

the utilization plateau

understanding why the U.S. pharmaceutical market has stagnated and what you can do to avoid the slow-growth trap

This white paper is adapted from:
pharmahandbook: A Guide to the International Pharmaceutical Industry[®]
2013 – U.S. Report

Author: Todd D. Clark

Research: Shannon Torley

Sales & Marketing: D. Scott Clark

Value of Insight Consulting, Inc.

2522 Center Avenue

Fort Lauderdale, Florida 33308

Phone: (US) 954 302 8852

Fax: (US) 954 252 3927

www.voiconsulting.com

publications@voiconsulting.com

Copyright 2013 Value of Insight Consulting, Inc.

All rights reserved. See user license agreement at end of document for details.

To learn more about VOI Consulting's pharmaceutical publishing and advisory services, contact us at (US) 954 302 8852 or visit our website at www.voiconsulting.com.

pharmahandbook:
A Guide to the International Pharmaceutical Industry®

Overflowing with data.
Concise. Thorough. Accurate.

pharmahandbook® is a comprehensive resource for drug development and commercialization in markets around the world. Brand new reports on the United States, Asia-Pacific and BRIC (Brazil, Russia, India, China) are now available for immediate download.



About the Author



Todd Clark is the President of Value of Insight (VOI) Consulting, Inc. and the author of both *PharmaHandbook — A Guide to the International Pharmaceutical Industry*, the first-ever single source reference guide on the pharmaceutical business and regulatory environments in 39 countries, and *GenericHandbook —*

A Guide to the US Generic Pharmaceutical Industry, a comprehensive reference guide to the marketing, intellectual property, legal, regulatory and competitive aspects of the generic drug sector in the United States. The publications have been purchased by customers in more than 45 countries and have received highly favorable reviews from business and academic press.

Since founding VOI Consulting in 1998, Todd has shared his expertise with 11 of the top 15 branded drug companies, as well as leading generic manufacturers, biotech firms, investment banks and cutting-edge health technology services — advising them on global strategies regarding market entry, clinical trial design, intellectual property issues, regulatory compliance, marketing strategy, competitive intelligence, pricing, reimbursement, allocation of sales-force resources and more. He is a member of the pharmaceutical advisory team for the Gerson Lehman Group, has served as an expert witness in pharmaceutical industry litigation, and is frequently quoted in trade publications.

In addition to his work with VOI, Todd is an adjunct business professor, teaching courses in marketing, business strategy and managerial decision making, at Tulane University, Loyola University the University of Phoenix Online. He developed a healthcare management curriculum for Tulane and taught healthcare policy, payment and regulation within that program. He also served on the Business Studies Advisory Committee for Tulane.

Todd is a graduate of Tulane University and has an MBA from the Kellogg School of Management at Northwestern University where he majored in strategy, finance, and marketing.

About VOI Consulting, Inc.



Founded in 1998, Value of Insight Consulting, Inc. (VOI) is a pharmaceutical consulting and publishing company dedicated to providing pharmaceutical

and biopharmaceutical clients with fact-based analysis and business intelligence to meet market challenges in today's highly competitive global environment. Employing innovative research techniques and advanced analytical tools, our services help clients minimize risks, cut costs and maximize commercial opportunities.

VOI stands for Value of Insight and plays on the statistical term "Value of Information," which describes the difference between expected outcomes in the absence of information and expected outcomes in the presence of information derived through applied research techniques, sound analysis and experienced judgment. For our clients — who have included 19 of the top 25 pharmaceutical companies — this insight translates into measurable success.

VOI Consulting's reputation as a leading publisher of pharmaceutical industry reference books and in-depth pharmaceutical market research reports has distinguished the company as a trusted source of research and analysis.

Our services are global in reach, are relevant for any therapeutic category and span the entire range of the pharmaceutical lifecycle. Whether you are planning a clinical trial or need to assess the market for a generic drug, whether you operate in developed countries or are looking at emerging opportunities in countries like China, India, Russia, Turkey or Latin America, VOI Consulting can help you execute more effectively.

Contact Information

Email: contact_voi@voiconsulting.com

Website: www.voiconsulting.com

Contents

- Contents 4
- Introduction 5
- Analysis of Utilization Trends 8
- What does this mean for the future? 16
- Are there any options to avoid the slow-growth trap? 19
- APPENDIX 22

Figures

- Figure 1 – Use of 1 or More Prescription Drugs in Past 30 Days by Sex (1988-94 vs. 2007-10) 8
- Figure 2 - Percent U.S. Population Using 1+, 3+, 5+ Prescription Drugs in Last 30 Days (20-year Trend) 9
- Figure 3 - U.S. Population Growth by Sex and Age 1990 to 2010 (in Millions) 10
- Figure 4 –Number of Patients by Consumption Group (in Millions) 11
- Figure 5 – Monthly Per Capita Prescription Drug Volume and Volume by Consumption Group 13
- Figure 6 – Share of Total Patients and Prescription Volume by Consumption Level (1990 to 2010) 14
- Figure 7 – Comparative Growth Rates: Earliest to Middle and Middle to Most Recent Surveys 15
- Figure 8 – Drivers of Volume Growth (1990 to 2030) 17
- Figure 9 – Monthly Prescription Drug Volume by Consumption Group (1990 to 2030) 18
- Figure 10 - Percent U.S. Population Using 1+, 3+, 5+ Prescription Drugs in Last 30 Days (Projections to 2030) 19
- Figure 11 -U.S. Population by Age and Sex 1990 to 2030 (in Millions) 22
- Figure 12 -Percent U.S. Population Using 1+, 3+, 5+ Prescription Drugs in Last 30 Days by Age and Sex (1990 to 2030) 23
- Figure 13 -Percent U.S. Population Using 1 or 2, 3 or 4, and 5+ Prescription Drugs in Last 30 Days by Age and Sex (1990 to 2030) ... 24
- Figure 14 -Size of Consumption Categories in Millions of People by Age and Sex (1990 to 2030) 25
- Figure 15 -Monthly Prescription Drug Demand in Millions of Rxs (1990 to 2030)..... 26
- Figure 16 - Percent U.S. Population Using 1+, 3+, 5+ Prescription Drugs in Last 30 Days (Projections to 2030) 27
- Figure 17 – Size of Population by Age Group (in Millions) 28
- Figure 18 – Average Monthly Prescription Drug Consumption by Age and Sex (2010 to 2030) 29
- Figure 19 – Share of Total Patients and Prescription Volume by Consumption Level (2010 to 2030) 30

Introduction

The 1990s are understandably thought of as a golden age in the U.S. pharmaceutical industry: the average number of new molecular entities approved each year was one-third higher than in the 2000s (31.1 versus 23.3);¹ the majority of these drugs were in mass-market, primary care segments that resulted in blockbuster sales; and marketing regulations, were substantially relaxed. Best of all, between 1995 and 2000, sales growth averaged 14% annually and approximately 80% of this increase was driven by non-price factors such as increased volume and displacement of older for newer therapeutics.²

Even as the industry moved into the 2000s, a period characterized by fewer approvals, niche therapies, aggressive pricing, and patent expirations, there was a widely held belief that the market would continue to experience strong growth due to an aging population and the creation of the Medicare Part D drug benefit. Although these have and will continue to have an effect on drug sales, their impact has been offset by a number of countervailing forces, some related to the worsening economy and others to structural issues within the pharmaceutical marketplace.

On the economic side, the effects of a long global recession followed by weak recovery were more pronounced in the U.S. because of its heavy reliance on employment-based health insurance. Forces endemic to the pharmaceutical industry include a less productive new product pipeline, a move from mass market to niche therapeutics, and, most notably, patent expirations on an unprecedented number of blockbuster drugs.

However, there is another major dynamic that is related to but not fully explained by economic and industry factors – this, generally overlooked, factor is utilization. In short, while the U.S. population is consuming more

Everyone knows that U.S. pharma growth rates have stagnated in recent years. In this whitepaper, Todd Clark, President of VOI Consulting, Inc. explores a vitally important but little noticed factor behind this slowdown - *the declining growth in prescription drug utilization* - and discusses potential options to avoid the slow-growth trap.

Value of Insight Consulting
www.voiconsulting.com

This whitepaper is adapted from the U.S. report: 2013 *pharmahandbook*®: A Guide to the International Pharmaceutical Industry.

¹ “Summary of NDA Approvals & Receipts, 1938 to the present.” FDA website; accessed May 2013

² VOI Consulting analysis of IMS data.

pharmaceuticals, the rate of increase has slowed dramatically in recent years. For example, calculations of data from IMS and the U.S. Census Bureau show that, between 1997 and 2002, the number of prescriptions filled per person increased 31%, from 8.9 to 11.7. By 2007, per capita consumption had increased to 12.8 prescriptions, a 9.4% increase over 2002 and roughly one-third the utilization growth rate seen in the previous five-year period. In 2012, average consumption equaled 13.1 prescriptions per person per year, only 2.3% higher than in 2007. Put differently, during the five years ending 2002 utilization grew 13 times faster than in the five years ending 2012.

Prescription drug utilization grew 13 times faster in the five years ending 2002 than in the five years ending 2012.

As will be shown in this VOI Consulting white paper, the pharmaceutical industry's growth over the past twenty years, especially the phenomenal rates witnessed in the 1990s, was driven by a variety of factors including new technologies, changing medicinal practices, and increased public acceptance of drug therapy as a solution for previously untreated conditions (i.e. "the medicalization of society"). The confluence of these factors resulted in substantial increases in both the percentage of the population on prescription drugs and in the average number of prescription drugs consumed per person.

