Forecasting New Product Revenues

When determining the potential value of new products, L.E.K.'s analysis is based on three factors: forecasts of revenue, estimations of costs and investments, and the discount rate that should be applied to account for systematic risk. In our experience, forecasting revenue can be the most challenging task of the three for managers at all levels of an organization. Whether it's a new product utilizing new technologies or a product line extension, developing trustworthy information from a broad range of internal and external sources is a necessity.

The importance of thorough, well-grounded revenue forecasts cannot be underestimated. Critical issues that depend on these numbers include:

- R&D prioritization
- Capital requirements
- Cost structure and resources
- Sales and marketing budgets
- Earnings estimates to appropriately set market and investor expectations

Accurate forecasts early in the product development cycle can make the difference between a yes/no decision on the project or influence alternative development pathways. Forecasts for pre-market technologies are also an imperative when considering acquisitions, alliances or licensing opportunities.

The tools and techniques that are used to forecast revenues are applicable to a broad range of industries and situations. For more than 17 years, L.E.K. has leveraged its rigorous fact-based approach to products as diverse as broadband services to orthopedic devices.

In this newsletter, Lisa McIntyre shares her experiences in developing revenue forecasts for her biopharmaceutical clients. Throughout the piece, she cites the importance of forecasts based on emerging information about the product,* market conditions and the competitive landscape. We hope that each of you will be able to draw the appropriate link to your own industry and situation.

Revenue Forecasting Model

The L.E.K. approach to forecasting product revenues looks deceptively simple:

> customer base x total penetration
> x product's share of penetration
> x price per unit x units per year

However, this basic formula raises complex questions, including these:

- Are all customers the same? If not, how should they be segmented?
- How will the customer base change over time?
- What percentage of the customer base is currently underpenetrated?
- What market share can be expected? How is this affected by marketing expenditures? By changing technology trends? By new product introductions? By competitor reactions?
- How do you most accurately estimate a small share of a large market?

For simplicity's sake, "product" also includes services, technologies, and intellectual capital that can generate revenue.

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- What should be assumed for product price? How do price changes impact the likely market share?

- How quickly will the product sales "ramp up"? When and why might sales flatten or decline?

- How will changes in product features and benefits affect projected sales?

To demonstrate how L.E.K. addresses these questions, we will elaborate on the process and the issues considered in each of the elements of the formula.

customer base x total penetration
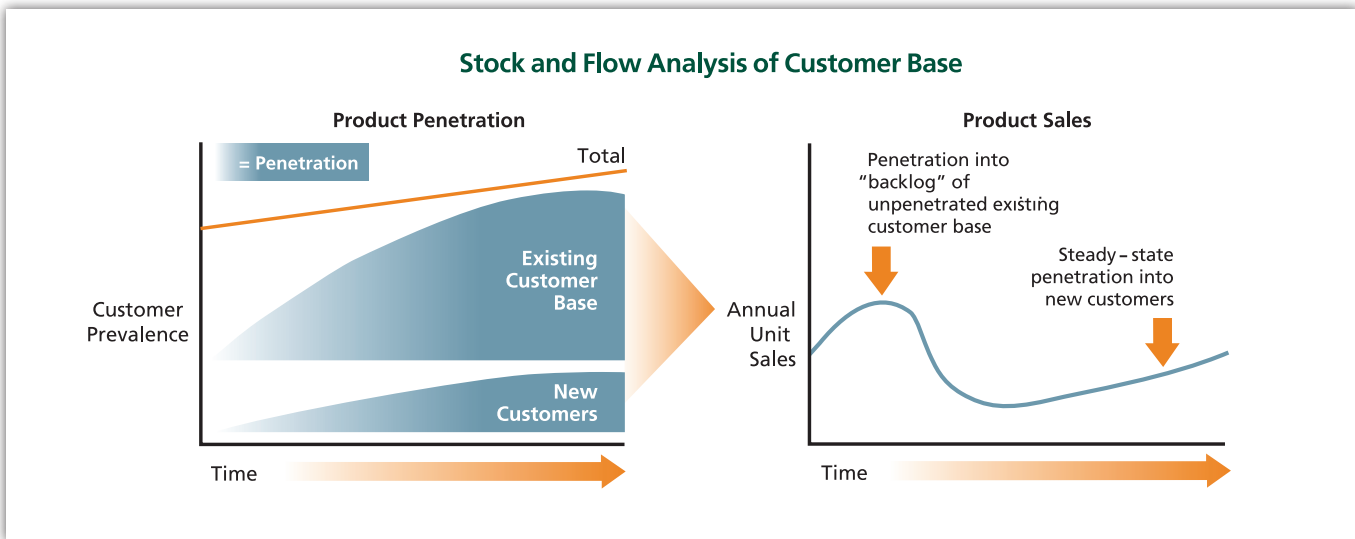x product's share of penetration
x price per unit x units per year

