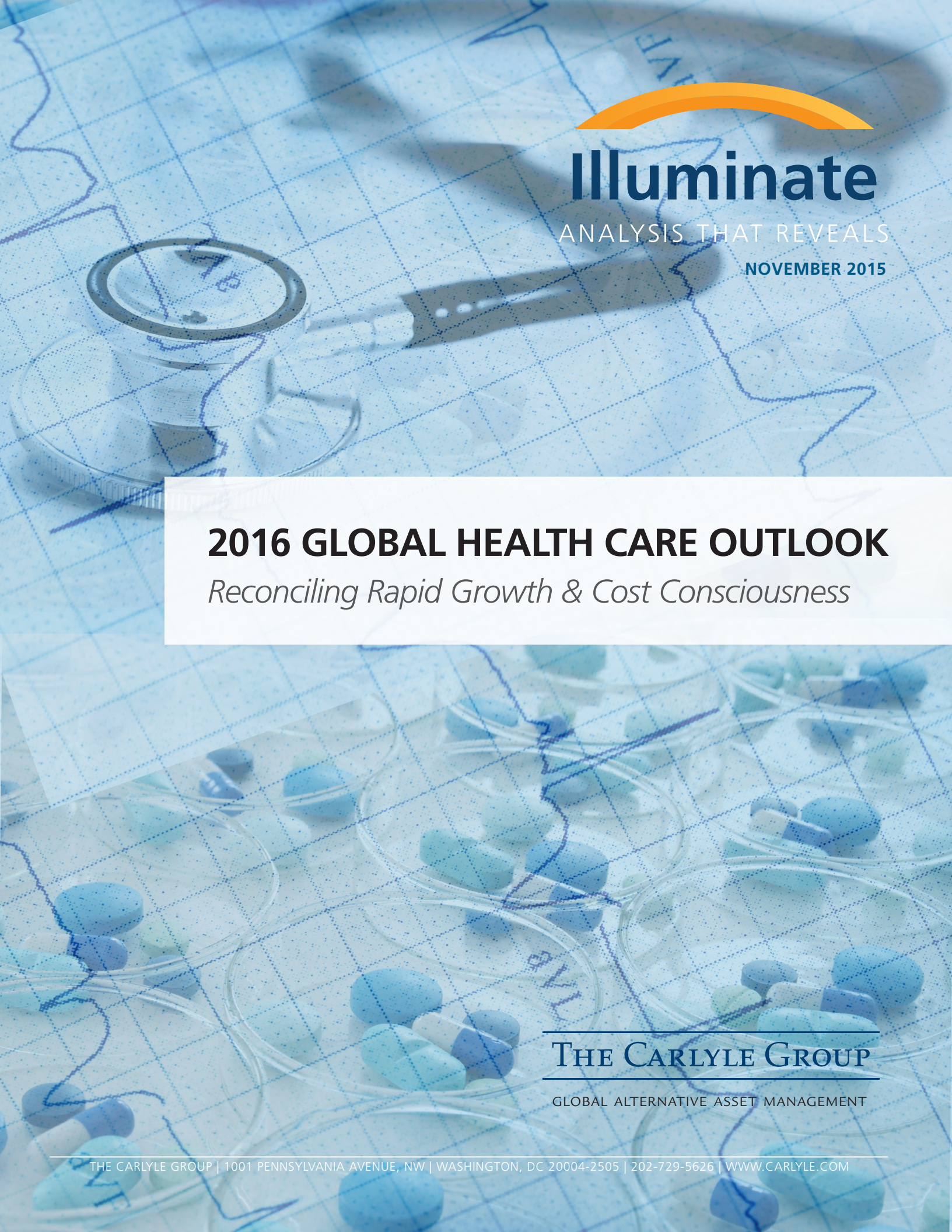

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ANALYSIS THAT REVEALS

NOVEMBER 2015

2016 GLOBAL HEALTH CARE OUTLOOK

Reconciling Rapid Growth & Cost Consciousness

THE CARLYLE GROUP

GLOBAL ALTERNATIVE ASSET MANAGEMENT

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2016 Global Health Care Outlook