Of importance, the primary focus of this analysis, i.e. utilization rates, is distinct from growth driven by changes in the size or demographic makeup of the population. It is well known, for example, that people over 65 have the highest levels of prescription drug consumption and, consequently, that demand for pharmaceuticals increases along with the size of this population; this is commonly referred to as "the impact of an aging society." In contrast, changes in *utilization rates* refer to the *level* of consumption *within* the same population at various points in time. Assume, for example, that, at Point A, the average person over 65 was on two prescription drugs and that this increased to an average of three prescription drugs per person by Point B in time; in this case, the utilization rate would have increased by 50% irrespective of how many people over 65 there were at either point in time. (Penetration rate is another metric used in this report; it refers to the percentage of the population on at least one prescription drug at a given point in time.)

Obviously, there is a multiplicative effect if *both* the size of the population and the utilization rate increase and, as we will see, this is exactly what happened over the past 20 years in the United States. However, in a phenomenon we refer to as the **utilization plateau**, average consumption levels have stabilized in recent years with the result that, while population and demographic changes will continue to drive growth through

2030, the industry will receive only minimal assistance from further increases in utilization.

Methodology

Data from the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS) published in the report, *Health United States: 2011* serves as the basis for this analysis. For our purposes, the key survey question is reported use of "any prescription drug in the past 30 days." This is a broad measurement and would be difficult to translate into more granular information such as an actual number of prescriptions written or filled. However, it has the advantages of consistency over time and equal coverage across retail, hospital, and other channels (whereas some alternative options are primarily retail-focused). As a result, we believe that the CDC data is appropriately reflective of overall U.S. drug consumption patterns over time.

Population data for the analysis was obtained from the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2012 Revision. In comparison to the latest U.S. Census Bureau data, the U.N. information was updated more recently and provided in a format that was more conducive to our analytical purposes. Note that both the U.S. Census Bureau and U.N. use an "under 20" and "20 to 44" year age breaks while the CDC uses "under 18" and "18 to 44." For purposes of this analysis, we have ignored the distinction; i.e. the population under 20 is treated as equivalent to the population under 18 and the 20-44 population figures as provided by the U.N. are treated as equivalent to the 18 to 44 group. Because the two-year age discrepancy represents a small portion of the population and occurs in age groups that have low prescription drug consumption levels, the difference is immaterial to the outcome of this analysis.

Similarly, the CDC surveys are conducted over several years (e.g. 1999 to 2002). In our discussion of results, we have taken some liberties in interpreting these timeframes into more conventionally meaningful periods. For example, the most recent available survey was conducted from 2007 to 2010; it is taken to represent activity circa 2010. As with the age breaks, this has no material impact on the findings presented here.

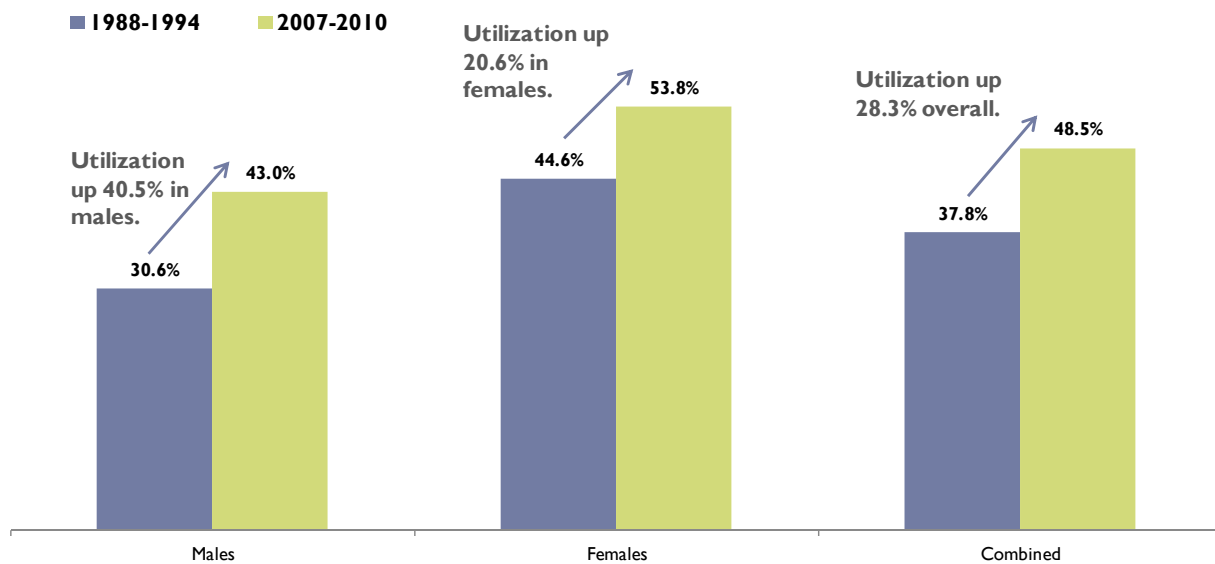
The confluence of factors driving Rx utilization growth over the past two decades represents a singular event that is unlikely to be seen again.

Analysis of Utilization Trends

An increasing portion of the population used prescription drugs over the past 20 years...

Using the NCHS data, Figure 1 shows that the overall penetration rate, i.e. the percent of the population reporting use of any prescription drug within the previous 30 days, went from 37.8% circa 1990 to 48.5% circa 2010. Broken down by sex: use of at least one prescription drug increased by 40.5% among males and by 20.6% among females. The higher penetration growth rate among males was, in large part, due to the fact that they were starting from a much lower base (males continue to have substantially lower utilization rates than females).

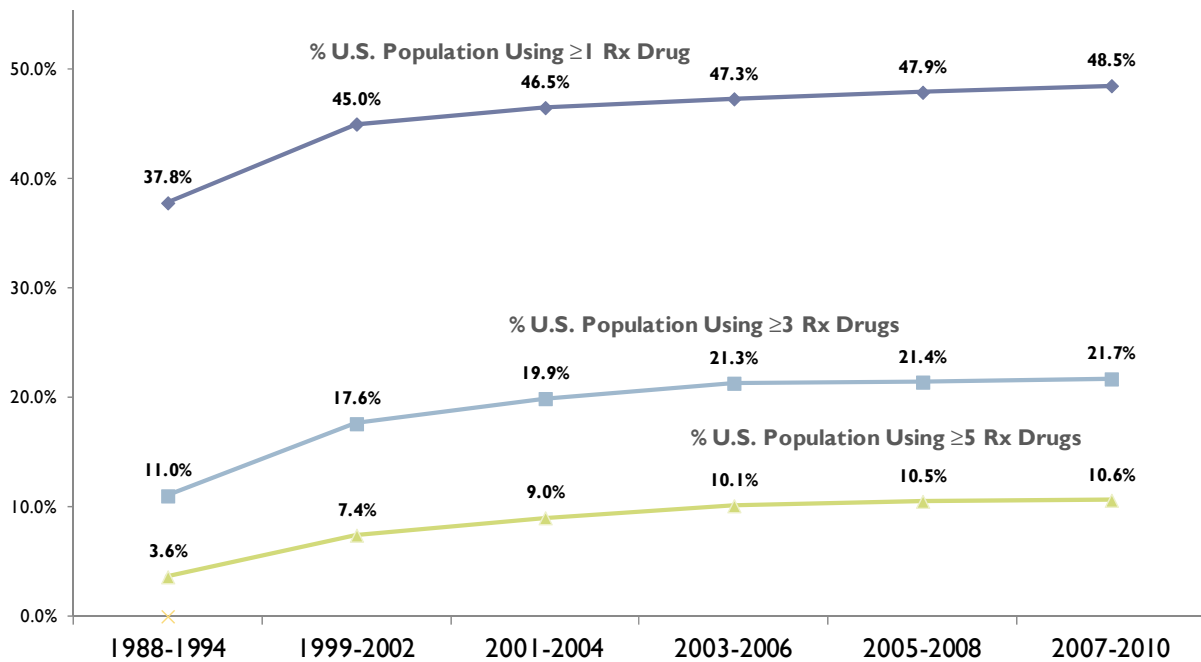
Figure 1 – Use of 1 or More Prescription Drugs in Past 30 Days by Sex (1988-94 vs. 2007-10)



More people took a higher number of drugs...

In addition to higher penetration at the one or more drugs per month level, the percent of the population taking three or more and five or more prescription drugs in a month also increased dramatically over the time period. Specifically, the percentage of Americans taking 3 or more drugs in a month roughly doubled from 11% to 21.7%; while the percentage taking 5 or more drugs nearly tripled from 3.6% to 10.6%.

Figure 2 - Percent U.S. Population Using 1+, 3+, 5+ Prescription Drugs in Last 30 Days (20-year Trend)



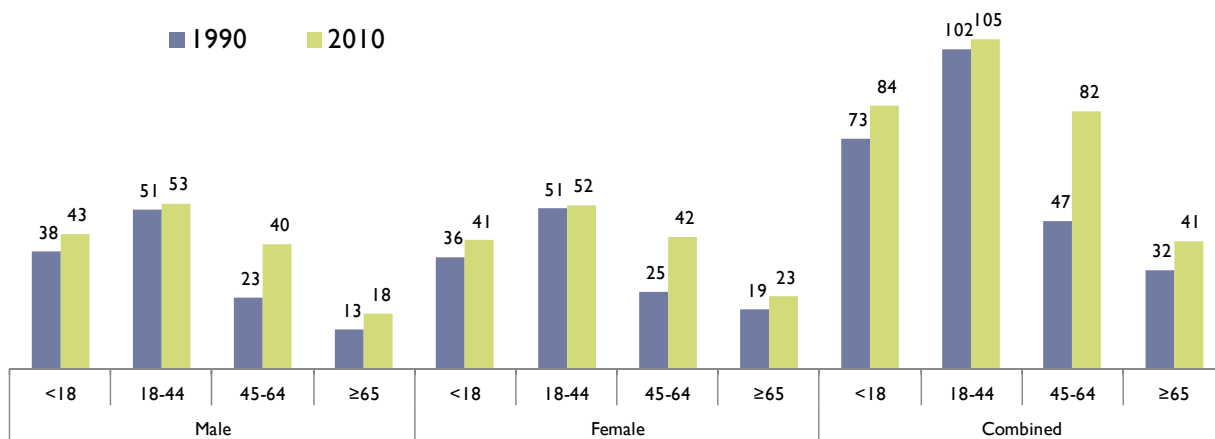
The population is also larger and older than 20 years ago...

