MAKE uk
The Manufacturers' Organisation

SECTOR BULLETIN: PHARMACEUTICALS

In association with:

Santander

MANUFACTURING ROUND UP

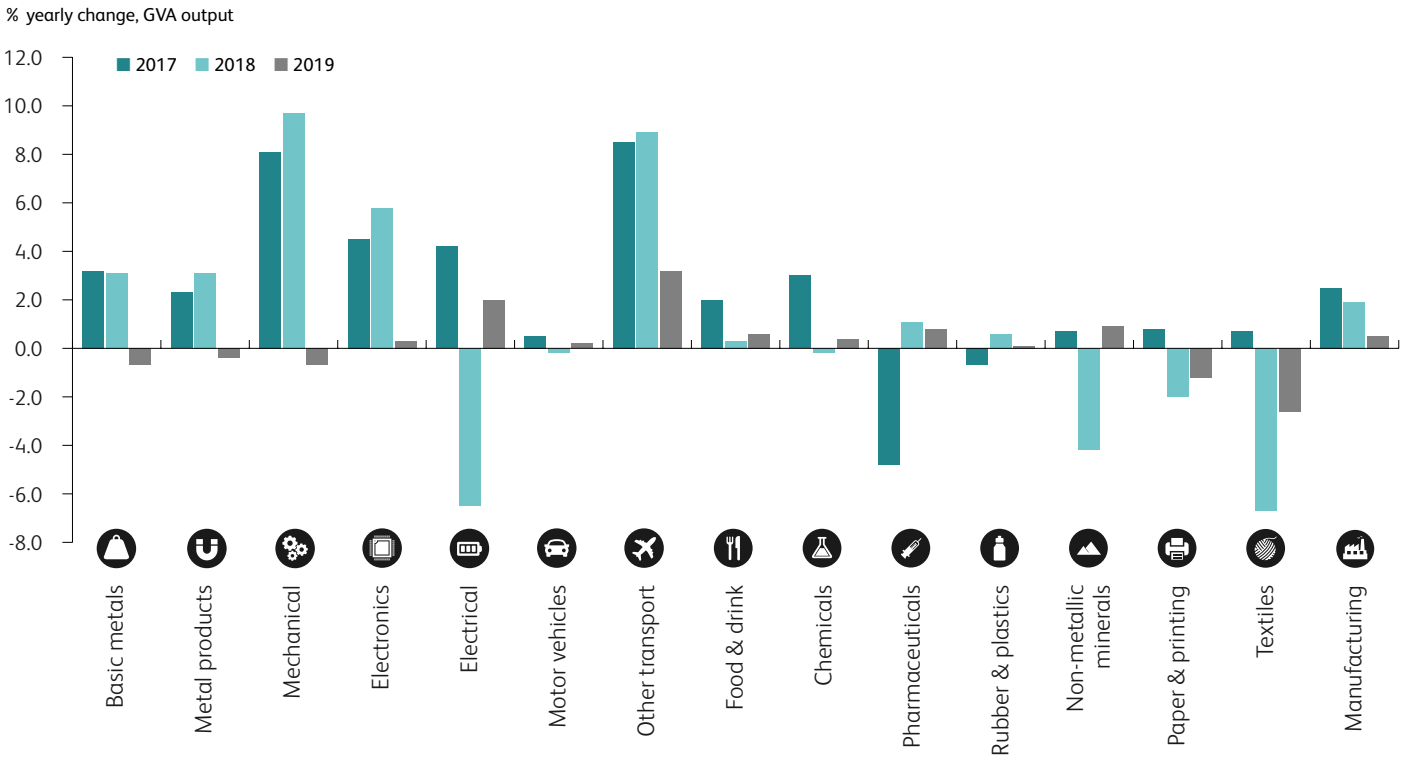
Welcome to our sixth Sector Bulletin report in partnership with Santander. Following on from our bulletins on the automotive, aerospace, food and drink, chemicals, and mechanical equipment sectors, this time we have taken a deep dive into the dynamic pharmaceuticals sector. Over the course of this report we will be examining its components, structure, inputs, trade channels, characteristics, risks, opportunities and long-term trends.

Before we do this however, let's first take stock of how the manufacturing sector as a whole has fared recently, and the key trends that will affect its performance looking ahead.

The manufacturing sector, following an excellent year in 2017, eased in the opening months of the year, with the first estimate of q1 GDP printing at a modest 0.2%. Much of the weakness can be attributed to the poor weather seen across the winter, with construction related sectors in particular feeling the effects caused by the disruption. However, even taking the weather into account, there is a sense that momentum in the sector is beginning to slow, with manufacturing PMIs, while remaining healthy, falling back. This is not all that surprising given the exceptional year last year, and a slight unwinding was to be expected.

Nevertheless with global conditions set to remain robust, Sterling's depreciation still providing support for exporters, and capital equipment manufacturers still benefiting from the upturn in business investment, we still expect the sector to have a good year by historical standards. We are forecasting growth of 1.9% this year, only slightly down from what we were expecting at the start of the year, to reflect the weaker first quarter. Looking ahead, we still expect the sector to slow further in 2019, penciling in an expansion of 0.5%, as uncertainty ramps up and momentum in the global economy eases.

Manufacturing round up



Source: EEF & Oxford Economics (2018)

UNDERSTANDING PHARMACEUTICALS

Thanks to advances in science and technology, the global pharmaceuticals industry has taken off in recent times, with the UK a driving force behind its development and evolution.

Indeed, in line with other leading manufacturing nations, UK manufacturing has increasingly specialised in high-value, technology intensive sectors such as pharmaceuticals and aerospace. This has seen the pharmaceutical sector's role and standing increase since the turn of the 21st century, contributing significantly not just to the UK economy, but to the health of populations both here and abroad.

The pharmaceutical sector's value and contribution to the UK

In 2017 Pharmaceuticals contributed £12.6bn to the UK economy

The UK's reliable legal system and strong protection of intellectual property has helped to establish the UK as a major centre, and key player, in the production of pharmaceuticals. As a result the UK is home to two of the largest pharmaceutical manufacturers in the world in GSK and AstraZeneca, with all other leading pharmaceutical corporations holding a presence in the UK[1]. In 2017, the sector contributed £12.6 billion to the UK economy, with output increasing by over 50% since 1990, a growth rate surpassed only by the other transport sector. The sector, as we will highlight in the characteristics section, is one of the most research intensive in the UK economy, along with other life science industries such as bio-tech and med-tech. As a sector at the forefront of R&D and technological developments, it is the epitome of modern day manufacturing, and is set to be a key pillar in the coming decades.

