

Longer Term Investments

Medical devices

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- The aging population and growth of the over-65 age group will create more opportunities for companies selling medical products and devices.
- Other drivers of this industry include better penetration in emerging markets due to improved infrastructure, innovative new treatments, increased affordability due to rising per-capita GDP and a growing prevalence of "lifestyle diseases" such as obesity due to urbanization.
- We identified five key markets for implantable or wearable devices, including consumer products such as hearing aids, dental implants and corrective lenses. We estimate their total market size at USD 114.8bn with a rate of potential growth in the mid-single digits.
- The theme is relatively defensive and should appeal to quality-focused investors. We recommend exposure to it via a diversified portfolio of stocks across our preferred markets and segments.

Medical devices can assist in the treatment of many conditions. Some reduce the risk of a treated condition worsening, perhaps as an alternative to drug therapy; others improve users' quality of life or functionality; and still others can solve problems untreatable with drugs. Devices like joint replacements effectively offer permanent long-term solutions (i.e. a cure).

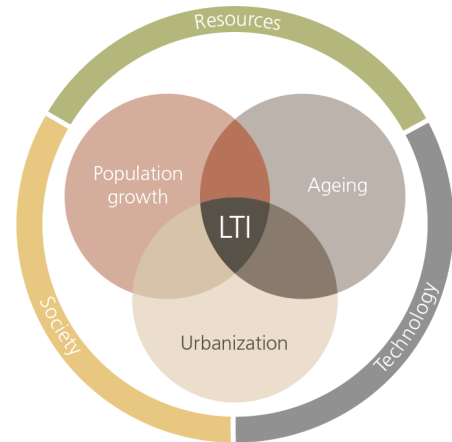
Medical devices are primarily used by the over-65 age group, whose growth will outpace the broader population's over the coming decades. Demand is also supported by the rise of "lifestyle diseases" like obesity, itself related to urbanization.

The medical device industry has matured, but still represents a substantial opportunity, in our view. We see the recent wave of industry innovation persisting as many surgical procedures move to robotic platforms or less-invasive techniques. Meanwhile, penetration in emerging markets still offers upside, as local government policy is supportive of higher healthcare spending. Consumer medical device companies can benefit from rising affordability in these markets.

We think implantable or wearable devices, including consumer medical devices like hearing aids, dental implants and corrective lenses, are the most attractive markets. The theme is relatively defensive and should appeal to quality-focused investors.

Introduction to the Longer Term Investments (LTI) series

- **The Longer Term Investments (LTI)** series contains thematic investment ideas based on long term structural developments.
- Secular trends such as population growth, ageing, and increased urbanization create a variety of longer term investment opportunities.
- These investment opportunities are influenced by the interplay of technological advancement, resource scarcity, and the societal changes.
- Investors willing to invest over multiple business cycles can benefit from potential mispricings created by the typically shorter term focus of stock markets.



While the dividend yield is below the broader healthcare sector average, the companies generate solid free cash flow and have scope to raise dividends.

Medical devices for long-term treatment

Despite advances in drug development, many medical conditions are still best treated with a physical intervention. A medical device can prevent conditions from worsening or posing complications, which can potentially contribute to lowering total healthcare costs. This is similar to chronic drug treatment but, in cases such as a hip replacement, the device effectively solves the medical problem on a permanent or near-permanent basis and represents a cure.

Medical devices address a wide range of underlying health issues. As many such conditions are more prevalent among the elderly, it is no surprise that devices are usually used by older patients. For example:

- two-thirds of hip implant patients are over 65
- most cardiovascular surgery patients are in their late 60s
- the average age of a first-time hearing aid user is near 70

We focus here on devices used inside the body (implantable medical devices) and those worn or carried by the user (which we refer to collectively as "consumer medical devices"). We estimate the combined present size of the relevant markets at USD 114.8bn and think they could grow at a mid-single-digit rate over the long term. Since our last update, we have raised our growth expectation for the minimally invasive replacement heart valve market due to new data broadening the potential patient pool for this treatment. We also explicitly describe the contact lens market given its growing importance to medical devices investors.

Investors can gain exposure to the theme by investing in a diversified portfolio of stocks across our preferred markets and segments. The main risks to investing in it relate to technological obsolescence and the impact of the shift to value-based healthcare systems, as well as product-specific risks that include failure, withdrawals and related legal liabilities.

Trends in the medical devices market

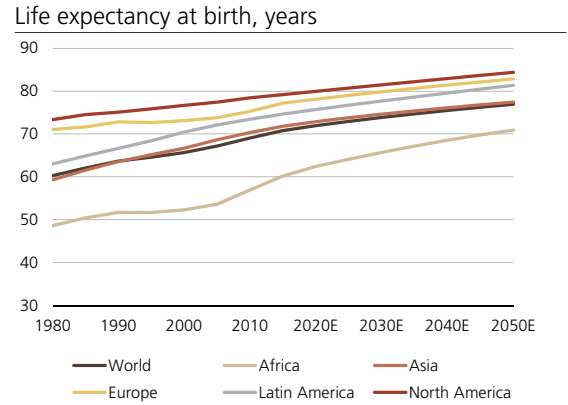
Rising over-65 population supports device market growth

The primary driver of growth in the medical devices market is the aging of the global population. Global life expectancy has continued rising and is expected to reach 77 years by 2050, up from 70 in 2015 (Fig. 1). The number of people aged 65 or over, who account for most medical device use, will climb by over 60% in the next 15 years, from just over 600 million in 2015 to nearly 1 billion by 2030. Secondary drivers include the rising incidence of "lifestyle" diseases such as obesity and heart disease, the side effects of which often require treatment with devices. Urbanization, especially in emerging markets, is chiefly responsible for obesity (see our report *Longer-Term Investments: Obesity* published 5 June 2018).

Many devices have become standards of care

The medical device industry has grown markedly over the last two decades, and in many cases devices are now the standard of care.