By Jason M. Thomas & Stephen H. Wise

No industry seems more out-of-step with the prevailing macroeconomic narrative than the health care sector. Rather than fear "secular stagnation," sluggish growth, or deflation, health care analysts are more likely to worry about excessive spending growth, rising prices, and inadequate capacity. In fact, the same forces slowing trend growth rates – societal aging in advanced economies and prior periods of "catch-up" growth in several emerging market (EM) economies – are boosting health care spending and the industry's share of global GDP.

The health care sector is not immune from cyclical ups-and-downs, but rising EM living standards and societal aging are likely to ensure that the industry grows much faster than the global economy. Based on current GDP forecasts, global health care spending should grow more than 6% annually over the next decade.[1] Needless to say, such rapid growth makes the health care sector a unique destination for capital in the current economic environment.

Strong growth in aggregate health spending will not necessarily translate to increased revenue and earnings at incumbent health providers and product manufacturers. Rising cost pressures - and policymakers' responses to them - are likely to spur innovation in new technology and business models that have the potential to disrupt existing arrangements. A passive approach to the sector will fail to capture the likely shift in spending patterns and market share. Instead, investors should seek to deploy capital strategically in response to the specific opportunities created by rapid EM health infrastructure growth and a new era of innovation and cost consciousness in advanced economies.

Personal Income Growth and Health Spending

A cursory glance at expenditures by country reveals a strong correlation between income levels and health outlays. Advanced economies like the U.S., Europe, and Japan spend about twice as much of their income (12% of GDP) on health care as EM and developing economies (6% of GDP, on average).[2] Overall, about two-thirds of the $8 trillion in global health care spending occurs in advanced economies, with the U.S. accounting for $3 trillion, or 40% of the total.

Health spending varies with income for two reasons. First, health care is a "superior" good, where demand rises more than proportionately with income.[3] As countries become richer, households are naturally willing to forego more discretionary consumption in favor of medical advances capable of extending life and improving its quality. Second, advanced economies also tend to be older societies. The share of the population over 64 years of age is equal to about 24% of the population between 15 and 64 in advanced economies. In low and middle income economies, this "dependency ratio" is only 9.6%.[4]

When holding country and demographics constant, a 10% increase in GDP per capita increases the health sector's share of GDP by about 0.2 percentage points, on average.[5] To put this relationship in context, a fast-growing economy transitioning from $12,000 to $19,000 in per capita income could expect to see health expenditures rise 1.3% per year faster than overall GDP, holding other factors like demographics constant.[6]

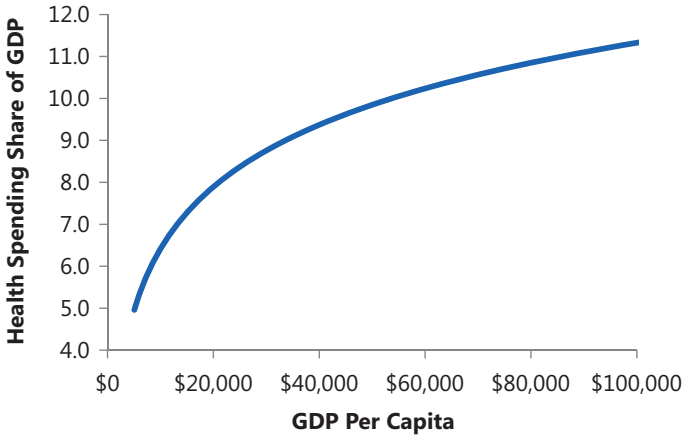
TABLE 1

Health Spending and Per Capita Income (at PPP), Holding Other Factors Constant

Percentile	GDP Per Capita (USD)	Health Spending Share of GDP
25th	12,180	7.1
50th	19,067	8.0
75th	34,525	9.3
95th	56,105	10.3

FIGURE 1

Health Spending and Per Capita Income



As shown in Figure 1, the relationship between per capita income and health spending is nonlinear: the effect of income growth on health spending is far more pronounced at lower income levels. A country where per capita income

1 IMF, 2015 World Economic Outlook Database. October 2015. Estimate based on fixed-effects regression model using the World Bank's 2015 World Development Indicators data on Health Expenditures.