The first factor in developing a forecast revenue model requires a determination of the customer base, or number of potential customers for your product. This can be achieved by first discerning whether prevalence or incidence best fits the product's sales volume profile. Prevalence, the total number of potential customers at any one point in time, is the appropriate choice if the product will be purchased by the same customer on a

recurring basis, (e.g., a lifelong AIDS therapy or an Internet access subscription). Incidence, the number of new potential customers each year, is appropriate if the product serves a one-time acute event (e.g., a heart attack) and is generally easier to estimate. For an unpenetrated market, customer base forecasts for long-term services may require a "stock and flow"analysis as displayed below. This may conclude that the product revenues record a one-time hump from the backlog of a large unserviced customer base which will drop off dramatically as needs are met.

Another aspect of determining the customer base is to pinpoint the exact user your product will serve. This is achieved by correctly identifying customer segments. When the forecasting model assumes a low market share, small changes can produce wide and unreliable swings in future forecasts of total revenues. Dividing a customer base into smaller groups can avoid this outcome. Accurate customer segmentation may also allow you to determine the most attractive "early adopter" segments and adjust penetration forecasts accordingly.

For example, rheumatoid arthritis (RA) affects 2.1 million people in the United States and is considered a relatively common condition. However, it is best to segment these patients into three groups: those who have very severe RA, those who have a moderately severe condition, and those who are mildly affected. L.E.K. analyzed a product that was appropriate for patients with severe illness and was not designed to compete with the over-the-counter or prescription treatments used for mild RA. This allowed us to base the market share estimates on only the 525,000 severe cases, or 25% of the total RA patient base.

Customer bases change over time. In many industries, historical data about an emerging market may not exist or may provide an inadequate forecast for future growth. In these situations, identifying and analyzing the major independent growth drivers is the most effective approach to predicting changes. The figure on the next page outlines how L.E.K. used this approach to estimate future growth of 8% in the diagnosed patient base for symptomatic osteoporosis patients.

Stock and Flow Analysis of Customer Base

customer base x **total penetration**
x product's share of penetration
x price per unit x units per year

Total penetration is the percentage of the customer base currently being served by all available products that would be categorized with your product.

Penetration is particularly important if the target audience is being under-served by current products. Therapeutics that created new markets because the customer base was poorly served include hormone replacement therapy, antihyper-tensive medications and cholesterol-reduc-ing products. The videocassette recorder, the personal computer, and Internet services are classic technology examples.

To illustrate this point, before Merck introduced Mevacor in 1987, cholesterol-level awareness and testing was low. Mevacor and subsequent drugs created a critical mass of studies that proved the link between high cholesterol and death from heart disease. Over time, rapid diagnos-tic tests were developed. The American Heart Association issued guidelines that helped build awareness in physicians and patients, which in turn increased testing. This created a market base we now take for granted. As the graph to the right shows, the market growth enabled third and fourth market products to enjoy simi-lar or greater sales than the first product to market.