Fig. 1: Life expectancy rising worldwide



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017); World Population Prospects: The 2017 Revision, UBS, as of July 2018

Recommended reading

- "Longer-Term Investments: HealthTech," 28 June 2018
- "Longer-Term Investments: Obesity," 5 June 2018
- "Longer-Term Investments: Emerging Market Healthcare," 26 April 2018

Source: UBS

So industry sales growth has slowed and become more correlated with the increase of the over-65 population (Fig. 2), and in some segments with economic growth. Consumer medical device companies have not been immune: although penetration is lower for them, costs are often borne out of pocket and broader penetration comes with higher economic sensitivity. So for the industry as a whole, we see the aging population, rather than higher penetration, as the primary determinant of future sales.

Scope for emerging market penetration to increase

Emerging markets have much lower healthcare budgets on a per-capita basis (Fig. 3) and thus have had a more limited ability to pay for medical devices. But in some regions, particularly rural areas, better infrastructure, not just money, will be needed to boost medical device use. Infrastructure can include people (e.g. suitably qualified surgeons) as well as hospitals and equipment.

We expect structural policies put in place by many developing country governments to ultimately support growth in healthcare spending above GDP. For example, the Chinese government has broadened healthcare insurance coverage and is working on an ambitious program of reforms. They include raising medical cost subsidies, deregulating drug prices and improving the quality of care in rural hospitals. The government's targets imply Chinese healthcare spending increasing sevenfold over the 2011–20 time period. These policies all support medical device sales. For more details, please see our report *Longer-Term Investments: Emerging Market Healthcare*, published 26 April 2018.

Rising affordability, infrastructure investment and demographics should thus underpin greater emerging market spending on medical devices for years to come.

Innovation supports pricing power

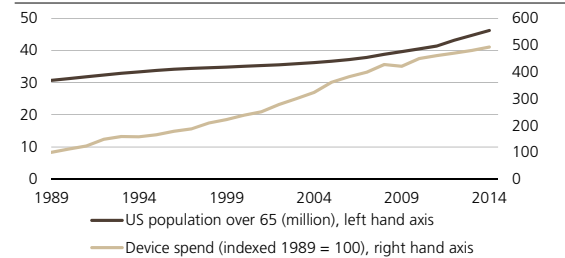
Like the drugs industry, medical device companies rely on innovation to maintain pricing, enabling them to launch new products at a higher price point. But the nature of innovation in medical devices is usually more incremental than in the drugs industry, and new products typically launch more slowly as cautious physicians must become comfortable with products that may be implanted in patients for the rest of their lives. On the other hand, medical devices do not suffer the sudden and dramatic loss of market share to generics that happens when a drug loses patent protection. So the revenue and earnings trends of the industry are usually more stable than those of pharmaceutical and biotechnology companies.

Nevertheless, major advances in medical device innovation do take place and we see at least two ongoing trends currently underpinning a better growth outlook for parts of our theme: surgery is becoming both more automated and less invasive.

- **Robotic surgery.** While robotic surgical platforms are not new and are not confined to any specific segment of the broader medical device market, we see a turning point in their use, with the number of medical device companies launching robotic surgical systems increasing. The most relevant application for our

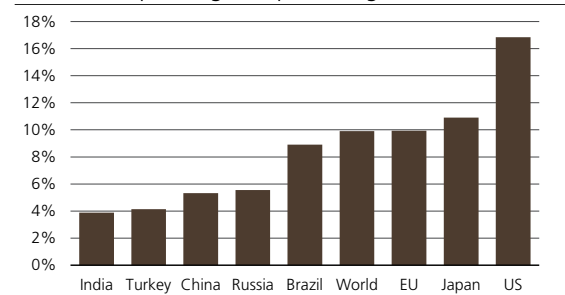
Fig. 2: US medical device penetration rose substantially for two decades

US medical devices spending compared to over 65s population



Source: OECD, Barclays research. As of July 2016

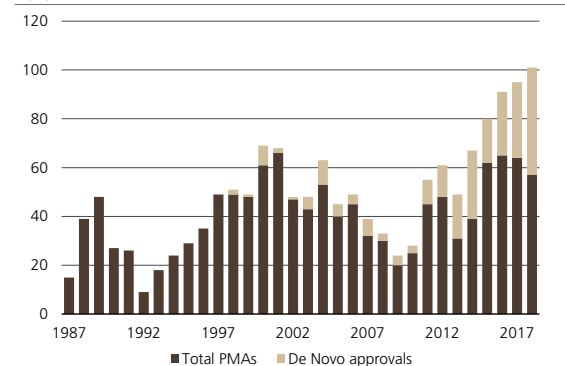
Fig. 3: Emerging markets spend less on healthcare
Healthcare spending as a percentage of GDP, 2015



Source: World Bank, UBS. As of April 2018

Fig. 4: The FDA has approved more devices since the introduction of the de novo pathway

Number of Class III medical devices approved by FDA by year, since 1987



Note: PMA = pre-market approval application for a Class III medical device (strictest category of devices for implantation), Do Novo approvals are for devices for which no marketed predicate device exists but general and/or special controls provide a reasonable assurance of safety and effectiveness. Source: Barclays Research, UBS. As of December 2018.

theme is in orthopedic surgery, where robot-assisted partial knee surgery has become commonplace and is now being expanded to total knee arthroplasty, as well as a range of applications in spinal surgery. Placing robots helps companies win follow-on implant sales and may improve outcomes for hospitals, a key consideration as reimbursement shifts toward value-driven payment structures.

- **Minimally invasive surgery.** In general, it is preferable to intrude as little as possible when carrying out any surgical procedure to minimize damage to surrounding tissue and reduce recovery times. So many procedures that once required highly invasive surgery have gradually been replaced with minimally invasive techniques, such as placing stents by inserting them through veins or arteries rather than during open-heart surgery. A current example is the rapid substitution of trans-aortic valve replacement (TAVR) for open-heart valve surgery in the structural heart segment of the cardiovascular market, which we estimate is currently growing at a low-teen rate annually. We expect these and similar techniques to fuel further innovation in the theme.