2 Unless otherwise noted, all data in the paper come from the World Health Organization, Global Health Expenditure Database, 2015.

3 Hall, R. and Jones, C. (2007), "The Value of Life and the Rise in Health Spending," *The Quarterly Journal of Economics.*

4 Demographics data from the World Bank, World Development Indicators Database, 2015.

5 This effect is significant at the 0.1% confidence interval (t statistic equal to 11.5) for panel data since 1995.

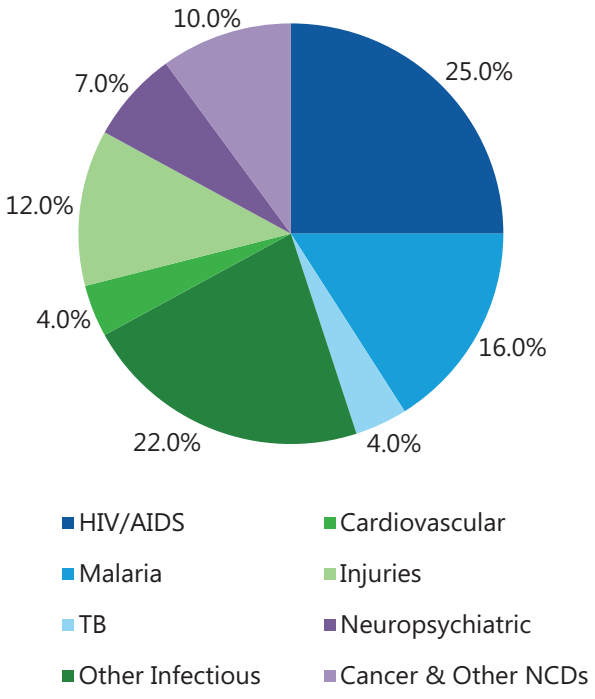
6 This transition would occur over a period of roughly 10 years: ln(19,067/12,180)/ln(1.05)=9.2.

rises from $10,000 to $20,000 would be expected to see its share of GDP spent on health care rise by 1.5 percentage points; between $20,000 and $40,000 in GDP per capita, the health spending share grows by just 0.9 percentage points of GDP; and between $30,000 and $40,000 the health share increases by just 0.6 percentage points of GDP.

The observed relationship arises as a result of income-related epidemiological changes. At lower income levels, health spending is dominated by communicable disease and childhood conditions, like respiratory infections, malaria, tuberculosis, and HIV/AIDs. As living standards improve, noncommunicable diseases (NCDs) like heart disease, diabetes, neuropsychiatric disorders, and cancer account for a larger share of health expenditures (See Figures 2 and 3). NCDs are much more expensive to treat and tend to impact older people. Increases in life expectancy stemming from improvements in living standards – clean water, sanitation, food refrigeration, etc. – increase the share of income devoted to health care, in part, by boosting the share of the population that lives long enough to develop expensive-to-treat NCDs.