Estimating both the peak penetration, the maximum percentage of the customer base ever using any product, and the time it will take to achieve such penetration are
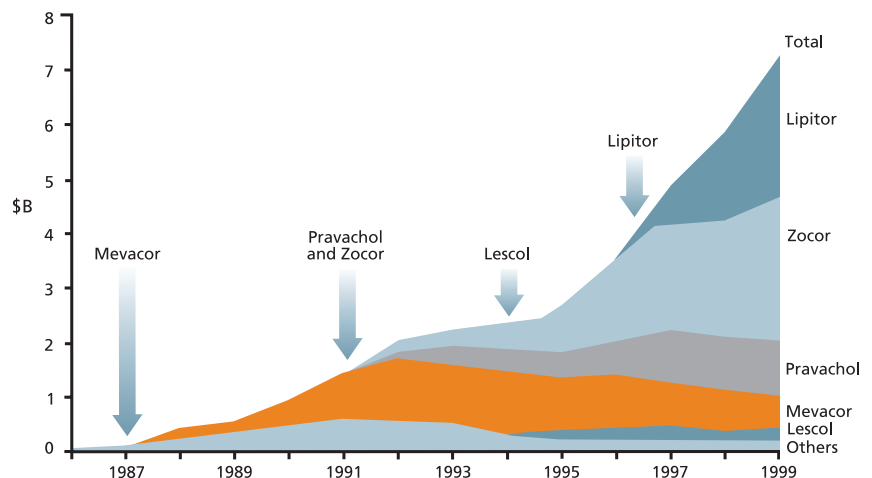
Qualitative Growth Drivers in Osteoporosis Patient Base

Factor/Driver	Relative Impact on Market Growth
Increasing age of population	⬆
Increased physician awareness of osteoporosis	⬆⬆
Improved access to diagnostic equipment	⬆⬆
Increasing use of osteoporosis diagnostic kits	⬆
Higher incentive to diagnose due to increased effectiveness of treatment options	⬆
Increased patient awareness and demand for BMD scans	⬆
Increased support from health care payers	⬆⬆
Second-generation preventative treatments reducing the number of patients with severe osteoporosis	⬇
Estimated future growth	**+8%**

key facets of predicting product revenue. To establish these estimates, the catalysts of penetration must be identified.
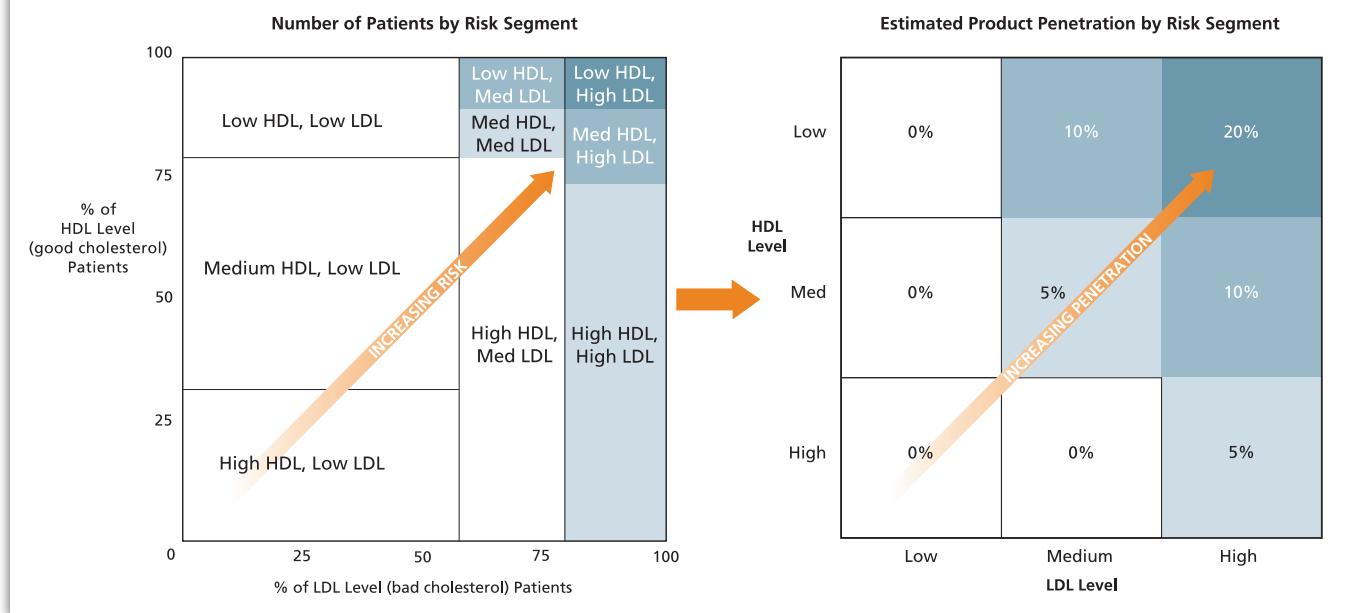
Continuing with the cholesterol example, L.E.K. examined the key factors that influenced the use of cholesterol drugs. These included patient symptoms such

