of management was to keep prices in line with costs to maintain profitability and that assuming relatively constant real prices would be a safe bet. Safe or not, there was no data available to us, so that assumption was made.

Each of the scenarios laid out detailed political and policy timelines that noted the most likely economic impact based on an analysis of the Brazilian economy and the track record of such policies in Brazil and other countries. The idea was not to come up with a precise economic forecast – almost always a fool's errand – but rather one that was credible and representative of what could reasonably be expected in the environment described by each of the scenarios. These scenario-contingent baseline forecasts were then used to drive motor vehicle sales forecasts within each of the scenarios. Each of the four strategic scenarios addressed both the broad nature of the business and economic climate, and specific insights as to how the auto market should be expected to trend within that scenario.

The problem we faced was that the Brazilian economy at that time did not really trend. Instead it lurched, stumbled, ran and hovered. Even if the general direction could be discerned, its actual path could be erratic. We needed a way of indicating within each scenario the expected range of variation in motor vehicle sales given the high year-to-year variability in the economy.

In addition to the uncertain economy, our research and interviews had uncovered more than a dozen possible one-off scenario-independent events ("wildcards"), ranging from a major increase in the global price of oil, another military takeover in Brazil and a slashing of the motor vehicle sales taxes. Any one of these events could potentially disrupt our baseline forecast of the motor vehicle market in any one of the scenarios.

Estimating wildcard impacts

We used a form of Monte Carlo analysis to address the GDP driven variability in sales. Over the previous 20 years the Brazilian economy had averaged a respectable 4.8 percent per annum in real GDP growth. Unfortunately the year-to-year variance in that growth had been +/-5 percent. Five hundred iterations were run with this normal variance about the GDP baseline forecast for each of the scenarios, which in turn was used to drive the scenario specific motor vehicle forecasts. The mean, standard deviation, maximum and minimum for each year's forecast was calculated to provide the expected range of variation for the motor vehicle forecasts in each of the scenarios due to the expected variability in Brazilian GDP.

Quantifying the impact of the various wildcard events required a detailed analysis of each event, assessing the probability of the event taking place in each year of the forecast as well as the nature of its impact on motor vehicle sales. Their impact could be positive or negative, sudden or delayed, permanent or transitory, major or minor. The estimates for all of these impacting aspects of these events were developed through research, third-party-expert interviews, discussions with client teams and our own assessment of these findings and opinions.

We used a Monte Carlo type analysis package, which simulated the random occurrence of the complete set of events on each of the scenario-specific motor vehicle forecasts. This enabled us to produce estimates of the expected range of variation in motor vehicle demand.

WHAT WE LEARNED

After considering all the major uncertainties facing the Brazilian motor vehicle market – political, economic, market – we were able to convincingly demonstrate the range of volatility in demand that the client needed to be prepared for.

From the start of the project, the company's Brazilian executives understood that it was not operating in an orderly market in which a straight-line growth forecast was all that was needed in order to plan their operation. They had already accepted the idea that their success would depend on their ability to respond to a rapidly fluctuating range of market conditions. What was needed, in order to plan for that type of dynamic operation, was a better understanding of the range and nature of the volatility that they would have to manage. As long as the risks and uncertainties were no more than a continuously revolving list of hypothetical "what ifs," decision making would remain paralyzed. But once the major uncertainties were all clearly identified, defined, researched, quantified and integrated – and corporate headquarters bought into the analysis – only then could management focus on developing a strategy and building the required organization to deal with the anticipated challenge.

They could clearly see that there was a baseline of operations and that there would be peak demands for which they had to have the ability to quickly ramp up to. They understood that the range and nature of this volatility varied across the major segments of the motor vehicle market and their experience during past swings enabled them to prepare for future market gyrations. Finally, they had a better idea of what to watch for in the political sphere and how to evaluate the impact of changing policy options. Having looked at the business environment hard and carefully, the uncertainty was significantly less unsettling or paralyzing than it had been.

PROCESS IMPROVEMENTS

From the consultants' perspective, the experience taught some important lessons, which we've since incorporated into our scenario consulting practice:

1. Attempting to integrate the qualitative and quantitative dimensions of the scenarios was overly ambitious. We tried to cram both quantitative indicators and strategic insights into five-year scenario stories. In the end, executives' narrow focus on vehicle demand estimates diverted their attention from the qualitative insights. Better practice would incorporate into the scenario planning process at least one executive-strategy workshop to qualitatively explore the scenarios before any vehicle forecasting numbers were displayed. Such workshops expose executives to a broad range of strategic insights and implications that otherwise tend to get buried when quantitative values are presented.

2. The scenarios should have been longer term – an end-state ten years into the future, instead of five. Emerging markets require that kind of longer-term perspective. In this case, Brazil passed through three of the four scenario worlds in the ten years after this project was completed. Companies today considering scenario work focused on China and India, for example, should similarly embrace at least 10-year scenario horizons, if not longer. It takes about a decade for real structural changes in an economy or society to play out.

3. Closer consultant/company working relations would have benefited the project. The formation of a client "Core Team" would have helped the company learn the scenario process from the bottom up, and better equipped its executives to both autonomously run the model and continue to work the scenarios after the consultant team completed the engagement. This kind of knowledge transfer to the client is an extremely important, though underappreciated, scenario-planning deliverable.

4. Resist relying on conventional wisdom from the client, especially when it concerns market fundamentals such as prices. The econometric models were built with no relative price information and the wildcard impact of a government cut in the sizable new vehicle tax was based solely on expert opinion. We should have introduced ad hoc estimates of price elasticity from other comparable markets. As it turned out the government did remove the tax, and this policy move resulted in a vehicle sales surge that exceeded our most aggressive

upside forecast. A few years later at the client's headquarters senior executives on this project confided in us: "You guys underestimated the upside when the government withdrew the taxes on vehicle sales. But so did we, and you were a lot less wrong than we were!"

Endnotes

[1] For a longer discussion on different types of scenarios, see Charles Thomas's Types of Scenario Planning at http://www.futuresstrategygroup.com/outlook-may08.htm

[2] BrasilAuto, Incorporado is a fictional name for an actual auto company's Brazilian subsidiary.

[3] The Futures Group was the predecessor firm to the Futures Strategy Group.

[4] Interviewees did not know the identity of BrasilAuto. In turn, BrasilAuto received a summary version of the interviews; no comments were attributed to any specific individual.

[5] Four is generally considered the minimal number of scenarios for most organizations. A set of three sets up a "Good," "Bad" and "Most Likely" mental model that is detrimental to rigorous scenario thinking about the possibilities of futures that are truly different from expectations.

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