More generally, the number of innovative new devices approved in the key US market has increased in the past 10 years (Fig. 4). The FDA appears to have adopted a more innovation-friendly approach to drug and device approvals alike. The number of Class I devices (using tech perceived as low or less damaging to patients in the event of malfunction) has remained roughly stable over the past decade. We regard the more permissive FDA environment as a structural change and expect the ongoing innovation wave to continue. This should support the industry outlook in the near to medium term.

European regulatory challenges

While the US regulatory environment has become more innovation-friendly, the situation has arguably gone the other way in Europe. The new Medical Device Regulation (MDR) introduced in May 2017 requires MDR-approval for all medtech products sold in the EU and Switzerland starting May 2024. As of May 2020, all newly approved products must have MDR approval. The new MDR is considered at least as stringent as the US regulation and will clearly increase approval costs for medical device makers. It will also prolong product development time. Overall, this gives larger companies an advantage over smaller ones.

Industry representatives including the Swiss Medtech association think "the time period granted for the necessary adaptations until 2020 will probably be insufficient, and certain products may become unavailable." Indeed press reports suggest delays and capacity shortages at European approval locations. Moreover, numerous medtech products now sold in continental Europe have received a "conformité européenne" mark (CE) in the UK, and are likely to need new MDR approval if and when Brexit occurs, leading to further regulatory challenges and costs.

At an industry level, Europe, in our estimation, accounts for just under one-third of global medical device revenue, although some product categories (such as dental implants) are more exposed. Considering

the balance of change in the US and Europe, we see a slight net benefit given the higher pricing often obtained in the US.

Value-based care and reimbursement changes

Healthcare systems worldwide are under pressure to deliver better clinical outcomes, despite budget constraints. In Europe this has often meant rationing treatment, while in Japan more costs are being shifted to employers and patients. Even the US healthcare system is beginning to move away from a fee-for-service model toward value-based healthcare: new reimbursement approaches being explored aim to use resources more efficiently by shifting the cost of over-treatment, re-admissions and adverse clinical outcomes from the payer to the provider. These initiatives will likely increase the focus on the clinical benefits and cost-effectiveness of devices. Industry innovations that lower costs, such as less-invasive surgical procedures, will lead to changes in the standard of care. While the current US administration has slowed the pace of government experiments with payment reforms somewhat, we expect new trials to be announced in due course and ultimately view the desire to save costs in the US healthcare system as a bipartisan goal.

Consolidation of buyers and sellers

Consolidation of the US hospital market has increased the buying power of hospitals. Purchasing has become more centralized instead of being done by individual surgeons as hospital groups leverage their scale by standardizing processes and procedures across facilities. Also, adapting to the shift toward value, they have sharpened their focus on the clinical and cost effectiveness of devices. In response, the medical device industry has consolidated to increase scale in R&D and marketing and to broaden the range of products a single company can supply. We also expect the long-established tradition of larger companies buying small, innovative competitors for their product pipelines to continue.

Defining the "medical device industry"

There is no agreed-upon definition of what constitutes the "medical device industry." We have chosen to focus on devices implanted into or worn/carried on the body and used to treat a medical condition. Some devices address conditions that have no other treatment (e.g. orthopedic reconstruction). Some alternate treatments are inferior or not suitable for all patients (e.g. dental implants). In other cases they are not medically necessary but enhance quality of life for the user (e.g. corrective lenses and some hearing aids). We see these sectors as most likely to benefit from the long-term demographic trends identified above.

Fig. 5: Key medical device markets

Global market size estimates, USD 114.8bn

Market opportunity	Current size (USD bn)	Long-term growth rate
Orthopedics and sports medicine	45.5	Low-mid single digit
Spine	9.0	Low single digit
Knees	7.5	Low-mid single digit
Trauma	7.2	Low-mid single digit
Hips	6.5	Low single digit
Extremities	6.0	Mid single digit
Sports medicine	6.0	Mid single digit
Endoscopy	3.3	Low-mid single digit
Cardiovascular	37.9	Mid single digit
CRM & HF	11.2	Flat-low single digit
Coronary vascular	9.6	Low single digit
Structural heart	5.2	High single digit
Peripheral vascular	4.5	Mid single digit
Electrophysiology	4.9	Mid-high single digit
Neuromodulation	2.5	Mid single digit
Consumer medical devices	31.4	Mid single digit
Corrective lenses	13.5	Mid single digit
Contact lenses	7.9	Mid single digit
Hearing aids	6.0	Mid single digit
Dental implants	4.0	Mid single digit

Note: CRM = cardiac rhythm management; HF = heart failure Source: UBS estimates. As of April 2019

In total, we estimate the collective size of our target markets at USD 114.8bn (Fig. 5). We project the rate of long-term growth to be in the mid single digits. Key markets include:

- **Orthopedic implants and sports medicine.** This segment includes replacement joints, spinal fusion, plates used to repair injured bones and surgical equipment for sports medicine.
- **Cardiovascular devices.** Pacemakers and implantable cardioverter-defibrillators, stents and products used to treat damaged heart valves are the key devices here.
- **Consumer medical devices.** This mixed subsector comprises hearing aids, dental implants and corrective lenses (including contact lenses). Users who may consider themselves consumers rather than "patients" typically choose and pay for them.

In the appendix below we provide overviews of each subsector. We excluded medical and hospital supplies from our target markets; though some products can be innovative, many are commoditized and less linked to innovation.

Equally, we excluded hospital capital equipment like operating room equipment and diagnostic imaging (e.g. MRI) and radio-oncology machines, the markets for which are more cyclical. We also excluded technologies used primarily for cosmetic purposes with no medical benefit and in vitro diagnostics.

Earnings growth outlook

We screened for companies exposed to our preferred end markets within the broader medical technology industry, namely orthopedics and sports medicine, cardiovascular devices and consumer medical devices, including corrective lenses, hearing aids and dental implants. Companies fall into one of two broad categories: stable, mature businesses and newer companies with fresh, innovative technologies but less operating history.