as "good" cholesterol (HDL) and "bad" cholesterol (LDL) levels. As the figure on the next page shows, product penetration into patient segments with the most se-vere criteria (high LDL and low HDL) were correctly predicted to have the greatest penetration and the most rapid uptake.

Mevacor Creates a New Market

Area chart titled "Mevacor Creates a New Market" with y-axis $B from 0 to 8 and x-axis years 1987 to 1999. Arrows mark product introductions: Mevacor (1987), Pravachol and Zocor (1991), Lescol (~1994), Lipitor (~1997). Stacked areas labeled Total, Lipitor, Zocor, Pravachol, Mevacor, Lescol, Others.

Drivers of Customer Base Penetration for Anti-Cholesterol Products

Number of Patients by Risk Segment

Estimated Product Penetration by Risk Segment

customer base x total penetration
x **product's share of penetration**
x price per unit x units per year

Product's share of penetration, or market share, refers to the percentage of the total penetration that your product will possess. Estimating a product's potential market share versus competitors requires clearly comparing the features and benefits of each product from a customer perspective. Secondary factors such as marketing efforts, production capability and distribution logistics are also important, but the analysis should always begin with the products themselves and the customers they will serve. The three-step process that L.E.K. has developed to determine this market share percentage is as follows:

Step One: Estimating your product's peak market share.

The first step in estimating your product's peak market share is to define the features and benefits in order to provide a systematic means of comparison. An example of how we compared two antiviral products for influenza is shown on page five.

Primary research with input from key purchase decision makers for the products (in this case, general practitioners) provides the best estimates of likely market share. Of course, if the product is still under development, its features might not be completely understood. In these circumstances, a small number of the product's probable characteristics should be tested. These can be created by collaborating with the development group. They best understand the key attributes and can gauge the probability of product expectations.

It is also necessary to consider market share dynamically – competitors today are not necessarily the same ones the

product will face tomorrow. In fast-cycle industries, new competition can come from anywhere at any time. Conversely, the long clinical trial periods for pharmaceuticals mean that surprise competitive introductions are unlikely. Where possible, monitor competitors' pipelines and analyze the timing and probability of their new product introductions. While it may be difficult to estimate the attributes of the competition's future products, revenue forecasts should be constantly updated as new information comes to light.

Pricing is critical when estimating market share. However, price is not always the most important attribute. In the anti-influenza comparison example below, Relenza had a lower price point, but it was Tamiflu's formulation and improved efficacy that proved to be the key determinants of relative product share in that market.

Step Two: Estimating ramp-up to your product's peak share.

The second step is to estimate how quickly your product sales are likely to ramp up to peak market share. The rate of uptake by customers is often driven by factors over and above the ability of the new product to address currently unmet needs. Key questions to consider include these:

- Do customers recognize that they have a need or an unmet need?