FIGURE 2

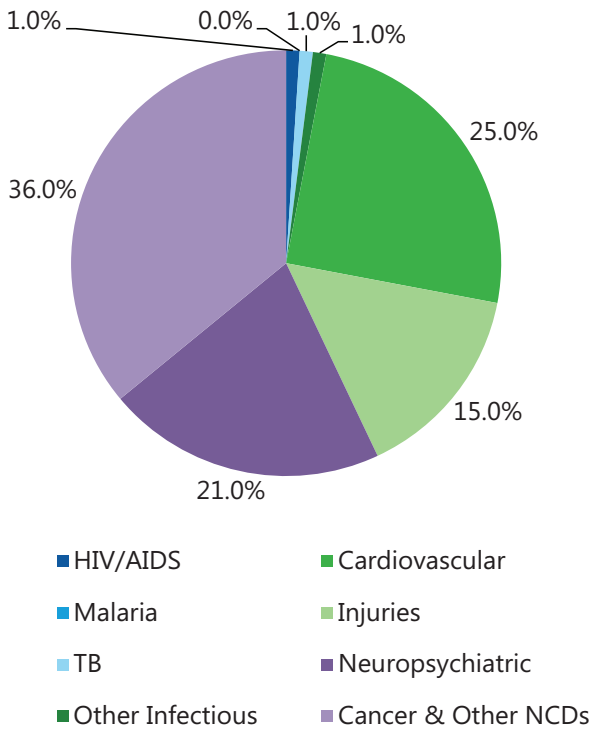
Share of Health Expenditures in Africa by Disease[7]



If global GDP grows by 4.5% per year in U.S. dollar terms over the next decade, global health spending would be expected to increase by about 6% per year.

FIGURE 3

Share of Health Expenditures in Europe by Disease[8]



Countries in the midst of the epidemiological transition experience much more rapid increases in (relative) health spending than economies that have already made the transition. Once a country's disease burden and mortality share has shifted decisively to NCDs, aging, rather than income growth, becomes the main driver of increases in health spending. But for economies in the $10,000 to $20,000 per capita income range (Table 2), income gains could translate into potentially explosive growth in health spending due to the increasing prevalence of chronic conditions.

TABLE 2

Economies in "Growth Phase" of Health Expenditures

Economy	GDP Per Capita (PPP)
Indonesia	$10,711.45
Developing Asia	$12,109.52
Peru	$12,554.21
China	$13,435.96
Dominican Republic	$13,518.52
Colombia	$13,617.08
South Africa	$13,885.85
Upper middle income	$14,864.99
Thailand	$15,330.15
Latin America & Caribbean	$16,369.88
Brazil	$16,785.93
Mexico	$17,608.59

7 Gottret, P.E. et al. (2006), *Health Financing Revisited: A Practitioner's Guide*, World Bank.

8 Gottret, P.E. et al. (2006), *Health Financing Revisited: A Practitioner's Guide*, World Bank.

Explosive growth comes primarily from the large required investment in the health care infrastructure and services necessary to treat NCDs. Building such an infrastructure requires significant investment in both human and physical capital, including the training of doctors and health care professionals, construction of hospitals, and the acquisition of medical equipment, diagnostic technology, and pharmaceuticals. This "growth phase" of health spending between $10,000 and $20,000 of per capita income is perhaps best likened to the period of capital accumulation that occurs in industries such as steel or automobiles where an economy invests in the technology and facilities necessary to deliver future goods and services.

As with capital accumulation in other sectors, the development of an EM health infrastructure will depend on foreign capital and expertise. In January 2015, Brazil passed a new law that allows foreign investment in hospitals, clinics, laboratories, and entities in the "heath assistance sector."[9] (Carlyle made the first major health care investment in Brazil following the law's enactment.) The Chinese government has also recently liberalized laws governing foreign investment in its health care sector to attract external capital to construct new hospitals and increase access to care.[10] Other countries experiencing health infrastructure shortfalls are likely to follow their lead.