In general, mature medical device companies share many of the defensive characteristics expected of the healthcare sector, such as high returns on equity (RoE) fueled by sustainable revenue growth and relatively high margins. Smaller companies, such as those focused on developing new technologies in the spine and cardiovascular areas, tend to be loss-making but can grow sales rapidly if their products receive widespread clinical adoption. Often, they are ultimately acquired by larger companies in the industry.

Link to sustainable investing

In our view, investing in medical devices developed at a reasonable cost fits our sustainable investing framework, in particular the cardiovascular devices segment. The third UN sustainable development goal (SDG), good health and well-being, specifically identifies reducing mortality rates attributed to cardiovascular disease as a sustainability target. Companies working to make products more available and more affordable to developing countries would be contributing the most to SDG3. The other forms of medical devices that fall into this theme contribute more to general well-being (also an SDG3 target), improving patient quality of life, enabling people to return to work

sooner after an illness or accident, and keeping older people independent longer. From an economic and productivity perspective, this can have the added benefit of lowering costs for either ongoing or future care, offsetting the sometimes high initial cost of procedures.

Investment conclusion

We expect the underlying trends of population growth and aging to conspire with the increasing prevalence of lifestyle and age-related diseases like obesity to support an average mid-single-digit rate of volume growth across our favored medical device markets. While pricing tends to be slightly negative on a like-for-like basis, new product innovation offers some pricing power and a mix benefit as new products displace old ones as standards of care provided that the higher prices can be justified by better clinical outcomes. Urbanization and rising per-capita GDP in emerging markets should also increase sales of more consumer-focused medical devices like dental implants and corrective lenses. We recommend a diversified exposure to minimize stock-specific risks.

Risks

Major risks to investing in the medical device theme include:

- **Technological obsolescence/disruption:** New technologies offering superior medical outcomes may cannibalize existing product sales. New drugs may be developed that reduce the risk of the conditions treated by medical devices, shrinking the available market over time. Conversely, some consumer medtech markets may suffer slower replacement cycles as older technology is deemed to be "good enough" by users, reducing the need to upgrade to the latest products.
- **Focus on healthcare system efficiency:** While pricing pressure is not new to the medical device industry, a lack of innovation could erode its pricing power should companies no longer be able to justify higher prices for new products that do not demonstrable clinical benefits at a reasonable incremental cost to the healthcare system. In general, the shift from fee-for-service to value-based care represents a hurdle to reimbursement for devices. Consolidation of the hospital industry could also pressure device manufacturers.
- **Price pressure from online retailers:** Changes in the distribution network represent another source of potential pricing pressure. We expect it to have its greatest impact on commoditized products and for distributors to face greater risk than manufacturers. Some consumer devices, in particular hearing aids, require fitting that is typically done by a qualified specialist, although even in the case of audiology the ability to fine-tune hearing aids remotely is growing. For the moment we expect only very slow changes to distribution channels, giving companies the time to respond. But this risk bears watching in the medium term.
- **US uninsured population rising again:** after falling by around seven million between 2013 and 2016, following enactment of the Affordable Care Act (ACA), the number of US adults without health insurance has begun to rise again since late

2016, as healthcare exchanges have struggled to provide affordable policies, and the Trump administration has continued to undermine the ACA. This trend could accelerate from 2019 as the "individual mandate" (the requirement to have health insurance or face a tax penalty) was repealed as part of the tax reforms passed in December 2017. This could lower US medtech volumes in certain reimbursed procedures, notably spine and other orthopedic surgeries. But we expect the negative impact to be limited as the boost to procedure volumes in these categories since the ACA went into effect was itself limited: many newly insured people had plans structured with such high deductibles that, in reality, their ability to afford elective orthopedic surgery was unchanged. The strong economy and lower unemployment rates were likely responsible for the higher procedure volumes of 2014–15, in our view.

- **Product risks:** Medical device companies face the risk of product failures, withdrawals, intellectual property disputes and greater regulatory burden on new products. Compared to pharma and biotech companies, the industry is less exposed to patent expiries, as brand history and loyalty play a much greater role in product choice. Product withdrawals for implantable medical devices can highly damage a company's reputation and financial position, especially if corrective surgery is required, although this is rare.

Appendix: Key medical device markets

In the following pages we provide overviews of the markets for each class of medical devices we have included in our theme. We estimate the current combined size of the relevant markets to be USD 114.8bn and think they could grow at a mid-single-digit rate over the long term.

Implantable medical devices

Orthopedic implants

Orthopedic implants are used to repair bones or joints damaged either by age-related diseases or injuries. The causes of bone disease vary although osteoarthritis, linked both to aging and obesity, is a major factor. More than 1.1bn people worldwide suffer from osteoarthritis, low back or neck pain, according to *The Lancet's* Global Burden of Diseases Study 2015, and nearly three-quarters of US adults over 65 are affected in some way.

We estimate the orthopedics and spine market to be worth USD 45.5bn. The aging population is the key force behind the growth, although lifestyle factors such as obesity also play a part. The cartilage in joints such as hips and knees naturally erodes with age and, since adult cartilage does not naturally regenerate, it must be replaced when damaged. Bones and joints can also be damaged in accidents or sporting injuries.

Obesity, itself driven by the trend toward urbanization, is also a risk factor for orthopedic surgery, as excess weight places greater pressure on the knee joints and increases the risk of damaged cartilage. One study (Mihalko *et al*, J AAOS, 2014) estimated that obese patients (i.e. those with a body mass index over 30, see Fig. 6) had a 8.5x higher need for knee replacement surgery than those with normal body weight. Obese patients are also at greater risk of injuries.

Reconstruction, or the replacement of damaged joints (mostly hips and knees), is the largest segment of the market (Fig. 7). Trauma refers to the use of plates and screws to fix bones damaged in accidents. Spinal fusion aims to stabilize damaged vertebrae to relieve pain; more advanced technologies include motion-preserving spinal discs. Most spine patients are over 50. The broader orthopedic market also includes sports medicine and arthroscopy, or tools and products for minimally invasive surgery on joints and soft tissue.