In addition to factoring for increased prescription drug usage rates, it is important to consider that the U.S. population grew 22.7% or, in absolute terms, from 254 million to 312 million over the relevant time period.

Figure 3 illustrates that this growth was heavily concentrated among the 45 and older age groups, where prescription drug consumption is also highest.

Over the past 20 years, the pharmaceutical industry's customer base increased by 56% or 55.2 million people.

Figure 3 - U.S. Population Growth by Sex and Age 1990 to 2010 (in Millions)



Together, these factors led to phenomenal growth in the Rx customer base...

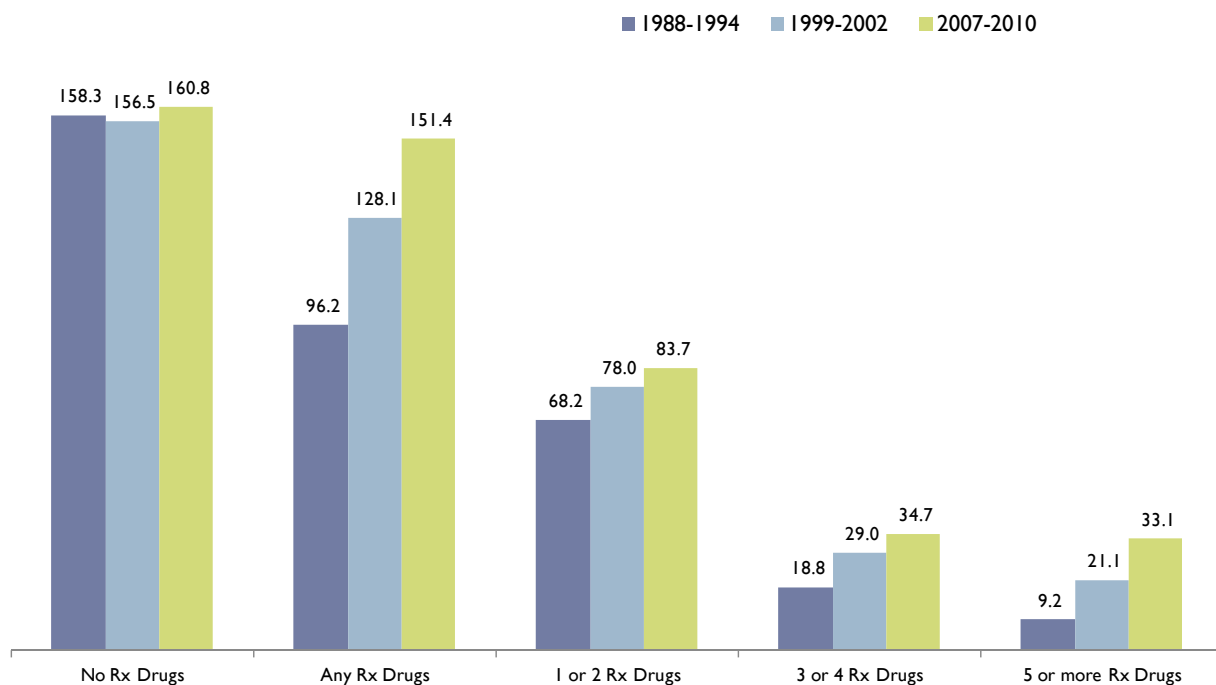
The combined effects of a larger population, a greater percentage of this population taking prescription drugs, and higher per person consumption levels can be seen in Figure 4. As shown:

- The U.S. population increased by 22.7% but the number of people who did not take prescription drugs in the past 30 days was almost unchanged at approximately 160 million.
- The number of Americans taking any prescription medicines in the last 30 days increased by 56% from 96.2 million in the earliest period to 151.4 million more recently. In other words, an additional 55.2

million people were added to the industry’s customer base over the past 20 years. Note that this is virtually the same as the 57.7 million people added to the U.S. population over the same timeframe.

- Consumption of many medicines increased more rapidly than consumption of a few medicines. Specifically, the number of people taking one or two medicines in a month grew 22% from 68 million to 83 million as compared to an 83% increase in the number of people on 3 or 4 medicines (18.8 million to 28.8 million); the size of the highest consumption group (5 or more) increased by a phenomenal 259% from 9.2 million to 33.9 million people.

Figure 4 –Number of Patients by Consumption Group (in Millions)



Estimating actual consumption...

The preceding clearly suggests that industry growth was driven by changes in the size of the population and in the rates of prescription drug use.

Making a few simple estimates about consumption levels within each group allows us to extend these findings and assess how utilization and population growth affected actual prescription volume and per capita consumption.

(See Box 1 for estimated consumption levels by group.)

Shows high volume users have driven industry growth...

Applying these estimates to U.S. population and prescription drug penetration data yields the monthly consumption volume results shown in Figure 5. (Note that a detailed table, which provides further breakouts of consumption by age and sex, may be found in Figure 12 in the Appendix.)

Key highlights of this analysis include:

- Aggregate monthly prescription volume grew at roughly five times the rate of population growth (i.e. 104.8% versus 22%).
- The average number of prescription drugs consumed per person per month increased from 0.91 in the earliest period to 1.53 most recently.
- By far the sharpest increases in volume were among patients on five or more prescription drugs per month. This was true for men and women and across all age groups.

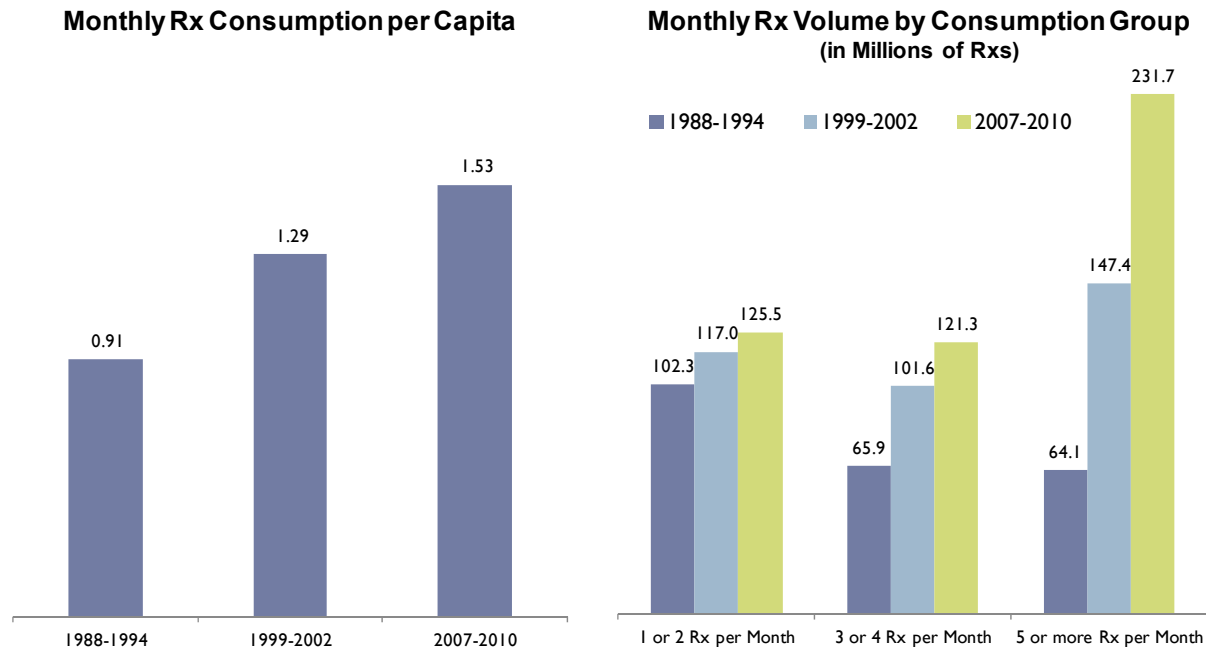
**Box 1.
Monthly Rx Volume Assumptions**

The following values were used to calculate actual prescription volume within each of the consumption groups:

| Category | Est. Rx Drugs per Mo |
|-------------------|----------------------|
| • 1 or 2 Rx Drugs | 1.5 |
| • 3 or 4 Rx Drugs | 3.5 |
| • ≥5 Rx Drugs* | 7.0 |

* Due to the open-ended nature of the ≥5 Rx per month category, the estimated average consumption level is more speculative than in the defined 1 or 2 / 3 or 4 categories (e.g. the actual average could be substantially higher).

Figure 5 – Monthly Per Capita Prescription Drug Volume and Volume by Consumption Group



These dynamics have dramatically changed the nature of pharmaceutical consumption...

The findings in Figure 5 above will no doubt provide some support for the argument that the pharmaceutical industry has promoted the “medicalization” of American society. From a long-term industry perspective, however, Figure 6 below, which shows contributions to overall volume by consumption level, may provide a more meaningful way of looking at the data.