But it is not just its contribution to the economy which makes the sector so important. Pharmaceuticals manufacturing has helped to improve the health of populations as it drives medical progress. Already the sector has contributed significantly to patient well-being, whether it be through the prevention or cure of previously life-threatening diseases, or its role in converting a number of acute 'death-sentence' illnesses to manageable chronic conditions (such as HIV and AIDS)[2]. Citizens can now expect to not only live longer, but live better quality lives.

What does the pharmaceuticals sector make?

Sector products, % of total pharmaceuticals GVA

The pharmaceutical sector's products, while varying hugely and covering a wide range of medical needs, can be split into two broad categories: the manufacture of basic pharmaceutical products and the manufacture of pharmaceutical preparations. The latter is responsible for a huge 95% of output.

1) Basic Pharmaceutical Products:

GVA: 5.5%

This includes the manufacture of substances to be used for their pharmacological properties in medicaments i.e. substances used to produce medicines. *Examples include antibiotics, basic vitamins and salicylic acids.*

2) Pharmaceutical Preparations:

GVA: 94.5%

This includes the broad production of medicaments. *Examples include vaccines, antisera and blood fractions, homeopathic preparations and other diverse medicaments such as chemical contraceptive products, and hormonal contraceptive medicaments.* This class also includes the manufacture of medical bandages, dressings and wadding.

[1]HM Government – Invest in Great
[2]ABPI – value of the pharmaceutical industry in the UK

Source: ONS (2016)

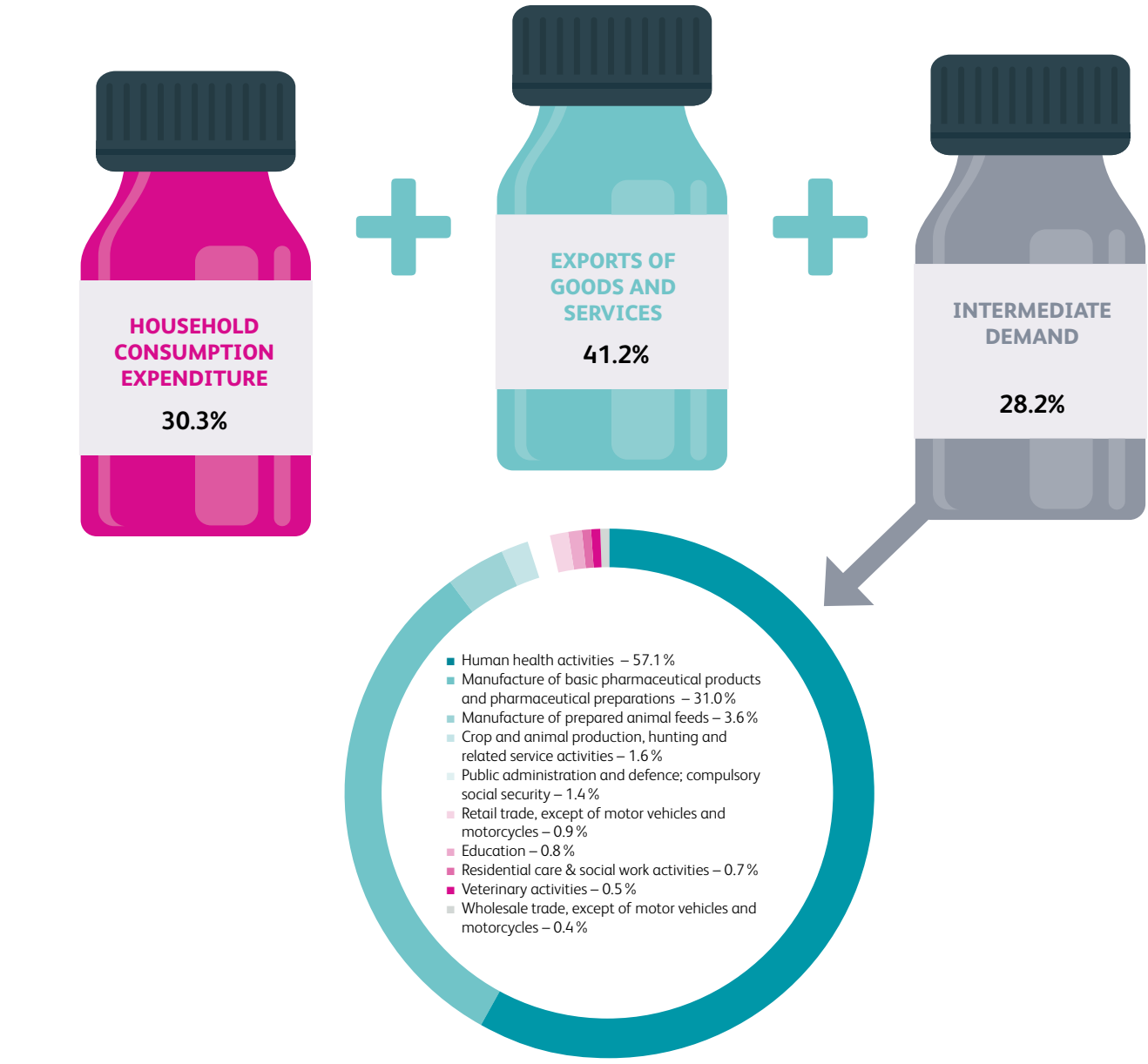
Demand structure

With populations living longer, advances in research and technology providing treatment for conditions previously deemed inconceivable, and the UK's reputation as a world leader in the production of pharmaceuticals, it is unsurprising that there is strong demand emanating from across the globe for UK pharmaceuticals. Indeed 41 % of the sector's demand is generated from overseas sales, making the sector the third most export intensive in UK manufacturing, after the other transport and mechanical equipment sectors (see exports section).

A further 30 % of pharmaceuticals' demand comes straight from UK consumers, either via the NHS and/or their GPs, or from over the counter services. While just under a third (28 %) of what the sector produces are intermediate products i.e. substances used in the production of other goods. The sector's largest intermediate demand market is unsurprisingly the human health activities sector.