The orthopedic market is mature and well consolidated in developed markets. Underlying market growth in the major categories of large joint reconstruction, trauma and traditional spinal fusion procedures lies in the low to mid single digits in percentage terms, with a mid-single-digit rate of volume growth offset by slightly negative like-for-like pricing. Pockets of higher growth come from shoulder, ankle and wrist (collectively referred to as extremities) reconstruction and sports medicine that benefits from lifestyle changes as people hope to stay active later in life.

The emerging trend of robotic surgical procedures holds promise for greater growth in reconstruction and, potentially, some segments of the spine market. Robotic surgery may improve the accuracy of implant placement and result in fewer costly revisions. This could have economic advantages from the hospital's perspective, particularly as reimbursement shifts towards value-based models where providers bear more risk for cost over-runs. Knee surgery has benefited from the growing use of robotic surgical techniques in recent years, accelerating its growth rate toward the mid-single digits. The technique was initially developed for partial knee arthroplasty, where only one side of the knee requires replacement, but is increasingly being employed for more common total knee replacement operations. From the manufacturer's perspective, placing robots in hospitals may boost sales as implants are platform-specific. The market is becoming more competitive with a number of new robotic platforms for orthopedic surgery being rolled out in the next few years. We also explore broader applications of robotic surgery in our report *Longer-Term Investments: HealthTech*, published 28 June 2018.

In the past, orthopedics has often been used as a testing ground for new reimbursement structures as payers attempt to reduce healthcare costs by making hospitals more accountable for the overall quality and cost-effectiveness of care. One such example, known as the Comprehensive Care for Joint Replacement (CCJR) program, tested a "bundled" payment designed to cover the total cost of a joint reconstruction operation, including post-operative rehabilitation. The program was launched in the US in 2016, but later scaled back by the Trump administration. Sales trends reported by the major orthopedic

Fig. 6: Obesity defined as BMI > 30

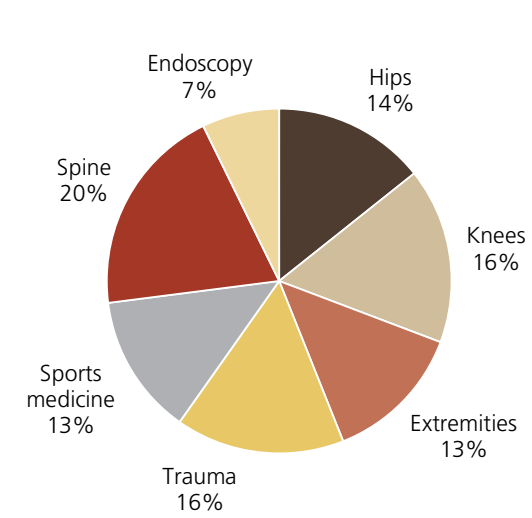
Classification of patients by BMI

Classification	BMI (kg/m ²)
Normal range	18.50 - 24.99
Overweight	≥25.00
- Pre-obese	25.00 - 29.99
Obese	≥30.00
- Obese Class I	30.00 - 34.99
- Obese Class II	35.00 - 39.99
- Obese Class III	≥40.00

Note: BMI = body mass index, calculated as a patient's weight (in kg) divided by the square of his height (in m)
Source: UBS

Fig. 7: Global orthopedic market

Global market, total USD 45.5bn



Source: UBS estimates. As of April 2019

manufacturers suggest that the bulk of pricing pressure was felt by the rehab industry, which can account for up to 50% of the total cost of a joint replacement. Like-for-like pricing in orthopedics has declined at a low-single-digit rate since 2015.

Although a number of companies have launched a lower-price, low-service orthopedics range, it has yet to capture a meaningful share of the market. So, despite more physicians being employed by hospitals and having lost some of their customary freedom to choose implants, the industry's traditional "high touch" sales model remains of value to surgeons. But given the bipartisan desire to contain healthcare costs, we still expect progress to be made toward value-based care, which may pressure the pricing in orthopedic surgery.

Reconstruction is one of the most economically sensitive segments of the implantable device market. Most hip, knee and spinal surgeries are elective and can be put off if patients lose their job or insurance coverage (Fig.8). But there tends to be a lag because many patients benefit from continuation plans such as COBRA that can provide coverage for up to 18 months after, say, job loss. Trauma is non-cyclical and mature and grows roughly in line with the developed market population, though faster in emerging markets as healthcare systems develop.

Cardiovascular devices

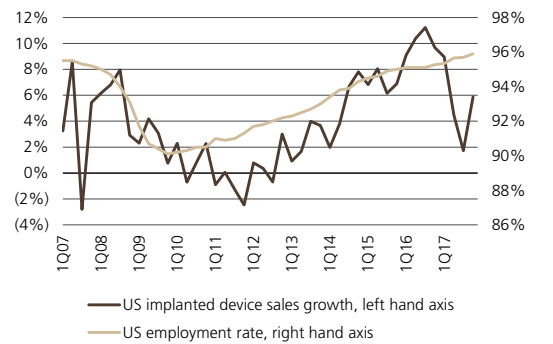
The cardiovascular devices market covers a wide range of products used to treat conditions in the heart and circulatory system, such as abnormal heart rhythms, vascular disease and valve disease. The incidence of these problems tends to rise with age. We estimate the total cardiovascular market to be worth an annual USD 37.9bn.

Cardiac rhythm management (CRM) devices and heart failure (HF) products constitute the largest single segment of the market (Fig. 9). These products include pacemakers (used to maintain or speed up the heartbeat), implantable cardioverter-defibrillator (ICDs, used to correct arrhythmias) and a wide range of devices used to monitor and prevent cardiovascular disease. These markets are largely mature, although new technologies are emerging in the heart failure monitoring space. For example, Abbott's CardioMEMS heart failure monitoring system is a device implanted in the pulmonary artery that can provide early warnings of worsening heart failure, enabling the patient to seek treatment before symptoms become apparent. Clinical data suggests CardioMEMS reduces hospitalization for heart failure, saving an average of USD 10,500 in total healthcare costs in the six-month period following implantation, according to one study (Desai et al, JACC, 2017).