TABLE 3

Share of Total Health Care Financing in Select Economies[11]

	Out-of-Pocket	Public	Private Insurance
EM Economies	35.8	52.5	11.5
Asia Ex-Japan	34.5	54.9	10.4
China	33.8	55.8	10.3
Latin America	32.1	52.6	15.1
India	58.2	32.2	9.5
Advanced Economies	14.7	61.1	24.1
U.S.	11.8	47.1	41.1
Euro Area	14.1	76.1	9.7

Investment in health care infrastructure is likely to be coupled with the development of new health care financing systems to increase access to care and pool risk across households. NCDs such as cancer, heart disease, and Alzheimer's often involve catastrophic expenses that could only be financed out-of-pocket by a small share of (very rich) households. To ensure that the rapidly expanding middle class can access the necessary care, EM economies will need to expand public and private insurance coverage. In 2015, out-of-pocket spending accounted for just 15% of total health care payments in advanced economies compared to 36% of all spending in EM economies, on average, and 58% in India (Table 3). Much of the increase in risk pooling will likely occur through public sector insurance programs, but stressed public finances may increase the role private health insurance plays in expanding access to care.

The Cost of Societal Aging

When economies transition to high-income status, aging becomes the main driver of health spending growth. When holding per capita income and country constant, a one percentage point increase in the dependency ratio (from 10% to 11% of the 25-64 population, for example) translates to a 0.19 percentage point increase in health care spending as a share of GDP. A rapidly aging society that sees its dependency ratio increase from 9% (the 25th percentile of the 2015 distribution) to 21.6% (the 75th percentile) would see its health care sector grow by 2.4 percentage points of GDP. A country aging at this rate with nominal GDP growth averaging 4% annually for ten years would be expected to experience 7% annualized growth in health spending, when holding other factors constant.

TABLE 4

Health Spending and Old-Age Dependency Ratio, Holding Other Factors Constant

Percentile	Dependency Ratio	Health Spending Share of GDP
25th	9.0	7.1
50th	12.4	8.0
75th	21.6	9.3
95th	27.7	10.2

For advanced economies, the old-age dependency ratio is expected to increase by 6.3 percentage points (25.5%), on average, over the next decade led by Germany's 7.9 percentage point increase (24.1%) and closely followed by 7.5 percentage point increases in the U.S. and Japan. Such aging would be expected to increase advanced economies' health spending by about 1.2 percentage of GDP (from 12% to 13.2%).

Societal aging is not limited to advanced economies. With the exception of 16 African nations, every country in the world is expected to see its old-age dependency ratio increase over the coming decade.[12] Among EM and developing economies, the dependency ratio is expected to rise 2.9 percentage points, or 30%, led by 6.4 percentage point increases in both Russia and China. Overall, the expected 3.25 percentage point (+25%) global increase in the old-age dependency ratio is expected to add 0.6 percentage points to the health spending share of 2025 global GDP.

9 Direct Foreign Investment in the Brazilian Health Sector | Federal Law # 13,097/2015

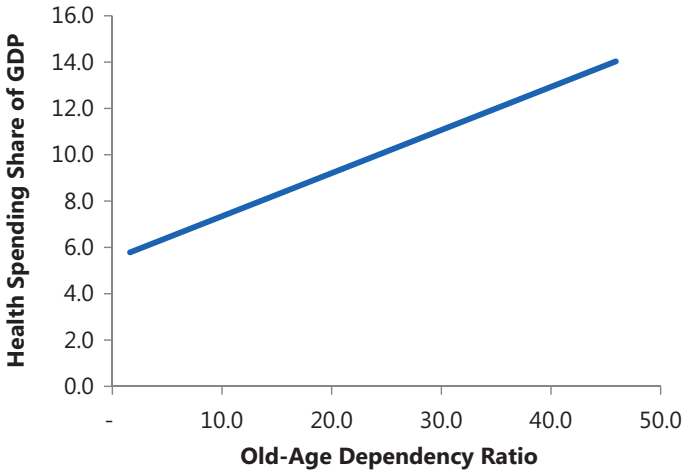
10 Economist Intelligence Unit, "China's hospital sector in the spotlight," September 2014.