Pharmaceuticals demand structure

Demand structure breakdown, % of final demand



NB: Gross fixed capital formation equals less than 1 % therefore has been omitted

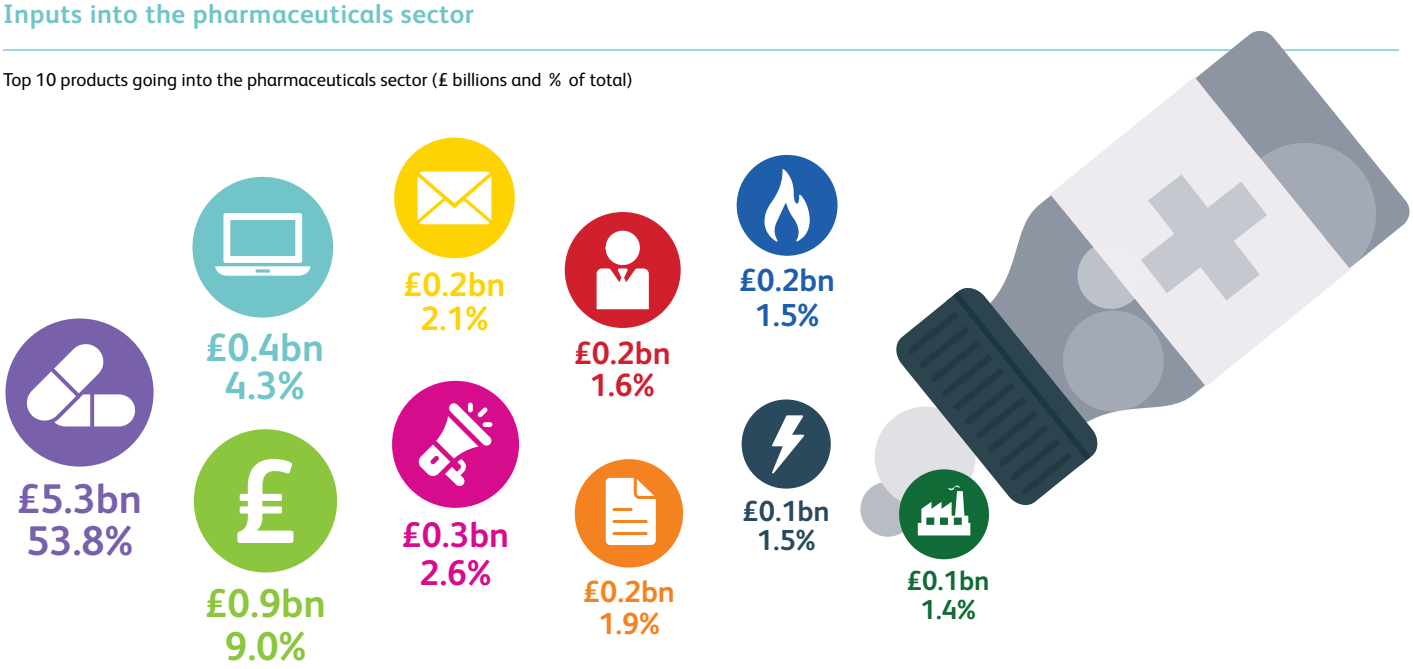
Source: ONS (2015)

Inputs

The pharmaceuticals sector, given that its products are not your typical manufacturing goods, also has an unusual input structure, with its top input by far coming from itself. A massive 54% of the products going into the sector are pharmaceutical products and/or preparations, made by the sector itself and then used elsewhere in the manufacturing process. The rest of the top 10 inputs are dominated by service related sectors – such as financial services, computer programing and advertising. This is an unusual dynamic for a manufacturing sector, and illustrates that its integration with other manufacturing sectors is limited.

Inputs into the pharmaceuticals sector

Top 10 products going into the pharmaceuticals sector (£ billions and % of total)



- Basic pharmaceutical products and pharmaceutical preparations
- Financial services, except insurance and pension funding
- Computer programming, consultancy and related services
- Advertising and market research services
- Postal and courier services
- Paper and paper products
- Employment services
- Gas; distribution of gaseous fuels through mains; steam and air conditioning supply
- Electricity, transmission and distribution
- Petrochemicals

Source: ONS (2015)

The manufacturing process

The pharmaceutical manufacturing process is unique. Unlike most other sectors, where production is characterised by a steady stream of goods or component goods leaving a factory[3], the production of a new pharmaceutical product or treatment is the result of years of research, testing and development, with no guarantee of success. In fact on average it takes between 12-15 years for a new medicament to go through the necessary tests and procedures before it can be prescribed by doctors in the UK, at a cost of £1 billion. The process by which a new drug is deemed safe for uptake in the UK is known as a clinical trial.

1

Preclinical research and discovery

- The initial stage involves the identification of the drug target, and its function. This process can take several years with many projects not going on to the clinical trial stage if research proves unsuccessful.

2

Phase 1 of clinical trial

- Phase one is the first time a new product is tested with humans. The trial happens in a small group of healthy people, normally about 20 to 100, with the goal of determining its safety, and what dosage range will be most effective.
- This phase generally takes several months.

3

Phase 2 clinical trial

- Phase two progresses to a larger group of people, typically several hundred, who are ill. This phase is working to determine the benefit of the product, ongoing safety, and how the product is used.
- This phase can take from several months up to multiple years.

4

Phase 3 of clinical trial

- Phase three is the final stage before the product can be used by the public. The study progresses to a larger group, this time several hundred to several thousand people, who are ill.
- Phase three studies confirm efficiency against existing treatments, and monitors long-term effects, collecting information that helps the intervention to be used safely. This phase can run from two years up to a decade.

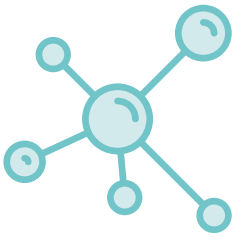
5

Phase 4 of clinical trial

- At phase four, the product is approved and is being used by the public. Studies continue, with clinical trials monitoring the effectiveness in the general population.

[3]This is the case for pharmaceutical products which have been tested, certified and sent to mass production e.g. Paracetamol

Evolving pharmaceutical products



The strand of pharmaceutical products manufacturers are looking to make (stage 1 in the manufacturing process) is evolving. The 20th and early 21st centuries were the eras of the small chemical molecule – simple compounds, synthesized chemically in factories that could treat common illnesses across populations e.g. aspirin.

Now however manufacturers are looking to produce more sophisticated drugs known as biopharmaceuticals, to tackle a host of complex diseases. Biopharmaceuticals are much larger, more complex structures which are manufactured inside animal cells or microorganisms such as bacteria. They offer higher efficacy in treating a growing list of previously untreatable diseases, as well as fewer side effects.

The benefits on offer from biopharmaceuticals mean they are increasingly going mainstream in pharmaceuticals manufacturing.