- Does the product require a customer to significantly change behavior?

- Will the product create other costs or complications for the customer?

- Does the product purchase process fit with customers' current buying processes?

- Does the purchasing decision maker have a budget for the product?

- Are the product's technology standards being universally adopted?

Estimates of ramp-up will also be influenced by how the competition reacts to your introduction. They can initiate market awareness campaigns, conduct special promotions or expand their distribution to combat a new product entry. The costs and support required to overcome these competitive reactions are usually underestimated. Anticipating competitive moves and understanding their impact can help budget resources appropriately.

Anti-Influenza Product Comparisons

Features	Relenza	Tamiflu
Formulation	Dry powder inhaler	Capsule, oral formulation
Indication	For adults and adolescents	For adults only
Efficacy	1–1.5 day reduction	1.3 day, more consistent reduction
Safety	May cause bronchospasm in patients with severe asthma or COPD	Well tolerated, but high-risk patients have not been studied
Price per course of treatment	$37	$44
Sales efforts	Significant DTC advertising during flu season	Difficulty getting FDA approval for DTC advertising, but detailed with 3,000 sales reps and heavy sampling
Market share	25%	50%

Another factor that affects uptake is product replacement. If the new product is following one or more established products that have a long life cycle or there are other barriers to switching, a more dynamic uptake is calculated.

Every industry has unique market dynamics that determine the speed of product sales ramp-up. For example, in the pharmaceutical industry, the ramp-up of drug sales within a specific geography is likely to depend on the following factors:

- Speed of customer and physician acceptance (often dependent on product novelty and results, as well as the level of conservatism of the relevant physician segment)

- Speed of reimbursement coding and formulary/payer acceptance

- Sales rollout (dispersion of relevant call points versus sales capacity to reach these call points)

- Marketing rollout (key conferences, advertising expenditures, timing of articles, association recommendations)

- Training requirements (if any)

- Timing of additional data, such as additional publications, increased patient data over time, phase four studies, label expansions for new indications or new dosage forms

- Miscellaneous factors such as physician board recommendations, and related product introductions such as diagnostic tests

Steps for Estimating Market Share

Step 1 **Determine peak share by:**
- analyzing product attributes versus current competitors; use primary research with customers to estimate potential peak share of penetration
- assessing impact of potential new product introductions on peak market share
- adjusting potential peak share by non-product factors such as relative marketing strength or distribution strength

Step 2 **Estimate timing of ramp-up of product sales to peak share based on factors such as:**
- speed of customer and/or vendor acceptance
- sales and marketing rollout
- training requirements
- label and/or indication expansions

Step 3 **Estimate long-term share decline by analyzing:**
- future novel competition including likely timing and probability of market entry and potential product attributes
- future generic competition once patent protection expires

Step Three: Estimating long-term share decline.

For long-term forecasts, the third step is to study the ramping down of market share. Two major items that negatively affect future share are new market entrants and loss of patent protection. Technology improvements, government regulations and demographic changes are other long-term trends that can affect product share.

Overall, a product's market share is one of the most uncertain assumptions of the revenue calculation. L.E.K.'s systematic approach, which we have briefly described and is summarized above helps reduce this uncertainty.

customer base x total penetration
x product's share of penetration
x **price per unit** x units per year

The optimal price per unit for a product needs to be determined before an accurate revenue forecast can be developed.* Product pricing assumptions can also have a major impact on volume forecasts.