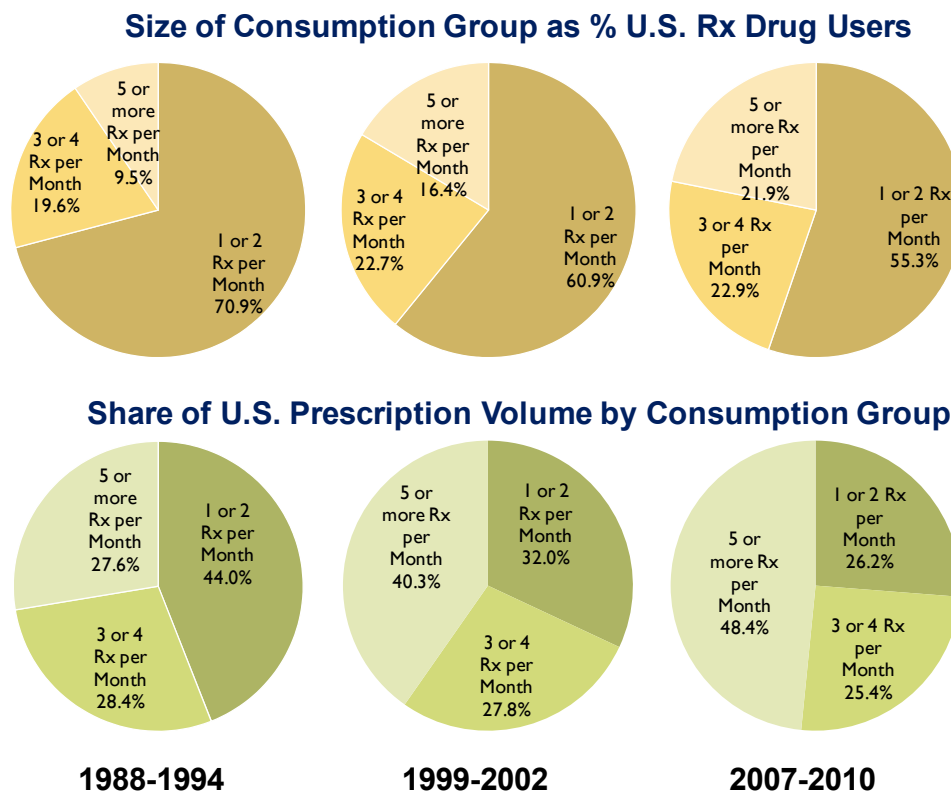
Most notable is the degree to which overall consumption has become concentrated among heavy users over the past 20 years:

- In the early period, 71% of all patients were in the 1 or 2 drugs per month category and, despite the relatively low levels of consumption, this group accounted for nearly half (44%) of total prescription volume. The remaining 56% of volume came from the middle and highest consumption groups, each of which contributed approximately 28% of total volume.
- By the most recent period, contribution levels had been reversed: slightly under half (48.4%) of all volume comes from the 22% of patients in the heaviest consumption category while the lower and

middle groups accounted for around one-quarter each. (As mentioned, we assumed a 7.0 monthly average consumption level for those in the “5 or more” category. Considering that the actual average for this group could be significantly higher, it is quite possible that the concentration of business among heavy users is even more pronounced than shown below.)

- In contrast to the major changes at the low and high ends of the consumption spectrum, moderate users (i.e. those in the 3 or 4 drugs per month category) have remained relatively steady as a share of patients (approximately 20%) and prescriptions (slightly over one-quarter).

Figure 6 – Share of Total Patients and Prescription Volume by Consumption Level (1990 to 2010)



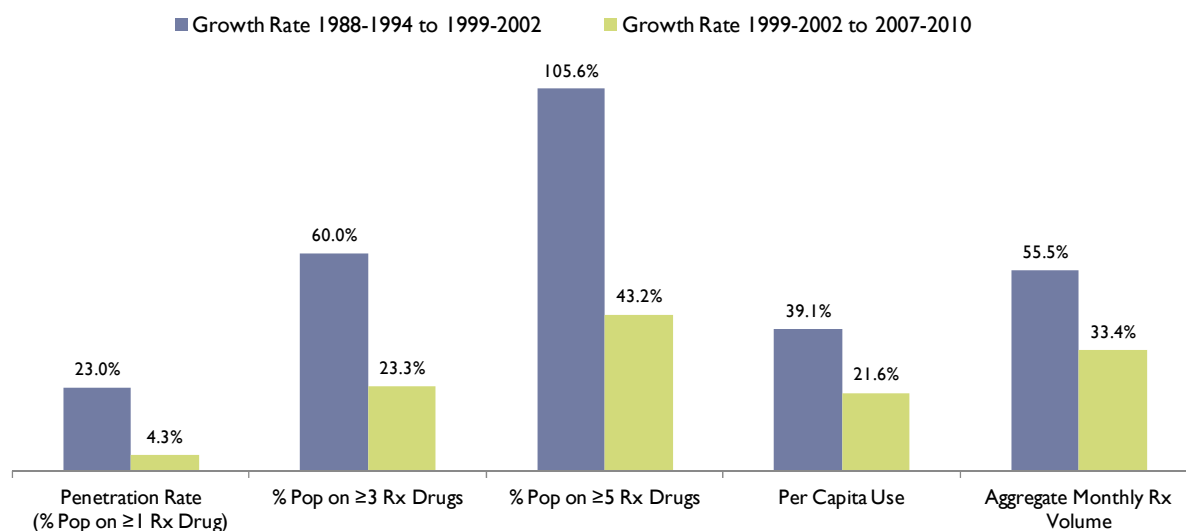
Utilization growth has already slowed...

As the preceding demonstrates, the bulk of prescription drug use has shifted over the last 20 years from a large group of patients consuming at fairly low levels to a small group of patients who consume at high levels. With any consumer product, whether it be soft drinks, clothing, or movie tickets, the proportion of potential users who fall into the heavy user category is finite. For a host of valid medical, economic, and other reasons, it will (and perhaps should) be difficult to increase utilization rates much beyond these already high levels.

Diminishing growth levels are, in fact, already clearly evident. Although we haven't focused on it thus far, readers may already have noticed that, while utilization continued to increase during the 2000 to 2010 period, the rate of increase was much lower than in the preceding decade. In fact, as shown in Figure 7 below, regardless of which metric we chose to examine, growth rates decelerated substantially in the 2000s. More specifically:

- Overall penetration growth was five times greater in the 1990s than the 2000s.
- The rate of increased participation in the middle (3 or 4) and high-consuming (≥ 5) categories fell by almost two-thirds.
- Per capita and aggregate volume growth slowed by roughly half.

Figure 7 – Comparative Growth Rates: Earliest to Middle and Middle to Most Recent Surveys



What does this mean for the future?

This analysis suggests that the U.S. pharmaceutical industry has entered a mature stage where growth will be driven by factors other than increased utilization. Per Figure 12 (see Appendix), 90% of women and 89% of men over 65 are taking at least one prescription drug and 40% of both men and women are taking five or more prescription drugs per month. Further, the percentage of over 65 women in the highest consumption group increased by 2.6 times over the past 20 years while the number of men increased by 3.5 times. Given concerns over drug-drug interactions, cumulative cost-of-therapy, “pill burden,” etc., it is hard to see how these levels would not represent a point of saturation or near-saturation.

Increased utilization contributed 13 times more to pharma volume growth in the 1990s than in the 2010s.

Additional evidence that we have reached a utilization plateau is provided by the fact that, in 2011, only one age group had an increase over the preceding year. This group was young adults who, because of the Patient Protection and Affordable Care Act (PPACA), were newly able to remain on their parents’ health insurance until age 26; prescription drug use in this segment increased by 2%.³ The 2011 bump among young adults was very short-lived, however, as their consumption fell by 0.2% in 2012. Moderate declines (less than 1%) were common for all age groups in 2012 except 65 to 79 year olds, who had no change from 2011, and pediatric patients, where use actually declined by 4.1%.⁴

These one-year observations are of interest but they are insufficient for a long-range perspective. To assess how the utilization plateau and other factors will shape the industry over the next 20 years, we projected consumption rates for each demographic and consumption category and combined these forecasts with projected U.S. population data. Details of this analysis may be found in the Appendix; highlights are discussed below.

Projections demonstrate the impact of the utilization plateau...

Utilization’s contribution to industry volume growth over the past 20 years and the impact of the utilization plateau on future growth can clearly be seen in Figure 8 below. The chart shows the overall 10-year growth in U.S. monthly volume demand and the relative contributions of increased utilization, changing demographics (e.g. aging society), and population growth. Demographics and population growth have been

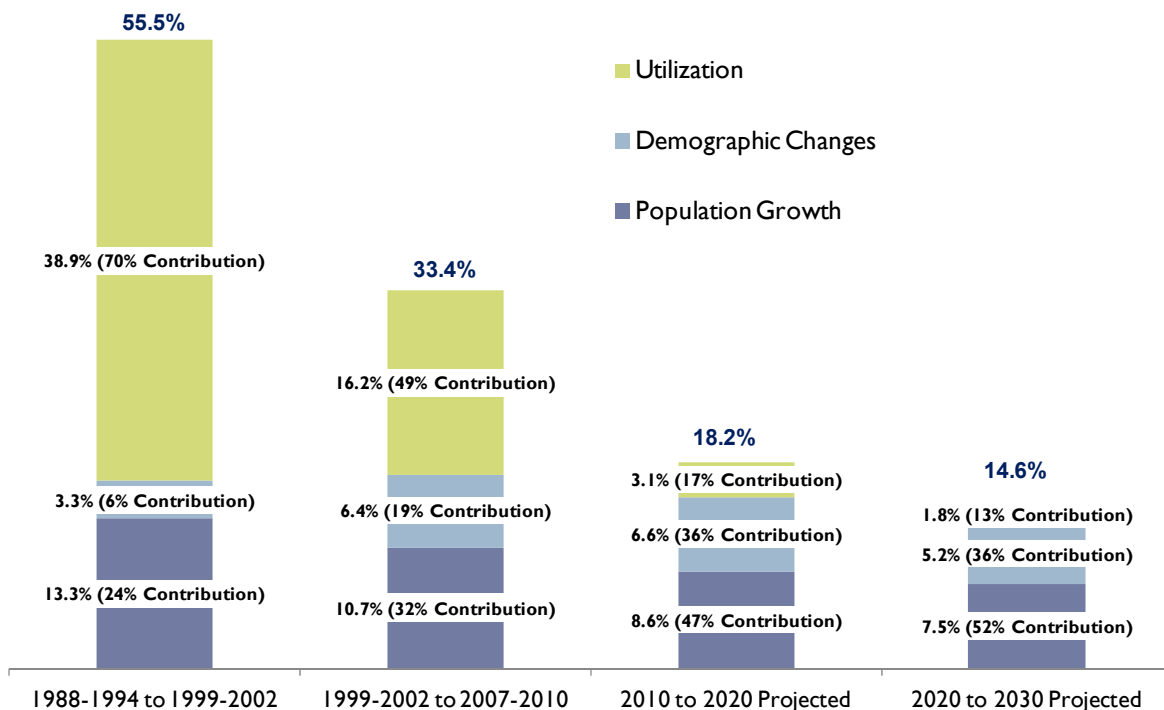
³ “US prescription spending barely up in 2011, due to patients cutting back, more use of generics.” Associated Press Apr 4 2012

⁴ “A Review of the Use of Medicines in the United States in 2012.” IMS Institute for Health Informatics May 2013

(and are expected to remain) relatively consistent, generating approximately 15% to increased volume over each 10-year period.