Indeed the global biopharmaceuticals market is estimated to reach $405 billion by 2024; growing at a compound annual growth rate of 9.3% from 2016 to 2024[4]. However with this comes difficulties. Specifically biopharmaceuticals' complex structure and size means copying them, let alone creating them is both difficult and expensive. Yet with ageing populations, demand is set to grow, and it is no surprise that pharmaceutical manufacturers across the world are shifting their resources and R&D spending to the production of biopharmaceuticals.

[4]Variant Market Research - Biopharmaceutical Market Research Report (2017)

THE DOMESTIC PHARMACEUTICAL MARKET

Given its unique manufacturing process, the pharmaceuticals sector is also not your typical economic market. In particular pharmaceutical manufacturers rely predominantly on one domestic customer – the NHS, with prices of branded drugs regulated. This brings with it both benefits and challenges.

The NHS is pharmaceutical manufacturers' biggest customer in the UK

The NHS is by far the pharmaceuticals sector's greatest domestic customer. Since its inception in 1948, pharmaceutical companies have worked in partnership with Government, policy makers and healthcare professionals to ensure that the most effective and innovative medicines reach patients as quickly as possible. This has helped to foster a highly supportive environment, encouraging research and development, high quality jobs and boosting the economy.

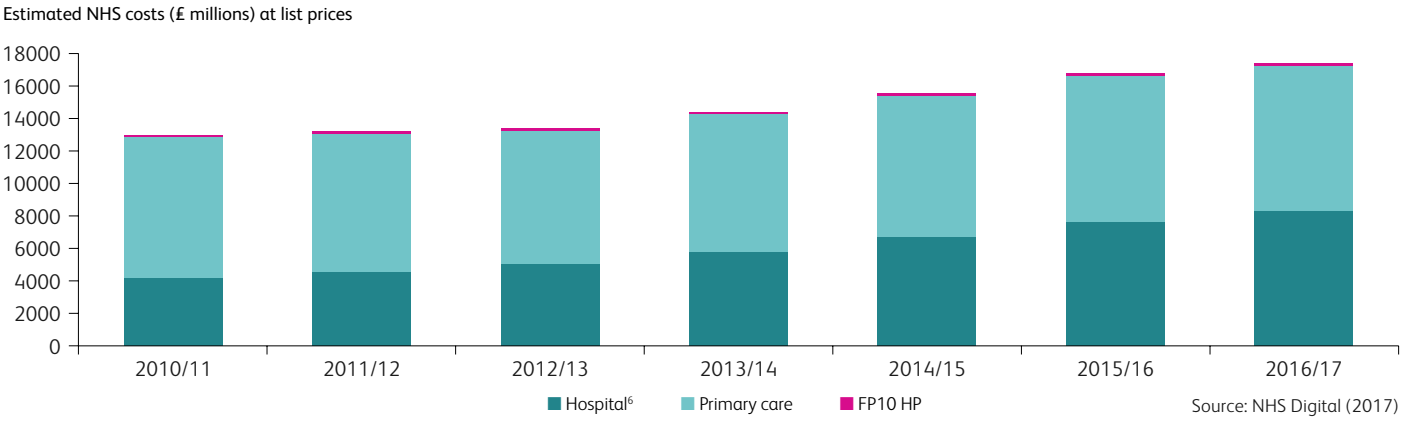
However the NHS is a publicly funded organisation, and with that brings challenges. The NHS is unable to afford all of the new products developed by pharmaceutical manufacturers, and so it has to pick and choose which products to buy and distribute free of charge, under a prescription system.

A government agency called the National Institute for Health and Care Excellence (NICE) is in charge of this. It replaced the former perceived "post-code" lottery system which distributed drugs based on location.

NICE assesses new drugs, or drugs that could have a significant effect on patients, to determine whether they are cost-effective. It then makes a recommendation to NHS England[5]. If NICE approves a drug, NHS England must make it available to patients with valid prescriptions within 90 days.

Once a drug is approved by NICE, the UK Department of Health negotiates with pharmaceutical manufacturers a five-year voluntary agreement called the Pharmaceutical Price Regulation Scheme (PPRS) to regulate the cost of brand-name medicines. Under this scheme (which took effect in January 2014), the bill for branded medicines is to remain flat for two years and then to rise by about 1.8% annually in 2016 and 2017 and 1.9% in 2018. Government spending on medicines in excess of these levels is reimbursed by the drug companies.

NHS costs have been rising

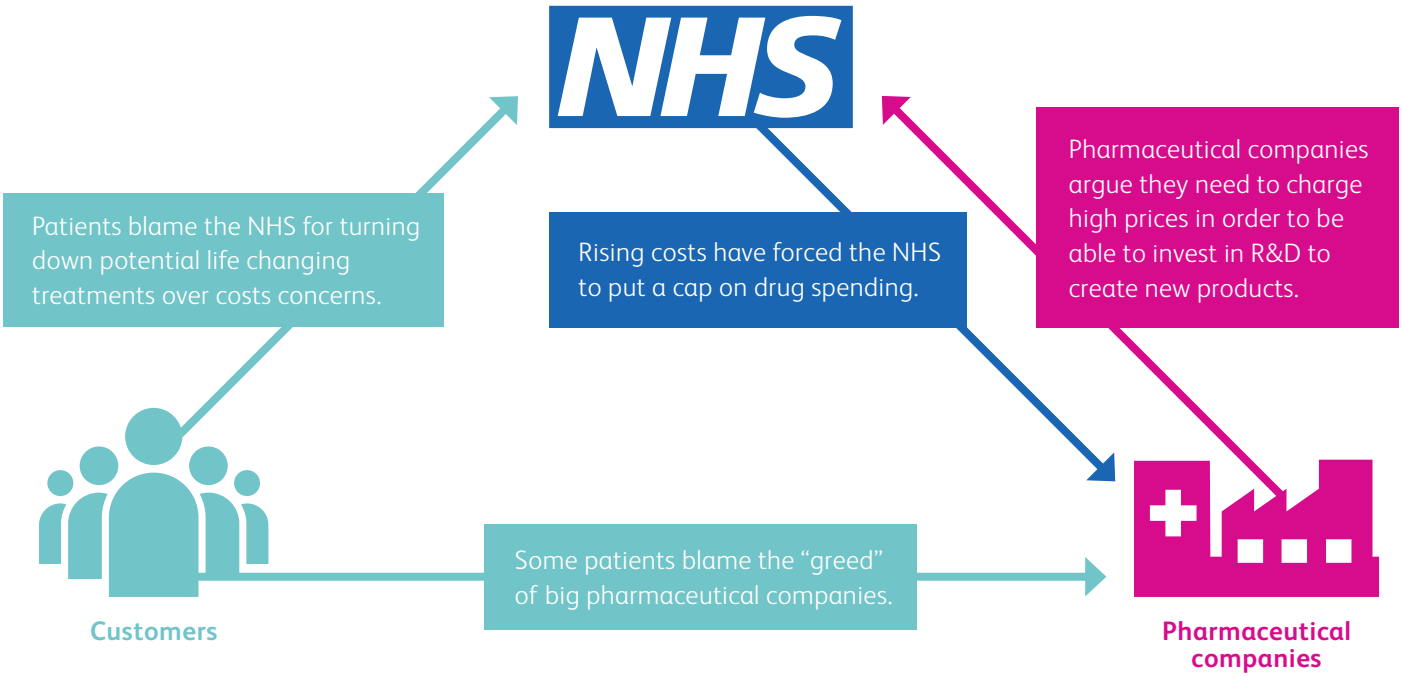


Source: NHS Digital (2017)