11 World Bank, World Economic Indicators Database, 2015.

12 World Bank, World Development Indicators Database, 2015.

FIGURE 4

Health Spending and Dependency Ratio



Taken together, demographics and rising incomes would be expected to add about 1.6 percentage points to the global health share of GDP over the next decade (from 10.2% to 11.8%). This means that if global GDP were to grow by 4.5% per year in U.S. dollar terms over the next decade, global health spending would be expected to increase by about 6% per year.

Among large economies, the biggest increase in relative health spending is likely to occur in China, which is expected to age like an advanced economy at the same time as per capita income continues to grow at among the fastest rates in the world. Over the next 10 years, China's old-age dependency ratio is forecast to rise from 13.0% (close to the global median) to 19.5% (the 67th percentile of the current distribution), which would add 1.2 percentage points to the health share of GDP – the same age-related spending increase as expected for Europe. When adding the effects of per capita income growth, China's health care sector is expected to consume an additional 2.8 percentage points of GDP over the next decade. This means that if real growth in China averages 7% over the next decade, health spending would be expected to grow by 10% per year in real terms.

TABLE 5

"Excess" Health Spending Growth by Factor (in Percent of GDP)

	Demographics	Income	Total
China	1.2	1.6	2.8
Asia Ex-Japan	1.0	1.6	2.6
U.S.	1.4	0.7	2.2
Euro Area	1.2	0.8	2.0
Japan	1.4	0.6	2.0
India	0.4	1.4	1.9
EM Total	0.5	1.1	1.7
World	0.6	0.9	1.6

The same story is likely to be true in much of the rest of Asia. In Japan, aging is expected to add 1.4% of GDP to the health sector. In the rest of Asia, income growth and aging are expected to combine to increase the health sector's share of GDP by 2.6 percentage points. For EM and developing economies as a whole, the health share of GDP is expected to rise by 1.7 percentage points over the next 10 years due to slightly better demographics trends but somewhat slower personal income growth relative to developing Asia.

Cost Pressures Become the Dominant Issue in Advanced Economies

Policymakers are not likely to acquiesce to the large forecast growth in health spending. There are limits to the amount of health care consumption any public or private insurance system can realistically finance. This is especially true when the demand for health care services grows faster than the capacity of the sector itself, which causes prices to rise faster than the economy-wide rate of inflation. Rapidly escalating health care costs have become the dominant issue facing the health care sector in advanced economies. With societal aging expected to add over 1 percentage point to the health share of GDP, the pressure to reduce costs and demonstrate value is intensifying. This means that while the twin forces of aging and income growth are likely to boost health sector growth in the aggregate, incumbent providers and businesses may not be the beneficiaries of the increase.

In Europe, several governments utilize the practice of "competitive tendering" as a tool to drive down the price of medical products and procedures.[13] Such tenders now cover imaging, surgery and laboratory tests, among other procedures. Tendering is used to supplement formularies and national guidelines to determine the drugs, devices, and procedures eligible for reimbursement in many advanced economies.[14] Across the developed world, increasingly stringent medical procurement policies require pharmaceuticals and medical devices companies to use real-world evidence on health outcomes to convince payors and providers to use their products. New procurement policies are likely to slow the pace of "technological diffusion," or the rate at which newly introduced drugs devices, or interventions are adopted.[15]

Nowhere are changes in health care finance and delivery occurring more rapidly than in the U.S. Through passage of the Affordable Care Act (ACA) in 2010 and other initiatives, policymakers are attempting to move U.S. health finance from "fee for service" to a "fee for value" model. The ACA encourages the creation of Accountable Care Organizations (ACOs) and bundled payment pilots through a "shared savings program" that allows consortia of health