The major change, of course, comes from utilization: this factor resulted in nearly 40% higher volume in the 1990s; although this fell by more than half in the first decade of the 2000s, utilization remained the largest component of volume growth. Going forward, however, the contribution from utilization will be minimal; per Figure 8, utilization’s contribution to volume growth in the 1990s was, respectively, 13 and 21 times higher than called for by projections in the 2010s and 2020s.

Figure 8 – Drivers of Volume Growth (1990 to 2030)



Population growth and demographic changes will keep the bottom from dropping out...

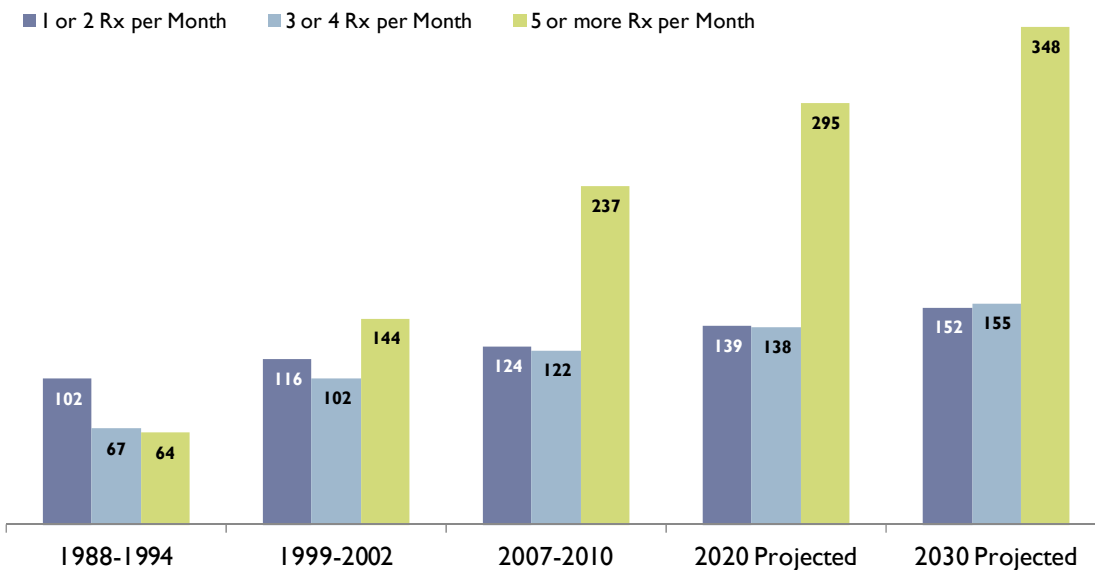
Despite the utilization plateau, volume growth is expected to continue through 2030 with population growth and demographic changes being the major contributing factors. As shown in detail in Figure 11 in the Appendix, the U.S. population is expected to reach 338 million in 2020 and 363 million in 2030. Based on these population estimates and our projections of overall penetration growth, we expect that the number of people using at

least one prescription drug per month will increase by 34 million or 22% between 2010 and 2030; as we have seen, this compares with 55.2 million new customers (and 56% growth) between 1990 and 2010.

The most notable upcoming demographic change (see Figure 17 in the Appendix) is that the high-consuming over 65 group is expected to increase by 37.1% between 2010 and 2020 and by an additional 30.6% from 2020 to 2030. One result of the larger elderly population, shown in Figure 9, is that there will be relatively little volume growth from the lower and middle consumption groups. Instead, the heavy using group will continue to represent a higher share of overall activity, increasing from 22% to 27% of users and from 48% to 54% of volume between 2010 and 2030.

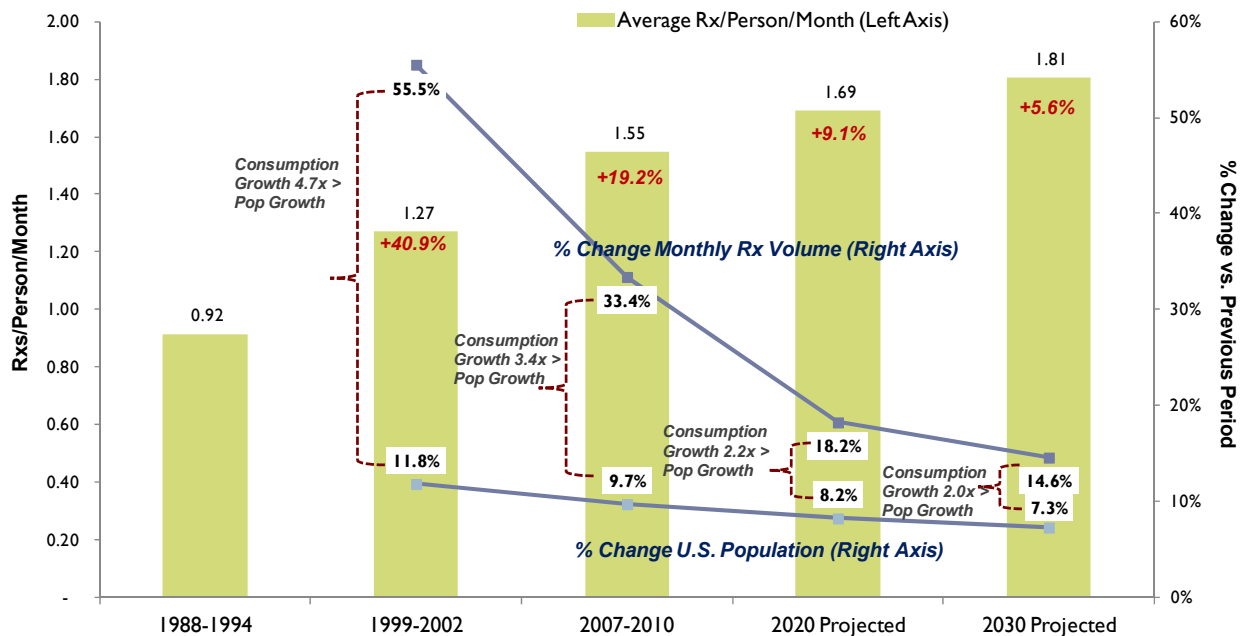
From 2010 to 2030, pharma will add 34 million new customers in the U.S. This compares to 55 million new customers from 1990 to 2010.

Figure 9 – Monthly Prescription Drug Volume by Consumption Group (1990 to 2030)



Activity for the preceding twenty years and projections for the next twenty are summed up in Figure 10. As shown, industry volume growth will continue to outpace population growth over the period but by a much smaller margin: whereas prescription drug volume increased at 4.7 times the rate of population growth in the 1990s, this will narrow to 2.2 times in the current decade and 2.0 times in the 2020s. When consumption grows faster than the population, then average use per person will, by definition, also increase; per capita growth is projected to slow, however, to 9.1% in the current decade and 5.6% over the following ten years.

Figure 10 - Percent U.S. Population Using 1+, 3+, 5+ Prescription Drugs in Last 30 Days (Projections to 2030)



Are there any options to avoid the slow-growth trap?

In light of the utilization plateau and considering that payers have developed increasingly effective means of fighting back against aggressive brand drug pricing, reinvigorated new product development and increased patient adherence offer the best options for a return to higher growth levels.

As always, drug makers need to aim for safe and effective new products. However, they will also need to be ruthless about culling pipeline projects that show little promise or appear likely to enter the market at a significantly later date than competitive members of their class. First mover advantage is a key success factor in many industries and this is certainly true of pharmaceuticals. For example, VOI Consulting research has shown that, in cases where independent generics have a 6-month exclusivity period in which to establish first-mover advantage, the initial product will capture between one-third (with a concurrently-launched authorized generic) and one-half (with no authorized generic) of overall sales value for the molecule 30 months after other generics enter the market. In contrast, later-to-market independent generics capture only 15 to 25% and this is usually divided among multiple entrants.

But these are commodity generic drug markets. One would expect quality to count for more than timing when it comes to well-differentiated therapies with extensive clinical data. Research in the June 2013 issue of Nature Reviews Drug Discovery finds that, with some high profile exceptions like Lipitor, this is not necessarily the case.⁵

As would be expected, being first-to-market and best-in-class is the ideal position. The next most favorable position is first-to-market but clinically second best; sales for these drugs average 92% of the first and best product whereas sales of second-to-market but therapeutically superior competitors averaged 88%. Of course, quality does matter, as demonstrated by the fact that sales of products that were first-to-market but clinically third-in-class averaged only 40% of the first-and-best product's while those that were third-to-market but therapeutically best captured 50%.

Products that were fourth-to-market and clinically inferior to other members of the class performed dismally, capturing only 2% of the first-and-best competitor's sales. Considering that such products will never earn back the investment required to bring them to market, it would be better to abandon them as soon as possible and reallocate funding to expedite development of more attractive candidates.