[5]Local public health systems in Wales, Scotland and Northern Ireland make their own decisions
[6]Hospital – medicines used in hospitals, Primary – medicines prescribed by GP, FP10 HP – prescriptions written by hospital doctors and dispensed in UK

The dynamic of NICE having to pick and choose which drugs to buy based on their cost effectiveness was amplified recently, when following a number of years of rising costs, the NHS adopted new pricing limits on how much it spends on certain medicines.

This has caused some tensions amongst both pharmaceutical manufacturers and customers. Pharmaceutical manufacturers question whether a cap on NHS drug spending means they really are serious about supporting innovation and R&D in the sector. Lower prices, or lower spending on their products, leaves them with less money for research and development, stifling their ability to invest in expensive, high-risk research projects for new medicines. Conversely, some suffering patients blame the NHS, and others pharmaceutical manufacturers, for not making potential life changing drugs available due to cost concerns. What side of the fence you fall on depends on who you are.



The role of patents and emergence of generics

Another idiosyncrasy of the pharmaceutical market is the role patents, and subsequently generic pharmaceutical products have on the sector.

Clearly given the huge costs and time involved with the production of a new pharmaceutical product, the right incentives need to be in place to encourage manufacturers to make these huge investments. These come in the form of patents, which give manufacturers of the drug sole rights over its production for a certain amount of time – typically between 15 and 20 years.

Once the patent expires however, other manufacturers can make generic versions of the drug e.g. paracetamol is the generic version of a number of branded drugs including Panadol, Tylenol and Calpol. The generic versions will be the same as the branded medicine because they contain the same active ingredients. Indeed, generic medicines are authorised to the same standards of safety, quality and efficacy as original branded drugs, and have to demonstrate that they are bioequivalent to the original product. They are used more often by the NHS because they're just as effective but cost far less - reducing prices by as much as 90% in some cases[7].

The expiration of patents, while good for consumers as it means increased competition and lower prices, can result in the pharmaceuticals sector performing erratically. This is due to the sharp declines in revenue for major players or "Big Pharma" in some of their key products. This phenomenon is known as a patent cliff.

[7]British Generic Manufacturers Association

Government looking to tackle price gouging in sector

In theory (and usually in practice as we have highlighted), the expiration of a patent results in market share for generic manufacturers increasing, as they are now able to enter the market, and sell the product at lower prices. However if increased competition does not materialise from the generics industry, the now deregulated market (PPRS does not apply to generic drugs) means companies are able to charge what they want for their products. This can result in huge price increases or "price gouging" by dominant pharmaceutical companies.

A recent example occurred in the UK, when the CMA, Britain's competition watchdog, issued a record £90 million worth of fines on US drugs giant Pfizer, and British manufacturer Flynn, for hiking up the price of an anti-epilepsy pill by more than 2000%. In response to this, and a number of other examples, the government amended the law in 2017 in order to extend the government's powers to regulate the cost of medicines and medical supplies. It means that pharmaceutical companies can now be compelled to reduce the price of a generic medicine in cases where charges are deemed 'unreasonable'.

SECTOR CHARCTERISTICS

The UK pharmaceuticals sector has seen extraordinary growth over the last 70 years, increasing its share of manufacturing output from less than 2% in the period just after the Second World War, to 6.7% today. A number of characteristics has helped fuel this impressive rise, namely size, productivity and R&D spending. The sector is also synonymous with a volatile growth performance and a high rate of mergers and acquisitions activity.

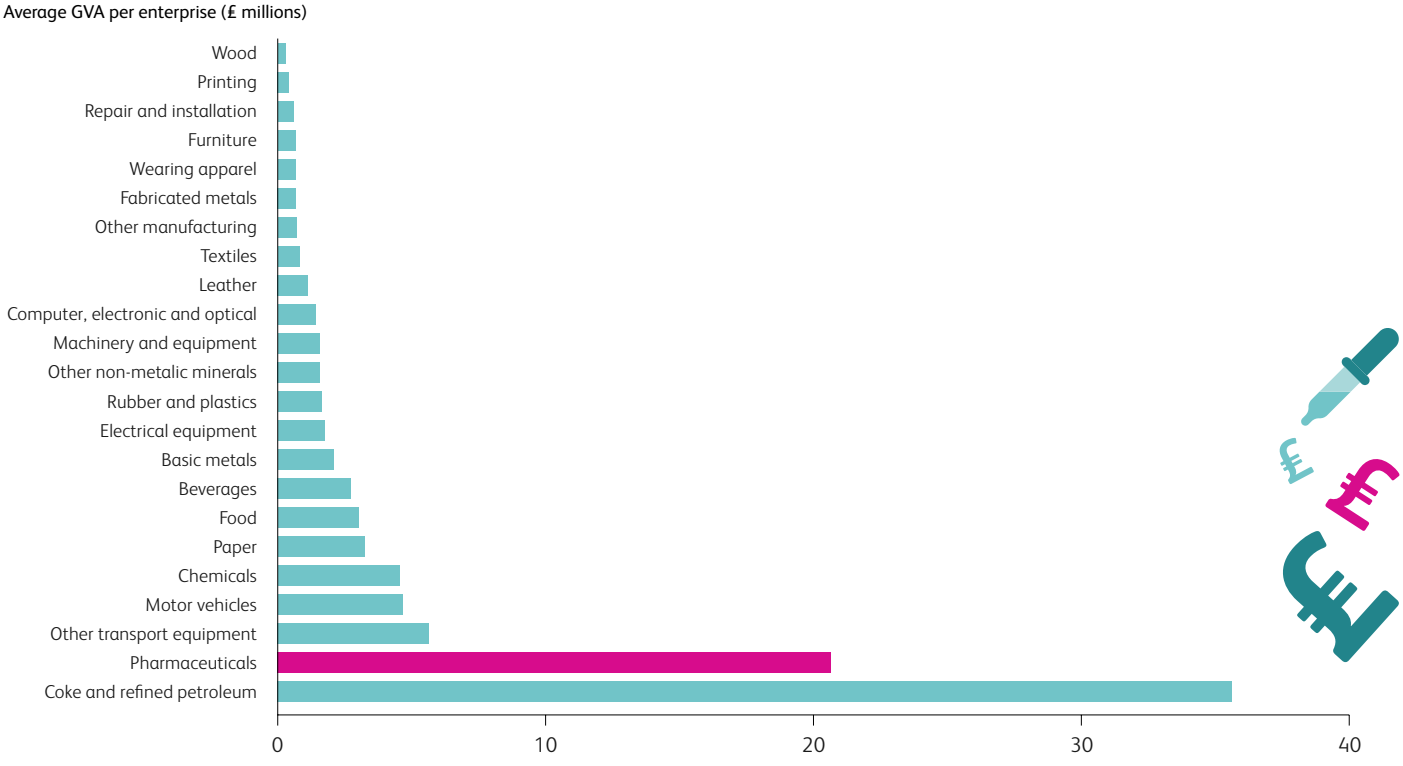
The sector is dominated by a few large firms