Comparing Attributes to Estimate Price – Illustrative

Drug	Attributes						
	Median Survival (months)	Response Rate (%)	Time to Progression (months)	Cardiotoxicity (%)	Primary Side Effect	Preparation Process	Average Direct Price per Cycle
Taxol	16.5	30–57	5.5	Negligible	Neurotoxicity	Single-step mixing process	~ $1,400
Taxotere	16.4	50–65	5.8–7.5	Negligible	Neurotoxicity	Multistep mixing process	~ $1,500
Herceptin	20–24	38–50	7.2	7 (single agent)	Mucositis, diarrhea, nausea	Single-step mixing process	~ $1,400
Doxil	18–21	43–46	9	10	Hand-foot syndrome	Single-step mixing process	~ $1,800
Doxorubicin	16.4	43	5.5	21	High incidence of anemia and nausea	Single-step mixing process	~ $100 (generic)
Target Drug	18–21	43–46	5.2–7.6	9	Mucositis, diarrhea, nausea	Multistep mixing process	$1,400– $1,600

The target drug, due to its high median survival rate and good response rate, among other characteristics, can be priced between $1,400 and $1,600

The level of pricing analysis depends on the stage of development of the product. For example, developing forecasts for a product in development as part of a prioritization exercise will not require as accurate a forecast as doing so for a launch plan. In some markets where the competing products are very similar, the pricing bandwidth is narrow and may not be a critical factor.

For early-stage products, we recommend looking at the prices charged for comparable products and estimating the premium or discount that a new product would deserve given the relative value that customers and influencers will attach to its attributes. Value to the customer is the key driver of pricing. Alternatives to purchasing the product in question extend past competing products – customers usually have other options (for instance, purchasing nothing). The table to the left illustrates top-level pricing analysis for a clinical stage oncology product examined in terms of its predicted attributes versus competing products.

For later-stage products, L.E.K. investigates the price-demand curves in key customer segments to determine which price points will maximize revenues and gross profits. How demand will change in response to price is likely to vary by customer segment. For example, a severely ill segment of patients is likely to be less price sensitive than a mildly ill segment of patients.

Product pricing in healthcare is particularly complex because of the interplay among decision makers – the physician prescribes the drug, the patient takes the drug, and the insurer or hospital pays the bill. Cost-benefit analysis and reimbursement strategies have become increasingly important inputs into pricing decisions for prescription pharmaceuticals.

When forecasting product revenue over many years, we must also look at pricing issues that affect revenue decline. As noted earlier, product patent expiration or the lowering of technology barriers generally result in share declines. This may also affect product price as generic or commoditized competitors substantially reduce category prices.

> customer base x total penetration
> x product's share of penetration
> x price per unit x **units per year**

This metric is usually taken into account as a part of the analysis of price per unit. At L.E.K., we have found that there are two additional issues to consider that depend on the product's characteristics:

Frequency of use as encouraged by a vendor or advisor

Manufacturers recommend how often a user should replace or service a product. However, many products need a service provider to perform that maintenance. Does the product have a robust network of vendors or advisors that will encourage the frequency recommendation over time? For example, in drug development situations we ask physicians if they would prescribe the recommended dosing and then try to increase or decrease the dose over time as they gain experience with the product.

Compliance by the end user

Units consumed per year depends on the extent that end users follow a vendor's or advisor's recommendation. Factors such as pricing, ease of use, convenience of replacement and user profiles can help determine compliance. In our drug development example, we ask physicians if they feel patients would comply with the recommended dosing. Medications with inconvenient dosing and delivery or delivery-related side effects cause some patients to never fill the scrip, skip doses or "drop off" over the course of time, which must be taken into account when projecting revenues.

Summary

This newsletter shares some points to consider when generating robust revenue forecasts for novel products. Note that the revenue forecasts may require several additional scenarios based on:

- Alternative product profiles

- Varying competitor scenarios

- Other industry factors that might strongly affect customer penetration or market share or price (e.g., association recommendations, regulatory issues, other)

If possible, we recommend a checks-and-balances approach be used on the final forecasts. These can be done simultaneously or after completing the above steps:

- Benchmark revenues for other products in the same category, and/or

- Benchmark revenues for analogous products in other categories

Keep in mind that generating forecasts for new products is complex. It is critical to make the forecasts as reliable as possible because many critical strategic, operational and financial decisions that can significantly impact value creation will depend on their accuracy.

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