Without the tailwind from increased utilization, pharma companies need to be ruthless about culling pipeline projects that show little promise or appear likely to enter the market at a significantly later date than competitive members of their class.

⁵ "What matters most in commercial success: first-in-class or best-in-class?" Nature Reviews Drug Discovery Jun 2013

For currently marketed drugs, patient adherence represents the most promising lever: research shows that for every 100 prescriptions written by a physician, 50 to 70 are filled, 48 to 66 are picked up by the patient, 25 to 30 are taken as directed, and 15 to 20 are refilled.⁶ These are ingrained consumer behavior patterns and there are no easy methods to change them but increased convenience, lower patient out-of-pocket burdens, and automated refill reminders all have the potential to yield significant benefits. At the individual product level, substantial increases in adherence offer the same positive impact as increased utilization once had on the industry as a whole.

It has been recognized for some time that the U.S. pharmaceutical industry faces a challenging environment, with the situation being attributed to fewer FDA approvals, patent expirations, increased cost containment, a down economy, and other causes. While these factors are certainly relevant, there is also an implication that, if they change, growth will return to previous levels. In fact, as we've seen here, the utilization plateau means that, in the absence of radical technological or societal change, the U.S. pharmaceutical market is unlikely to experience a second wave of sustained, broad-based, high growth rates similar to what happened over the past two decades. Put differently, mature markets and the accompanying slow growth rates are the new normal: there will be no rising tide that lifts all boats. To survive, companies will need to maximize and maintain their share of a relatively stable market via smarter strategic decisions and more effective execution.

At the individual product level, substantial increases in adherence offer the same positive impact as increased utilization once had on the industry as a whole.

Mature pharma markets and slow growth are the new normal: there will be no rising tide that lifts all boats. To survive, companies will need to maximize and maintain their share of a relatively stable market via smarter strategic decisions and more effective execution.

⁶ "EMD Serono Specialty Digest: Managed Care Strategies for Specialty Pharmaceuticals." Eighth Edition, EMD Serono 2012

APPENDIX

Figure 11 -U.S. Population by Age and Sex 1990 to 2030 (in Millions)

| Sex | Age | 1990 | 2000 | 2010 | 2020 Projected | 2030 Projected |
|----------|--------------|---------------|---------------|---------------|----------------|----------------|
| Male | <18 | 37.57 | 41.63 | 42.99 | 44.11 | 46.48 |
| | 18-44 | 50.89 | 52.95 | 52.85 | 56.15 | 58.71 |
| | 45-64 | 22.84 | 30.55 | 40.03 | 41.33 | 40.71 |
| | ≥65 | 12.74 | 14.54 | 17.65 | 24.98 | 33.05 |
| | Total | 124.05 | 139.67 | 153.53 | 166.57 | 178.94 |
| Female | <18 | 35.77 | 39.58 | 41.05 | 42.32 | 44.53 |
| | 18-44 | 51.14 | 52.38 | 52.40 | 55.04 | 57.34 |
| | 45-64 | 24.56 | 32.31 | 42.12 | 43.10 | 41.80 |
| | ≥65 | 19.00 | 20.65 | 23.14 | 30.96 | 40.02 |
| | Total | 130.46 | 144.92 | 158.72 | 171.42 | 183.69 |
| Combined | <18 | 73.34 | 81.22 | 84.04 | 86.42 | 91.01 |
| | 18-44 | 102.03 | 105.33 | 105.25 | 111.19 | 116.05 |
| | 45-64 | 47.41 | 62.86 | 82.16 | 84.43 | 82.50 |
| | ≥65 | 31.74 | 35.19 | 40.80 | 55.94 | 73.07 |
| | Total | 254.51 | 284.60 | 312.25 | 337.99 | 362.63 |

APPENDIX

Figure 12 -Percent U.S. Population Using 1+, 3+, 5+ Prescription Drugs in Last 30 Days by Age and Sex (1990 to 2030)

| | 1988-1994 | 1999-2002 | 2007-2010 | 2020 Projected | 2030 Projected |
|----------------------------|--------------|--------------|--------------|-------------------|-------------------|
| No Rx Drugs / Month | 62.2% | 55.0% | 51.5% | 49.8% | 48.9% |
| 1 or more Rx drug | | | | | |
| Both sexes | 37.8% | 45.0% | 48.5% | 50.2% | 51.1% |
| Male: | 30.6% | 38.6% | 43.0% | 45.4% | 46.8% |
| Under 18 years | 20.4% | 25.7% | 24.5% | 24.8% | 24.7% |
| 18-44 years | 21.5% | 27.1% | 29.5% | 30.5% | 31.0% |
| 45-64 years | 47.2% | 55.6% | 61.3% | 63.0% | 64.0% |
| 65 years and over | 67.2% | 80.1% | 88.8% | 90.0% | 90.0% |
| Female: | 44.6% | 51.1% | 53.8% | 54.9% | 55.4% |
| Under 18 years | 20.6% | 21.7% | 23.5% | 26.4% | 31.3% |
| 18-44 years | 40.7% | 44.6% | 47.6% | 49.9% | 51.7% |
| 45-64 years | 62.0% | 72.0% | 70.8% | 70.9% | 70.9% |
| 65 years and over | 78.3% | 88.1% | 90.4% | 90.9% | 91.1% |
| 3 or more Rx drugs | | | | | |
| Both sexes | 11.0% | 17.6% | 21.7% | 24.1% | 25.9% |
| Male: | 8.3% | 13.9% | 19.0% | 21.6% | 23.3% |
| Under 18 years | 2.6% | 4.3% | 4.4% | 4.4% | 4.4% |
| 18-44 years | 3.6% | 6.7% | 7.1% | 7.2% | 7.2% |
| 45-64 years | 15.1% | 23.6% | 30.4% | 32.0% | 32.5% |
| 65 years and over | 31.3% | 46.3% | 66.8% | 67.0% | 67.2% |
| Female: | 13.6% | 21.1% | 24.2% | 26.6% | 28.5% |
| Under 18 years | 2.3% | 3.9% | 3.1% | 3.5% | 3.3% |
| 18-44 years | 7.6% | 10.2% | 12.2% | 12.5% | 13.5% |
| 45-64 years | 24.7% | 37.5% | 38.1% | 38.3% | 38.4% |
| 65 years and over | 38.2% | 55.9% | 66.4% | 67.0% | 67.5% |
| 5 or more Rx drugs | | | | | |
| Both sexes | 3.6% | 7.4% | 10.6% | 12.5% | 13.7% |
| Male: | 2.5% | 5.6% | 9.1% | 10.9% | 12.1% |
| Under 18 years | 0.0% | 0.0% | 0.8% | 0.9% | 1.0% |
| 18-44 years | 0.8% | 1.7% | 2.1% | 2.3% | 2.4% |
| 45-64 years | 4.8% | 9.5% | 14.4% | 15.5% | 16.0% |
| 65 years and over | 11.3% | 24.7% | 39.5% | 40.0% | 40.2% |
| Female: | 4.7% | 9.1% | 12.1% | 14.0% | 15.3% |
| Under 18 years | 0.0% | 0.8% | 0.7% | 0.7% | 0.8% |
| 18-44 years | 1.7% | 2.8% | 4.0% | 4.8% | 5.2% |
| 45-64 years | 9.7% | 16.8% | 19.1% | 19.5% | 19.8% |
| 65 years and over | 15.6% | 28.9% | 39.8% | 41.0% | 41.2% |

APPENDIX

Figure 13 -Percent U.S. Population Using 1 or 2, 3 or 4, and 5+ Prescription Drugs in Last 30 Days by Age and Sex (1990 to 2030)

| | 1988-1994 | 1999-2002 | 2007-2010 | 2020 Projected | 2030 Projected |
|-----------------------------|--------------|--------------|--------------|-------------------|-------------------|
| No Rx Drugs / Month | 62.2% | 55.0% | 51.5% | 49.8% | 48.9% |
| 1 or 2 Rx / Month | | | | | |
| Both sexes | 26.8% | 27.4% | 26.8% | 26.1% | 25.2% |
| Male: | 22.3% | 24.7% | 24.0% | 23.9% | 23.5% |
| Under 18 years | 17.8% | 21.4% | 20.1% | 20.4% | 20.3% |
| 18-44 years | 17.9% | 20.4% | 22.4% | 23.4% | 23.8% |
| 45-64 years | 32.1% | 32.0% | 30.9% | 31.0% | 31.5% |
| 65 years and over | 35.9% | 33.8% | 22.0% | 23.0% | 22.8% |
| Female: | 31.0% | 30.0% | 29.6% | 28.3% | 26.9% |
| Under 18 years | 18.3% | 17.8% | 20.4% | 22.9% | 28.0% |
| 18-44 years | 33.1% | 34.4% | 35.4% | 37.4% | 38.2% |
| 45-64 years | 37.3% | 34.5% | 32.7% | 32.6% | 32.5% |
| 65 years and over | 40.1% | 32.2% | 24.0% | 23.9% | 23.6% |
| 3 or 4 Rx / Month | | | | | |
| Both sexes | 7.4% | 10.2% | 11.1% | 11.7% | 12.2% |
| Male: | 5.8% | 8.3% | 9.9% | 10.7% | 11.2% |
| Under 18 years | 2.6% | 4.3% | 3.6% | 3.5% | 3.4% |
| 18-44 years | 2.8% | 5.0% | 5.0% | 4.9% | 4.8% |
| 45-64 years | 10.3% | 14.1% | 16.0% | 16.5% | 16.5% |
| 65 years and over | 20.0% | 21.6% | 27.3% | 27.0% | 27.0% |
| Female: | 8.9% | 12.0% | 12.1% | 12.6% | 13.2% |
| Under 18 years | 2.3% | 3.1% | 2.4% | 2.8% | 2.5% |
| 18-44 years | 5.9% | 7.4% | 8.2% | 7.7% | 8.3% |
| 45-64 years | 15.0% | 20.7% | 19.0% | 18.8% | 18.6% |
| 65 years and over | 22.6% | 27.0% | 26.6% | 26.0% | 26.3% |
| 5 or more Rx / Month | | | | | |
| Both sexes | 3.6% | 7.4% | 10.6% | 12.5% | 13.7% |
| Male: | 2.5% | 5.6% | 9.1% | 10.9% | 12.1% |
| Under 18 years | 0.0% | 0.0% | 0.8% | 0.9% | 1.0% |
| 18-44 years | 0.8% | 1.7% | 2.1% | 2.3% | 2.4% |
| 45-64 years | 4.8% | 9.5% | 14.4% | 15.5% | 16.0% |
| 65 years and over | 11.3% | 24.7% | 39.5% | 40.0% | 40.2% |
| Female: | 4.7% | 9.1% | 12.1% | 14.0% | 15.3% |
| Under 18 years | 0.0% | 0.8% | 0.7% | 0.7% | 0.8% |
| 18-44 years | 1.7% | 2.8% | 4.0% | 4.8% | 5.2% |
| 45-64 years | 9.7% | 16.8% | 19.1% | 19.5% | 19.8% |
| 65 years and over | 15.6% | 28.9% | 39.8% | 41.0% | 41.2% |