According to the ONS, just 610 companies (or 0.5% of total manufacturing enterprises) were registered as pharmaceutical enterprises at the start of 2018. Micro-firms (those with less than 5 employees) account for the vast majority of total enterprises with a share of 65.6%, compared to total manufacturing which stands at 63.7%.

This may lead one to think that pharmaceutical companies are small players. This could not be further from the truth. Indeed pharmaceutical firms with over 250 employees make up a considerable 3.3% of total manufacturers in this category. The UK also has two companies in the top 15 world pharmaceutical companies, ranked by revenue. These are, as we have mentioned, GSK with a revenue of $42.1 billion (ranked 6th) and AstraZeneca with a revenue $22.5 billion (ranked 14th)[8].

Thanks to these two huge players, the sector's GVA per enterprise ratio is the second largest in manufacturing and fourth when the total economy is considered. Notably, the pharmaceutical sector's ratio is almost 15 times bigger than the average manufacturing ratio. The sector is therefore dominated by a few large players.

The importance of a few large players is reflected in the data



[8]Company reports (2017)

Source: ONS (2017)

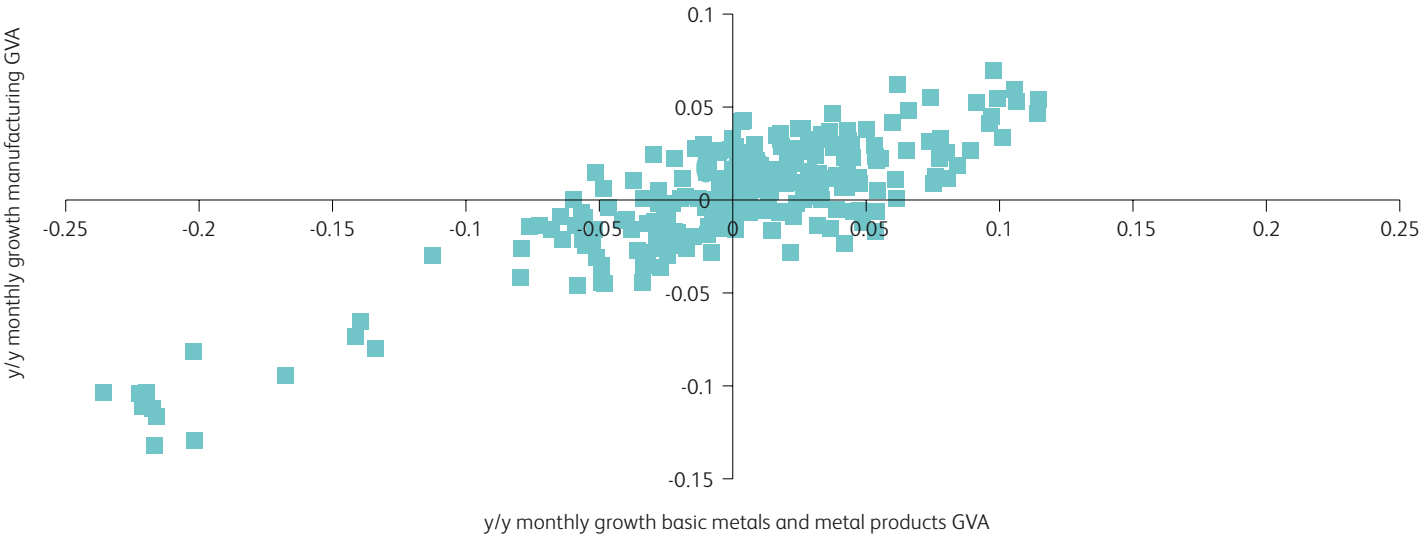
A random growth path

A key characteristic of the pharmaceuticals sector is its volatile growth performance, which is highly uncorrelated with total manufacturing growth (on the contrary a sector such as basic metals is heavily-aligned with total manufacturing). The two scatter plots below clearly show this situation.