13 European Commission, "Competition Among Health Care Providers in the European Union," February 2015.

14 France – Medical Devices, October 2011.

15 Skinner, J. and Staiger, D. (2009), "Technology Diffusion in Health Care," NBER Working Paper 14865.

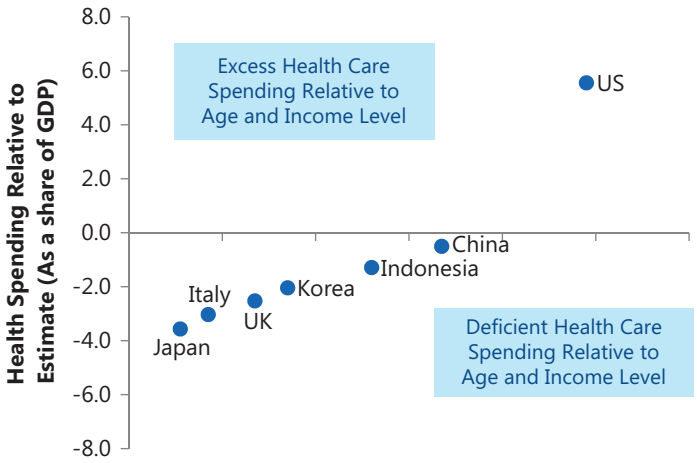
care providers to keep a portion of the savings they generate from more cost-effective care.[16] As a result of these changes, the proportion of insurance payments made to providers through value-based care arrangements is estimated to increase from 10% to 50% over the next five years.[17]

At the same time, high-deductible health plans (HDHPs) – including the high out-of-pocket cost "bronze" plans in state health exchanges – are soon expected to account for a majority of all private insurance plans in the U.S.[18] While the ACA regulates premiums and mandates coverage, its only limits on cost-sharing are (very high) annual out-of-pocket caps. Increased out-of-pocket spending will sensitize consumers to the cost of health care and force providers to demonstrate value.

While increased cost consciousness will likely slow the rate at which new medical technologies are embraced by providers and payors, it should increase the adoption of technology designed to track spending and measure health outcomes. Health Care Information Technology (HCIT), including electronic health records and analytics software, has the potential to standardize care, improve outcomes, and reshape how health care is reimbursed. At the very least, digital records and analytics should help to explain why the health sector's share of U.S. GDP (17%) is so much larger than what one would anticipate based on U.S. income levels and demographics (11.5% of GDP; Figure 5). When coupled with the growth of value-based care arrangements and HDHPs, new HCIT-based analytics could facilitate the emergence of new business models that allow the U.S. health care system to deliver significantly improved care at lower cost.

FIGURE 5

Health Care Spending Relative to Income and Demographics



16 Ropes and Gray, Medicare Shared Savings Program, PPACA, Section 3022.

17 Evolent Health, Inc., Form S.1, Filed June 1, 2015.

18 Wharam, J.F. et al. (2015), "Navigating the Rise of High-Deductible Health Insurance: Childbirth in the Bronze Age," *Journal of the American Medical Association*.

Opportunities for Private Equity

In the years ahead, health investment in EM economies and heightened cost-sensitivity in the aging advanced economies should provide private equity investors with numerous opportunities to deploy capital. EM economies in the midst of the epidemiological transition need to build the health care infrastructure and services necessary to treat chronic conditions and will likely require foreign capital and expertise to do so. Carlyle has identified and executed on similar opportunities in the past through our investments in Rede D'Or and Qualicorp in Brazil, Medical Park Hospital in Turkey, Medanta and Metropolis Healthcare in India, and Healthscope in Australia. The data presented in prior sections provide reason to believe a number of similar opportunities are likely to manifest themselves in the near future, particularly in Asia and Latin America.

In advanced economies, the winners in today's increasingly cost-conscious world are likely to be low cost-of-care facilities and providers that embrace "at-risk" business models. Clinics, urgent care facilities, and ambulatory surgery centers are likely to see large increases in revenues as payors steer beneficiaries to lower-cost alternatives to hospitals. Shared savings programs place integrated health systems, ACOs, and physician groups "at risk" of loss in the event that total payments exceed a designated benchmark, but also allow these groups to generate significant earnings growth if they can deliver care at lower cost through improved coordination and analytics.