APPENDIX

Figure 14 -Size of Consumption Categories in Millions of People by Age and Sex (1990 to 2030)

| | 1988-1994 | 1999-2002 | 2007-2010 | 2020 Projected | 2030 Projected |
|-----------------------------|-----------|-----------|-----------|-------------------|-------------------|
| 1 or 2 Rx / Month | | | | | |
| Total Population | 68.0 | 77.3 | 83.0 | 92.4 | 101.1 |
| Male: | 27.7 | 34.4 | 36.7 | 40.7 | 43.8 |
| Under 18 years | 6.7 | 8.9 | 8.6 | 9.0 | 9.4 |
| 18-44 years | 9.1 | 10.8 | 11.8 | 13.1 | 14.0 |
| 45-64 years | 7.3 | 9.8 | 12.4 | 12.8 | 12.8 |
| 65 years and over | 4.6 | 4.9 | 3.9 | 5.7 | 7.5 |
| Female: | 40.3 | 42.9 | 46.3 | 51.8 | 57.4 |
| Under 18 years | 6.5 | 7.0 | 8.4 | 9.7 | 12.5 |
| 18-44 years | 16.9 | 18.0 | 18.5 | 20.6 | 21.9 |
| 45-64 years | 9.2 | 11.1 | 13.8 | 14.1 | 13.6 |
| 65 years and over | 7.6 | 6.7 | 5.6 | 7.4 | 9.4 |
| 3 or 4 Rx / Month | | | | | |
| Total Population | 19.1 | 29.3 | 34.9 | 39.4 | 44.2 |
| Male: | 7.3 | 11.9 | 15.4 | 17.8 | 20.0 |
| Under 18 years | 1.0 | 1.8 | 1.5 | 1.5 | 1.6 |
| 18-44 years | 1.4 | 2.6 | 2.6 | 2.7 | 2.8 |
| 45-64 years | 2.4 | 4.3 | 6.4 | 6.8 | 6.7 |
| 65 years and over | 2.5 | 3.1 | 4.8 | 6.7 | 8.9 |
| Female: | 11.8 | 17.4 | 19.4 | 21.6 | 24.2 |
| Under 18 years | 0.8 | 1.2 | 1.0 | 1.2 | 1.1 |
| 18-44 years | 3.0 | 3.9 | 4.3 | 4.2 | 4.8 |
| 45-64 years | 3.7 | 6.7 | 8.0 | 8.1 | 7.8 |
| 65 years and over | 4.3 | 5.6 | 6.2 | 8.0 | 10.5 |
| 5 or more Rx / Month | | | | | |
| Total Population | 9.2 | 20.6 | 33.8 | 42.1 | 49.7 |
| Male: | 2.9 | 7.4 | 14.2 | 18.1 | 21.6 |
| Under 18 years | - | - | 0.3 | 0.4 | 0.5 |
| 18-44 years | 0.4 | 0.9 | 1.1 | 1.3 | 1.4 |
| 45-64 years | 1.1 | 2.9 | 5.8 | 6.4 | 6.5 |
| 65 years and over | 1.4 | 3.6 | 7.0 | 10.0 | 13.3 |
| Female: | 6.2 | 13.2 | 19.6 | 24.0 | 28.1 |
| Under 18 years | - | 0.3 | 0.3 | 0.3 | 0.4 |
| 18-44 years | 0.9 | 1.5 | 2.1 | 2.6 | 3.0 |
| 45-64 years | 2.4 | 5.4 | 8.0 | 8.4 | 8.3 |
| 65 years and over | 3.0 | 6.0 | 9.2 | 12.7 | 16.5 |

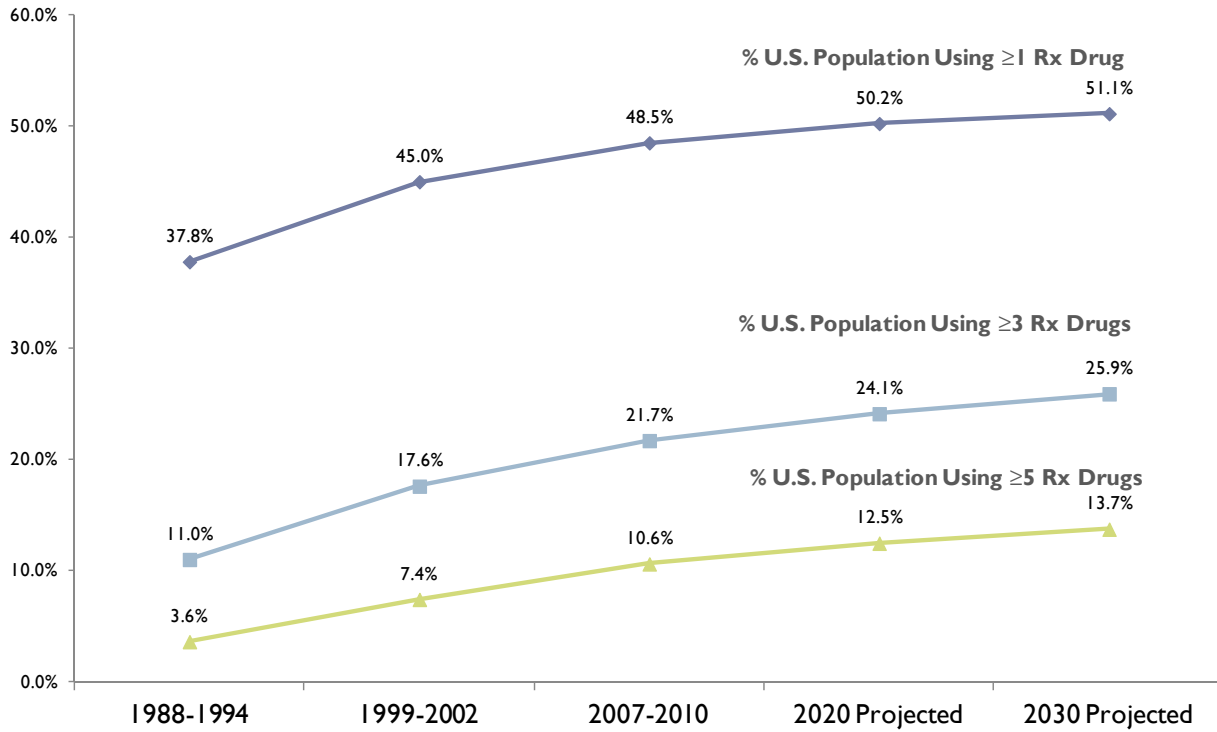
APPENDIX

Figure 15 -Monthly Prescription Drug Demand in Millions of Rxs (1990 to 2030)

| | 1988-1994 | 1999-2002 | 2007-2010 | 2020 Projected | 2030 Projected |
|--------------------------------|-------------|-------------|-------------|-------------------|-------------------|
| Rx Volume per Month | 233 | 362 | 483 | 571 | 655 |
| US Population | 255 | 285 | 312 | 338 | 363 |
| Average Rx/Person/Month | 0.92 | 1.27 | 1.55 | 1.69 | 1.81 |
| 1 or 2 Rx / Month | | | | | |
| Total Population | 102 | 116 | 124 | 139 | 152 |
| Male: | 42 | 52 | 55 | 61 | 66 |
| Under 18 years | 10 | 13 | 13 | 13 | 14 |
| 18-44 years | 14 | 16 | 18 | 20 | 21 |
| 45-64 years | 11 | 15 | 19 | 19 | 19 |
| 65 years and over | 7 | 7 | 6 | 9 | 11 |
| Female: | 60 | 64 | 69 | 78 | 86 |
| Under 18 years | 10 | 11 | 13 | 15 | 19 |
| 18-44 years | 25 | 27 | 28 | 31 | 33 |
| 45-64 years | 14 | 17 | 21 | 21 | 20 |
| 65 years and over | 11 | 10 | 8 | 11 | 14 |
| 3 or 4 Rx / Month | | | | | |
| Total Population | 67 | 102 | 122 | 138 | 155 |
| Male: | 26 | 42 | 54 | 62 | 70 |
| Under 18 years | 3 | 6 | 5 | 5 | 6 |
| 18-44 years | 5 | 9 | 9 | 10 | 10 |
| 45-64 years | 8 | 15 | 22 | 24 | 24 |
| 65 years and over | 9 | 11 | 17 | 24 | 31 |
| Female: | 41 | 61 | 68 | 75 | 85 |
| Under 18 years | 3 | 4 | 3 | 4 | 4 |
| 18-44 years | 11 | 14 | 15 | 15 | 17 |
| 45-64 years | 13 | 23 | 28 | 28 | 27 |
| 65 years and over | 15 | 20 | 22 | 28 | 37 |
| 5 or more Rx / Month | | | | | |
| Total Population | 64 | 144 | 237 | 295 | 348 |
| Male: | 21 | 52 | 99 | 127 | 152 |
| Under 18 years | - | - | 2 | 3 | 3 |
| 18-44 years | 3 | 6 | 8 | 9 | 10 |
| 45-64 years | 8 | 20 | 40 | 45 | 46 |
| 65 years and over | 10 | 25 | 49 | 70 | 93 |
| Female: | 44 | 92 | 137 | 168 | 197 |
| Under 18 years | - | 2 | 2 | 2 | 2 |
| 18-44 years | 6 | 10 | 15 | 18 | 21 |
| 45-64 years | 17 | 38 | 56 | 59 | 58 |
| 65 years and over | 21 | 42 | 64 | 89 | 115 |