The coronary and peripheral vascular segments include balloons for coronary angioplasty (a procedure to unblock clogged arteries), drug-eluting stents (metal scaffolds placed inside arteries following angioplasty treatment to prevent restenosis), and atherectomy devices used to remove plaque, typically due to cholesterol, from artery walls. Stents and related products are a mature market growing at a low-single-digit rate with negative pricing.

Fig. 8: Elective procedures create economic sensitivity

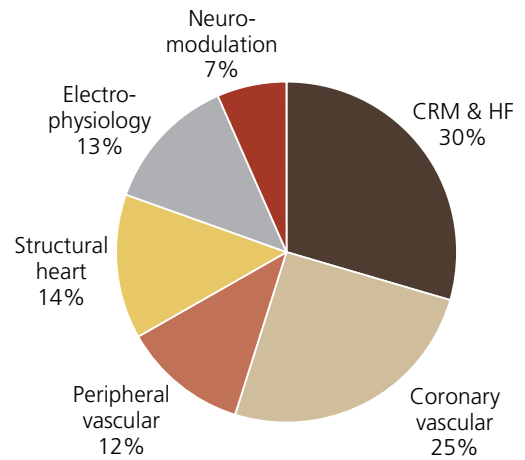
Quarterly sales growth of US implantable medical devices vs. the employment rate



Note: index of US sales of implantable cardiac rhythm management devices, orthopedic implants as proxy for discretionary medtech volume. Source: Bureau of Labor Statistics, UBS. As of April 2018

Fig. 9: Global cardiovascular market

Global market, total USD 37.9bn



Note: CRM = cardiac rhythm management; HF = heart failure Source: UBS estimates. As of April 2019.

The most exciting major segment of the cardiovascular devices market is the structural heart segment. Structural heart refers to physical defects in the heart itself rather than in veins or arteries; the most common procedure is replacement valve surgery, often due to aortic stenosis, or the age-related degeneration of heart tissue leading to the aortic valve not fully opening. This limits blood flow from the heart to the body, potentially leading to heart failure and a higher risk of death. The traditional approach to treatment was open-heart surgery to replace the damaged valve, a highly invasive procedure not suitable for all patients. More recently, a minimally invasive technique known as trans-aortic valve replacement (TAVR) has made surgery possible via catheters inserted through the femoral artery. TAVR produces the same reduction in mortality risk as traditional surgery while reducing time (and therefore costs) in both the operating room and intensive care unit. The treatment was initially reserved for patients considered at high risk of death from open-heart surgery, but we now expect its use to expand into the wider population. In March 2019, two landmark studies (EVOLUT LOW RISK and PARTNER-3) presented at the American College of Cardiology demonstrated conclusively that the benefits of TAVR treatment extend to patients considered at lower risk of death. We estimate this could ultimately increase the addressable market size by two-thirds or more.

TAVR accounts for nearly three-quarters of the USD 5.2bn structural heart segment at the moment, in our estimate, and is one of the fastest-growing markets in the medical devices space. This growth is partly offset by a decline in implants for traditional open-heart valve replacement as TAVR becomes the standard of care, but could still suffice to drive a low-teen rate of growth in structural heart over the next five years. Longer term, minimally invasive approaches to other more common heart valve dysfunctions, such as mitral valve replacement, will also drive the structural heart market. We expect growth to settle in at a rate in the mid to high single digits.

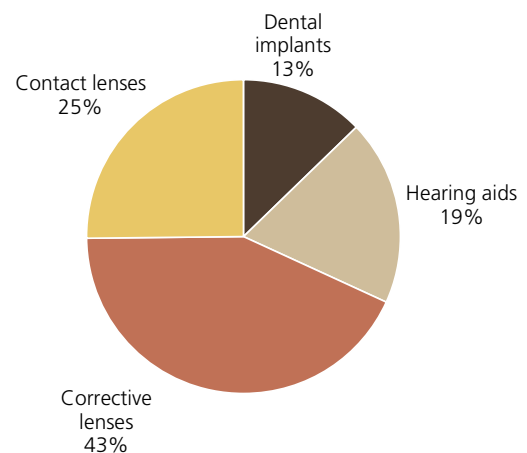
Unlike orthopedic procedures, which are largely elective, most conditions addressed by cardiovascular devices are immediately or potentially life-threatening. Economic sensitivity is therefore less than in the orthopedic market, although overall healthcare utilization can fall in times of economic stress, leading to fewer patients being diagnosed and treated. Overall, we estimate the cardiovascular devices market has mid-single-digit long-term growth potential in percentage terms, since the more mature categories face modest pricing pressure, while new technologies such as TAVR and, potentially, mitral valve replacement, can expand addressable markets.

Consumer medical devices

We have grouped together three consumer-focused segments, i.e. corrective lenses (including contact lenses), hearing aids and dental implants (Fig. 10). Purchase decisions for these products tend to lie with the user: often the choice is made to improve quality of life (e.g. corrective lenses) or achieve a better outcome compared to an alternative (e.g. dental implants vs. bridges). Collectively, we estimate worldwide sales in these markets at USD 31.4bn, with a slightly higher growth outlook than implantable devices.

Fig. 10: Overview of major consumer medical device markets

Global market, total USD 31.4bn



Source: UBS estimates. As of April 2019

Corrective lenses

The aim of corrective lenses is to improve vision quality. According to market leader EssilorLuxottica, more than 4.5 billion people globally have poor vision, but less than two billion of them currently benefit from vision correction. Of those with uncorrected vision, over 90% live in emerging markets.