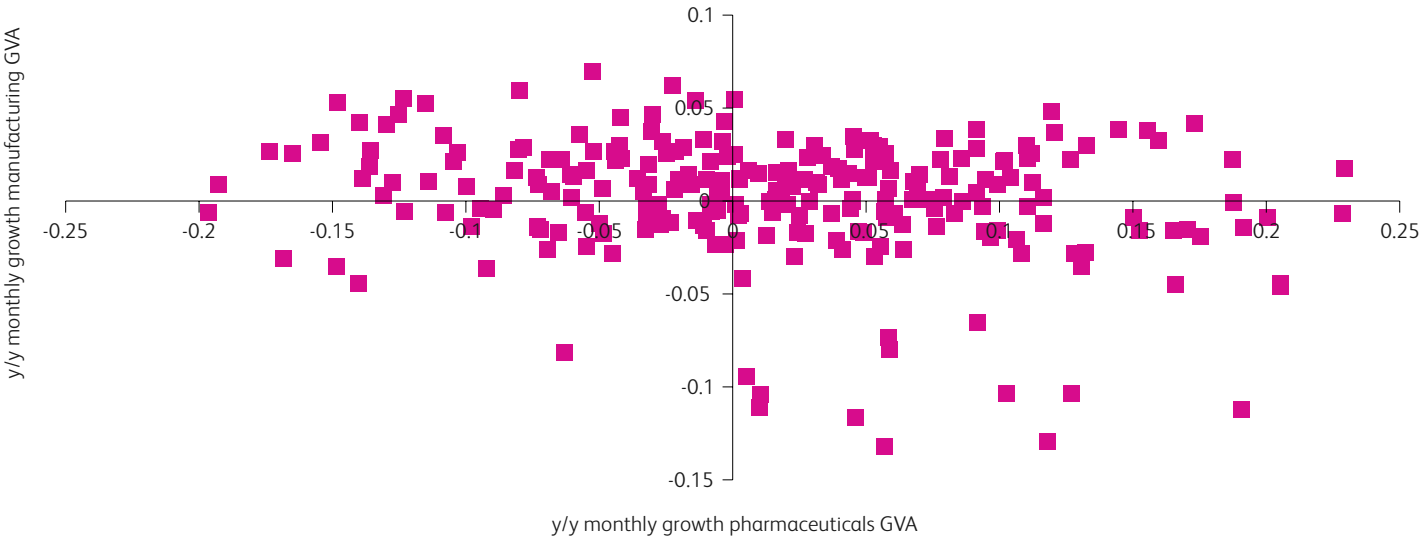
One possible reason behind this "random walk" is the sector's unusual demand structure that we highlighted earlier. The sector has an extremely low investment demand share, but also a low proportion of demand emanating from other sectors (its intermediate demand). For instance, the vast majority of the sector's intermediate demand comes from the sector itself (31%) and from "human health activities" (57%). Put simply, the sector does not interact much with other manufacturers. Therefore its growth is not driven by the same forces which move the rest of manufacturing – hence the lack of correlation between performances. The role of patents, and subsequent patent cliffs also play a role in the sector's often volatile growth figures.

Correlation between pharmaceuticals and manufacturing GVA growth, and between basic metals and manufacturing GVA growth - Jan 1998 to Feb 2017

Basic metals Jan 1998-Feb 2017



Pharmaceuticals Jan 1998-Feb 2017



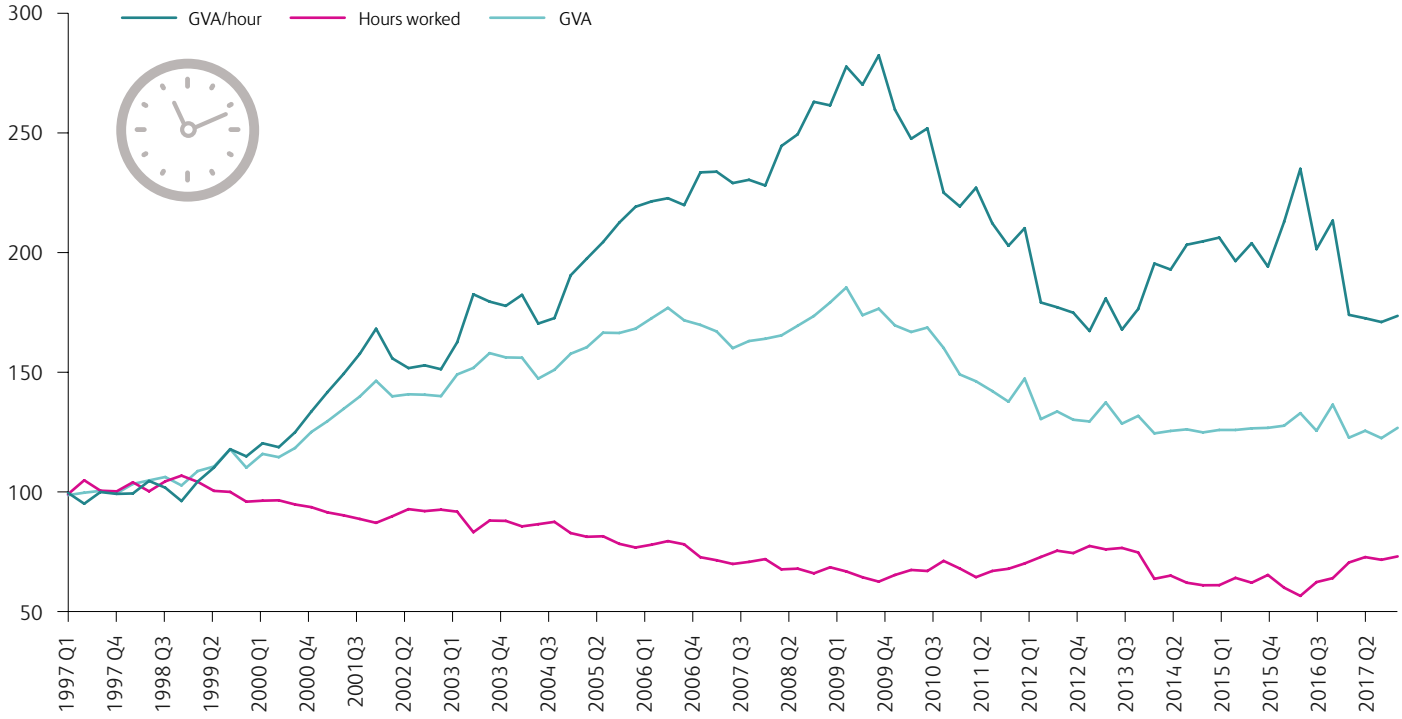
Source: ONS (2017)

A highly productive sector – but heading on the wrong trajectory

As said at the beginning of this section, the pharmaceuticals sector has grown spectacularly in recent times. However after reaching its peak in 2009 (where it accounted for 10% of manufacturing output), its gross value added has declined steadily, and is now at a level similar to the one seen in 2000/2001. This decline is reflected in its productivity performance. The pharmaceuticals sector moved from an astonishing 182% productivity growth between 1997q1 to 2009q4 (top growing manufacturing sector) to a 33% contraction between 2010q1 and 2017q4 (worst performance amongst manufacturers). Getting the sector back onto the right productivity path will be key to its future performance.

Pharmaceutical productivity has been declining

Measures of productivity, hours worked and GVA. 1997q1=100



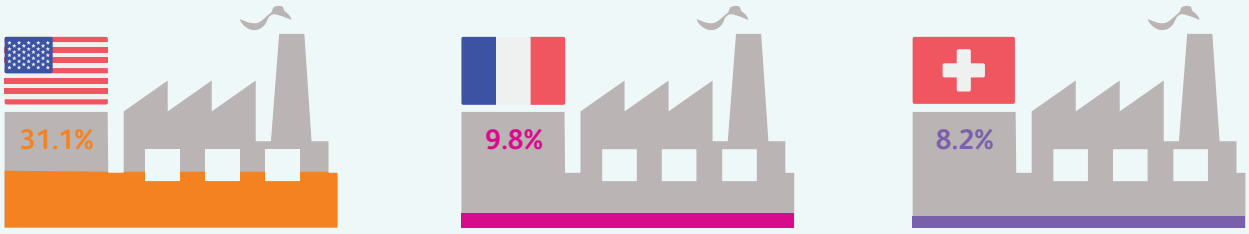
Source: ONS (2017)

High degree of foreign ownership

Another important factor to understand the make-up and characteristics of the sector, is its degree of foreign ownership. 11% of pharmaceutical companies are foreign owned compared to just 3% for the total manufacturing sector[9].