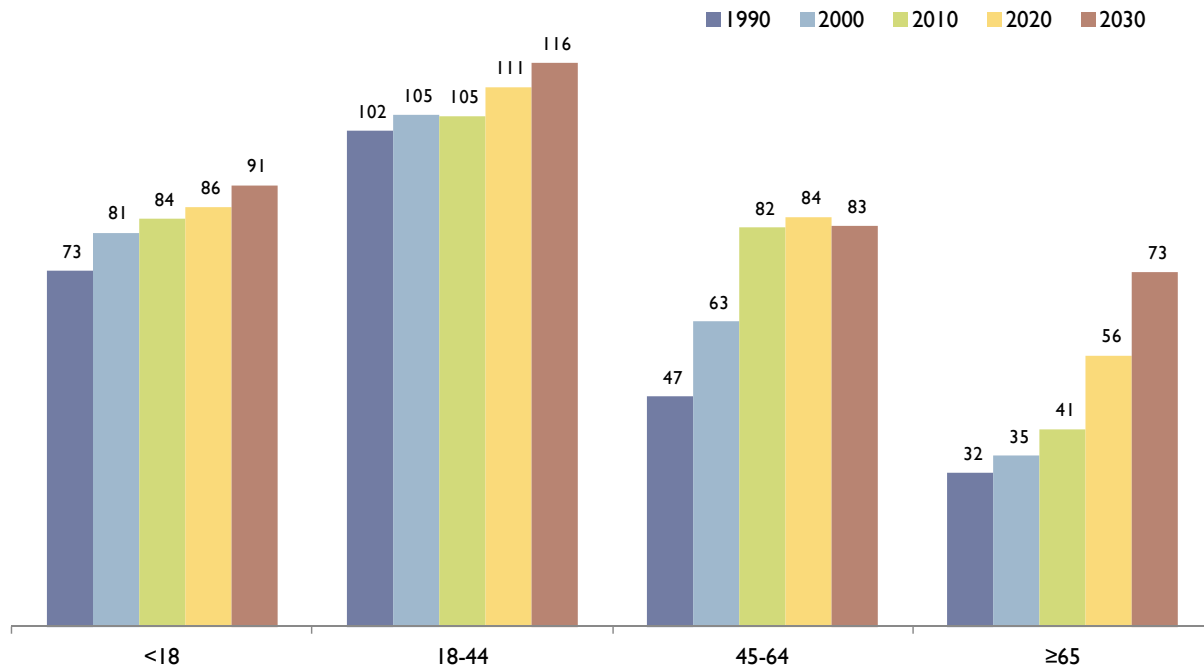
APPENDIX

Figure 16 - Percent U.S. Population Using 1+, 3+, 5+ Prescription Drugs in Last 30 Days (Projections to 2030)



APPENDIX

Figure 17 – Size of Population by Age Group (in Millions)



APPENDIX

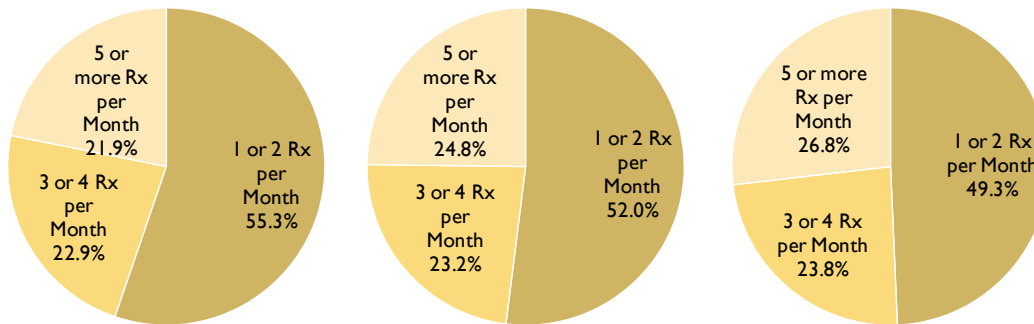
Figure 18 – Average Monthly Prescription Drug Consumption by Age and Sex (2010 to 2030)

| | 1988-1994 | 1999-2002 | 2007-2010 | 2020 Projected | 2030 Projected |
|--|-------------|-------------|-------------|----------------|----------------|
| Average Rxs per Month | | | | | |
| Male: | 0.71 | 1.05 | 1.34 | 1.49 | 1.59 |
| Under 18 years | 0.36 | 0.47 | 0.48 | 0.49 | 0.49 |
| 18-44 years | 0.42 | 0.60 | 0.66 | 0.68 | 0.69 |
| 45-64 years | 1.18 | 1.64 | 2.03 | 2.13 | 2.17 |
| 65 years and over | 2.03 | 2.99 | 4.05 | 4.09 | 4.10 |
| Female: | 1.11 | 1.51 | 1.71 | 1.85 | 1.94 |
| Under 18 years | 0.36 | 0.43 | 0.44 | 0.49 | 0.56 |
| 18-44 years | 0.82 | 0.97 | 1.10 | 1.17 | 1.23 |
| 45-64 years | 1.76 | 2.42 | 2.49 | 2.51 | 2.52 |
| 65 years and over | 2.48 | 3.45 | 4.08 | 4.14 | 4.16 |
| Total | 0.91 | 1.28 | 1.53 | 1.67 | 1.77 |
| Under 18 years | 0.36 | 0.45 | 0.46 | 0.49 | 0.53 |
| 18-44 years | 0.62 | 0.78 | 0.88 | 0.92 | 0.96 |
| 45-64 years | 1.48 | 2.04 | 2.27 | 2.32 | 2.35 |
| 65 years and over | 2.30 | 3.26 | 4.07 | 4.12 | 4.13 |
| % Change versus Previous Period | | | | | |
| Male: | NA | 47.8% | 27.6% | 11.1% | 6.6% |
| Under 18 years | NA | 31.7% | 2.5% | 1.6% | 0.5% |
| 18-44 years | NA | 42.0% | 9.7% | 3.4% | 1.4% |
| 45-64 years | NA | 39.1% | 24.0% | 4.7% | 2.0% |
| 65 years and over | NA | 47.4% | 35.4% | 1.0% | 0.3% |
| Female: | NA | 36.3% | 13.8% | 7.7% | 4.8% |
| Under 18 years | NA | 21.5% | 1.7% | 12.0% | 14.5% |
| 18-44 years | NA | 18.1% | 13.1% | 6.2% | 5.2% |
| 45-64 years | NA | 37.1% | 3.1% | 0.8% | 0.5% |
| 65 years and over | NA | 38.9% | 18.1% | 1.5% | 0.5% |
| Total | NA | 40.5% | 19.3% | 9.1% | 5.6% |
| Under 18 years | NA | 26.8% | 2.2% | 6.4% | 7.4% |
| 18-44 years | NA | 26.0% | 11.8% | 5.0% | 3.7% |
| 45-64 years | NA | 37.7% | 11.2% | 2.5% | 1.1% |
| 65 years and over | NA | 41.7% | 24.7% | 1.3% | 0.4% |

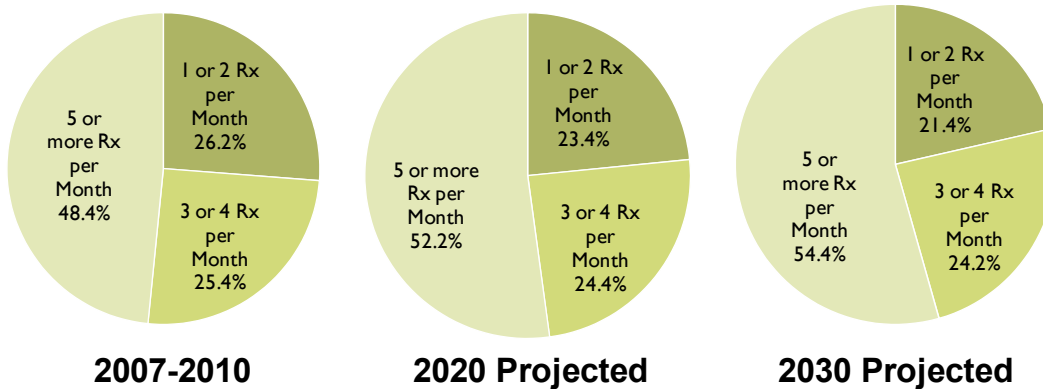
APPENDIX

Figure 19 – Share of Total Patients and Prescription Volume by Consumption Level (2010 to 2030)

Size of Consumption Group as % U.S. Rx Drug Users



Share of U.S. Prescription Volume by Consumption Group



Value of Insight Consulting, Inc.

2522 Center Avenue

Fort Lauderdale, Florida 33308

Phone: (US) 954 302 8852

Fax: (US) 954 252 3927

www.voiconsulting.com

publications@voiconsulting.com