The market for corrective lenses used in glasses is currently worth about USD 13.5bn (Fig. 11). The market benefits from several relevant long-term market trends, including urbanization in emerging markets, which leads to lifestyle changes like higher education levels and more use of computers, and the aging global population. Volume growth in developed markets is 2%–3% that stems from a combination of aging (which leads to presbyopia) and a rising incidence of myopia (near-sightedness), particularly among the young. The natural replacement cycle (around every three years) provides an opportunity for existing users to move to higher-priced lenses, which should boost average selling prices for the industry over time. In general, this "mix effect" contributes about 2%–3% annually to industry growth.

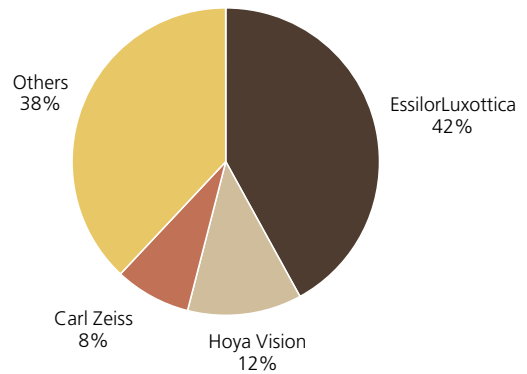
Lower penetration in emerging markets means growth in these regions is currently about double that of developed markets: rising per-capita GDP supports increased market access (as more ophthalmologists set up shop) and enables more consumers to pay for premium lenses.

As people age, their vision often deteriorates. Presbyopia describes the condition where a lens can't focus, causing sufferers to lose the ability to see objects up close. This typically begins in the mid-forties and gets worse. The best solution for sufferers is progressive lenses, which enable the wearer to see sharply at any distance. These lenses can generate a premium of more than 50% over normal lenses. Despite being invented in the 1950s, progressive lenses have yet to become the standard treatment for presbyopia, and still account for less than one-third of lenses sold in most developed markets, although use is steadily increasing.

Several factors have contributed to the increasing prevalence of myopia (near-sightedness) in developed markets. According to the National Eye Institute, its prevalence in the US grew from 25% of the population aged 12–54 in 1971–72 to nearly 42% by 1999–2004. This has been widely attributed to more time spent reading (so-called "near work") and the rising use of computers, leading to eye fatigue. These lifestyle trends look set to continue, especially in emerging markets where urbanization supports higher education levels, more office-based jobs and wider use of electronic devices. According to EssilorLuxottica, more than 90% of 20–65 year olds in developed markets use digital devices every day and nearly two-thirds spend four hours or more per day on computers.

The corrective lens market comprises many small companies and a few large players who benefit from scale and global reach in R&D and marketing.

Fig. 11: Corrective lens global market share
Global market USD 13.5bn



Source: Company data, UBS estimates. As of April 2019

While some countries provide partial insurance coverage for vision correction, glasses are usually an out-of-pocket purchase, so the corrective lens market exhibits some cyclicality.

Related to corrective lenses are contact lenses, which many people wear as an alternative or supplement to their traditional glasses. The global market for vision-correcting contact lenses (not cosmetic lenses designed to change the appearance of the eye) is currently worth USD 7.9bn and growing at a rate in the mid-single digits. Like glasses, "trading up" from standard to premium priced lenses (such as toric and multifocal) contributes to market growth, as does geographical expansion into previously underpenetrated markets such as Asia. There is some cyclicality to this market: in times of economic difficulty users of daily disposable lenses (which are typically worth a 200%–300% premium to vendors) may return to their previous re-usable lenses to save money. The market is oligopolistic. It has four main competitors (Fig. 12) yet is fiercely competitive, with new product cycles driving material changes in market share within a few years.

The demographic, social and economic trends supporting the use of corrective lenses and contact lenses look set to persist for decades, as does the greater use of premium lenses. Given these multiple drivers, we see the market as attractive over the medium to long term.

Hearing aids

The WHO estimates that 466 million adults suffer from disabling hearing loss, and expects this figure to rise to 900m by 2050. Hearing loss disproportionately affects the old: hearing ability naturally deteriorates with age as sensory cells in the ears degenerate.

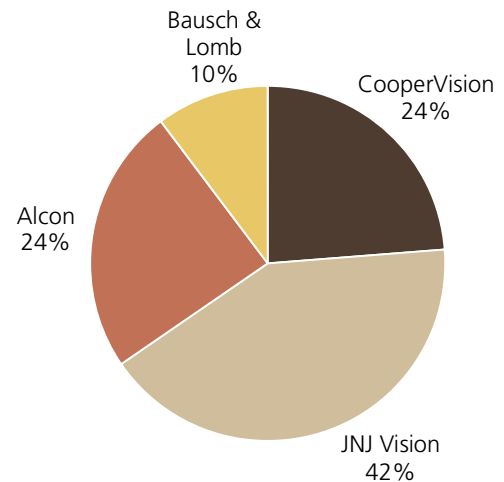
One-third of people over 65 years old have hearing difficulties. While aging is estimated to account for 85% of hearing loss cases, other causes include exposure to loud noise such as music, explosions or gunfire.

We estimate the value of the hearing instrument market at USD 6.0bn (Fig. 13). It is growing at mid single-digit rates. Trend volume growth is typically 2%–4%, although in any specific year growth can fluctuate in this range as product cycles wax and wane. Factoring in slightly negative like-for-like pricing and the benefit of new products, we project a mid-single-digit growth rate over the medium term.

Hearing aid quality has improved over the years: the introduction of digital hearing aids (starting in the late 1990s) was a step-change for the industry, followed by development of binaural hearing aids, which improve the overall sound reproduction for users with two devices, in the mid-2000s. The most recent innovation is greater integration of connectivity, allowing easier use with mobile phones and other electronic devices.