Roll-up or mergers and acquisitions (M&A) strategies could allow private equity firms to create organizations with the necessary scale and capabilities to compete in this new health care market. Carlyle has employed this M&A strategy before with our prior investment in Multiplan and our current investment in PPD, which has involved four subsequent acquisitions since 2011. The value of scale and emphasis on coordination and health outcomes should make roll-up strategies across providers attractive in the years ahead.

Finally, Carlyle will continue to look for carve-out opportunities as companies realign their portfolios. Businesses in the pharmaceutical, medical devices, and medical technology industries are likely to respond to new cost pressures and procurement policies by exiting non-core businesses so as to focus attention on demonstrating the value of core products. It is also likely that recent mergers in the pharmaceutical industry will result in the sale of entire divisions or individual drugs, as firms rationalize their portfolios. Carlyle has demonstrated that carved-out divisions can be attractive in the right hands, particularly if the assets were ignored or underinvested in while under a corporate umbrella.[19] One recent example in the health care space was our acquisition of Ortho Clinical Diagnostics from Johnson & Johnson in 2014.

19 Clare, P. and Thomas, J. (2014), "The Opportunities from Underinvestment," Economic Outlook, The Carlyle Group.

Conclusion

Rising EM living standards and population aging make the health care sector an attractive destination for capital in a world bereft of growth. Increases in aggregate health spending will not necessarily translate to increased revenues and earnings at incumbent providers and firms. Rising cost pressures - and policymakers responses to them - are likely to spur innovation in new therapies, technology, and business models that have the potential to disrupt existing arrangements. A passive approach to the sector will fail to capture the coming shifts in spending patterns and market shares. Instead, investors should seek to deploy capital strategically in response to the opportunities created by rapid EM health infrastructure growth and a new era of innovation and cost consciousness in advanced economies.

Jason M. Thomas is a Managing Director and Director of Research at The Carlyle Group, focusing on economic and statistical analysis of the Carlyle portfolio, asset prices, and broader trends in the global economy. Mr. Thomas is based in Washington, D.C.

Mr. Thomas' research helps to identify new investment opportunities, advance strategic initiatives and corporate development, and support Carlyle investors.

Mr. Thomas received a B.A. from Claremont McKenna College and an M.S. and Ph.D. in finance from George Washington University where he was a Bank of America Foundation, Leo and Lillian Goodwin, and School of Business Fellow.

Mr. Thomas has earned the Chartered Financial Analyst (CFA) designation and is a financial risk manager (FRM) certified by the Global Association of Risk Professionals.

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Stephen H. Wise is a Managing Director and Co-head of the Global Health Care Team at The Carlyle Group. He is based in New York.

Since joining Carlyle in 2006, Mr. Wise has invested approximately $5 billion of equity in health care companies around the world. He serves as a member of the board of directors of PPD, HCR-Manor Care, Rede D'Or São Luiz S.A., Ortho Clinical Diagnostics (OCD), Healthscope Ltd. (prior), Grupo Qualicorp (prior), Multiplan (prior) and Lifecare (prior). He also served on the board of Qualicaps Group (prior), a portfolio company of Carlyle Japan Partners. Mr. Wise serves on the Leadership Council of the Harvard School of Public Health.

Prior to joining Carlyle, Mr. Wise worked with JLL Partners, a New York-based private equity firm, where he focused on health care-related investments. He reviewed and executed transactions in a wide variety of sectors, including facilities-based services, managed care and pharmaceutical services. Previously, he worked with J.W. Childs Associates, a Boston-based private equity firm, and prior to that, in the leveraged finance group of Credit Suisse.

Mr. Wise earned a bachelor's degree in economics and finance from Bucknell University and received his master's in business administration from Harvard Business School.