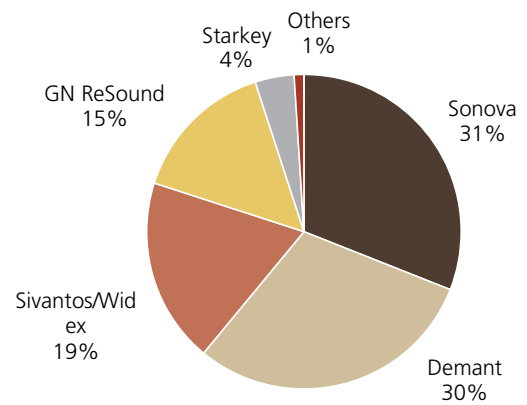
Hearing aid penetration is still relatively low, even among those with moderate to severe hearing loss (Fig. 14), given the stigma associated with wearing a hearing aid. Growing use of audio headsets may reduce this reluctance, but patients still spend an average of 3–7 years deciding to get a device.

Fig. 12: Contact lens global market share
Global market USD 7.9bn



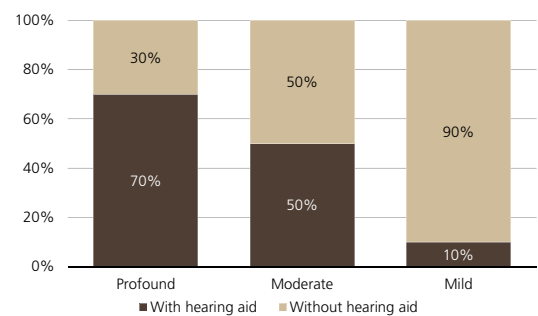
Source: Company data, UBS estimates. As of April 2019

Fig. 13: Hearing aid global market share
Total market USD 6.0bn



Source: Company data, UBS estimates. As of April 2019

Fig. 14: Hearing aid penetration rates
Percent of hearing-impaired using hearing aids, by degree of hearing loss



Source: Sonova. As of March 2018

Financial considerations have also limited many patients' ability to buy a hearing aid, despite partial government assistance in some markets. This challenge is being addressed by a number of companies, typically from outside the traditional hearing aid industry. They are seeking to launch so-called "over the counter" hearing aids that do not require professional fitting by an audiologist. In the US, for example, the OTC Hearing Aid Act passed in 2017 mandated the FDA to establish a new category of OTC hearing aids. The availability of these devices may increase penetration in the mild-to-moderate hearing loss segment, but could come at the cost of a lower average selling price (ASP). So far, early products have looked uncompetitive compared to traditional audiologist-fitted hearing aids, and evidence from Japan, where OTC products have been available for several years, suggests their adoption will be slow.

Another potential source of pricing pressure for the industry is consolidation of the retail channel. Historically, the hearing aid industry was characterized by a small number of manufacturers (no significant new company has entered the market since 1967) selling via a large number of independent audiologists. Recently, larger chains and "big-box" retailers have gained more importance in the distribution channel, leading some manufacturers to expand their own retail networks. The shift toward distribution in larger, more price-focused chain stores may make it easier for a new entrant to gain a foothold in the market, particularly if consumers embrace new devices featuring communications technology, where branding and connectivity with other devices is more important. Some companies are also exploring on-line sales and automatic fitting.

In the longer-term it is likely that the hearing aid market will evolve as distribution shifts to lower-cost channels (either on-line or big-box retailers) and more options are available at lower price points. But since there are few alternative treatment options for the hard of hearing, reliable demographic drivers and a wealthy core customer base (the over 65s), the market remains attractive over the medium to long term, in our view.

Dental implants

Dental implants offer an alternative to the traditional way lost teeth are dealt with. Medically, implants are superior to traditional bridges as they help preserve the underlying jawbone; they can also have aesthetic advantages. It is estimated that approximately half the population in developed markets is missing at least one tooth. We have included dental implants in the "consumer" category since they are not reimbursed and the decision to opt for one rather than traditional treatment with a crown or bridge is made by the patient.

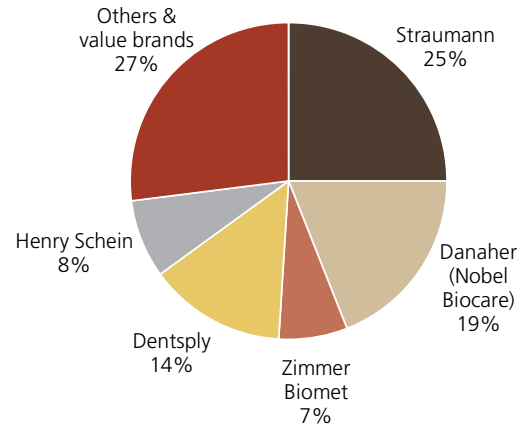
We estimate the dental implant market to be worth USD 4.0bn annually. Growth has slowed from a double-digit rate in the last decade to a mid-single digit one currently, as implant penetration has risen in developed markets.

While penetration is still generally low (still below 15% of tooth restorations in the US, for example), many patients cannot afford dental implants, which can cost USD 3,500 for a single tooth replacement and up to USD 10,000 for a full denture in the US, and instead choose to receive traditional treatment. Urbanization in emerging markets, which supports the desire and financial ability to improve one’s looks, and continued penetration of developed markets are near-term market drivers. In the long term we expect the market to grow at a mid-single-digit rate as the value segment of the industry grows in importance.

As implant penetration has risen, the market has become more cyclical. Also, a value segment of companies has emerged that are less innovative but can provide functional implants at a lower price. Value players account for around one-quarter of the global implant market (Fig. 15), and established premium-quality implant makers have launched or acquired their own discount brands.

We expect this trend to continue, but it should support increased penetration of implants. As long as premium manufacturers are able to innovate and differentiate their premium brands to maintain price, we think the industry can grow at a mid-single-digit rate in the long term.

Fig. 15: Dental implant global market share
Total market USD 4.0bn



Source: Company data, UBS estimates. As of April 2019

Appendix

Terms and Abbreviations

Term / Abbreviation	Description / Definition	Term / Abbreviation	Description / Definition
A	actual i.e. 2010A	bn	Billion
COM	Common shares	E	expected i.e. 2011E
GDP	Gross domestic product	K	One thousand
Shares o/s	Shares outstanding	UP	Underperform: The stock is expected to underperform the sector benchmark
CIO	UBS WM Chief Investment Office		

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