This is a significant difference and reflects, as we will come on to shortly, the need for mergers and acquisitions across the industry in order to gain the economies of scale and financial capability to manufacture pharmaceuticals.

The biggest non-domestic investor in the UK pharmaceutical sector is the US with 31% of foreign owned companies, followed by France (10%) and Switzerland (8%).



[9]Eurostat (2014)

Source: Eurostat (2014)

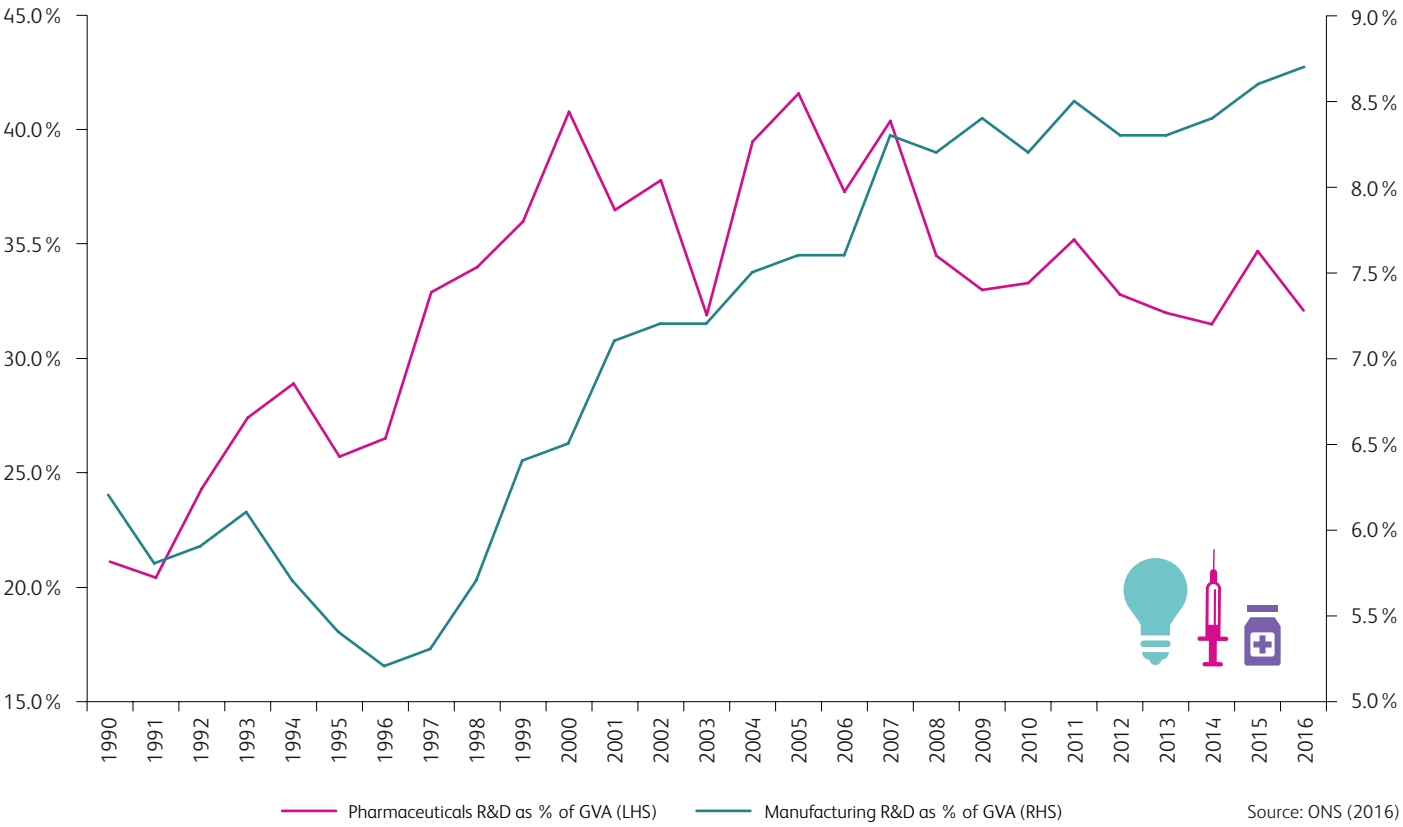
Top sector for R&D expenditure – but its share is declining

A bulletin about pharmaceuticals cannot be complete without mentioning R&D expenditure. The sector is clearly the king amongst all other sectors for R&D expenditure, and in 2016 it accounted for almost 27% of total manufacturing R&D expenditure (18.5% of total economy).

However the same decline experienced by the sector in terms of GVA and productivity also affected R&D expenditure. Indeed the sector is currently spending in nominal terms 16% less than it did 2011. Moreover, in 2010 the sector accounted for 40% of total manufacturing R&D expenditure and 29% when compared to the whole economy. This decline is clearly not good news for the government's ambitious plan to increase R&D spending intensity to 2.4% by 2027 (the current level is 1.7% for R&D as % of GDP).

The ambitious 2.4% R&D target will surely need the support of its biggest contributor

Research & Development expenditure as % of GVA



Source: ONS (2016)

Mergers and acquisitions are a key facet of the sector's make-up

Anyone even marginally interested in the pharmaceuticals sector would be familiar with the endless news of mergers and acquisition offers which have characterised the market over the last 20 years. As mentioned in the paragraph above, research and development is fundamental to pharmaceutical companies that rely on the discovery of new drugs to achieve growth. However the long lag times and costs between research beginning and a drug being patented is prohibitive. Therefore a small R&D budget is incompatible with companies that want to compete worldwide. Thus, the need to join forces is necessary. The two main British companies mentioned in the bulletin are the result of the two largest pharmaceuticals mergers in history. AstraZeneca is the result of the merger of Swedish Astra AB and British Zeneca in 1998. GSK is the outcome of the merger of two British companies - Glaxo Wellcome and SmithKline Beecham in 2000.

TRADE

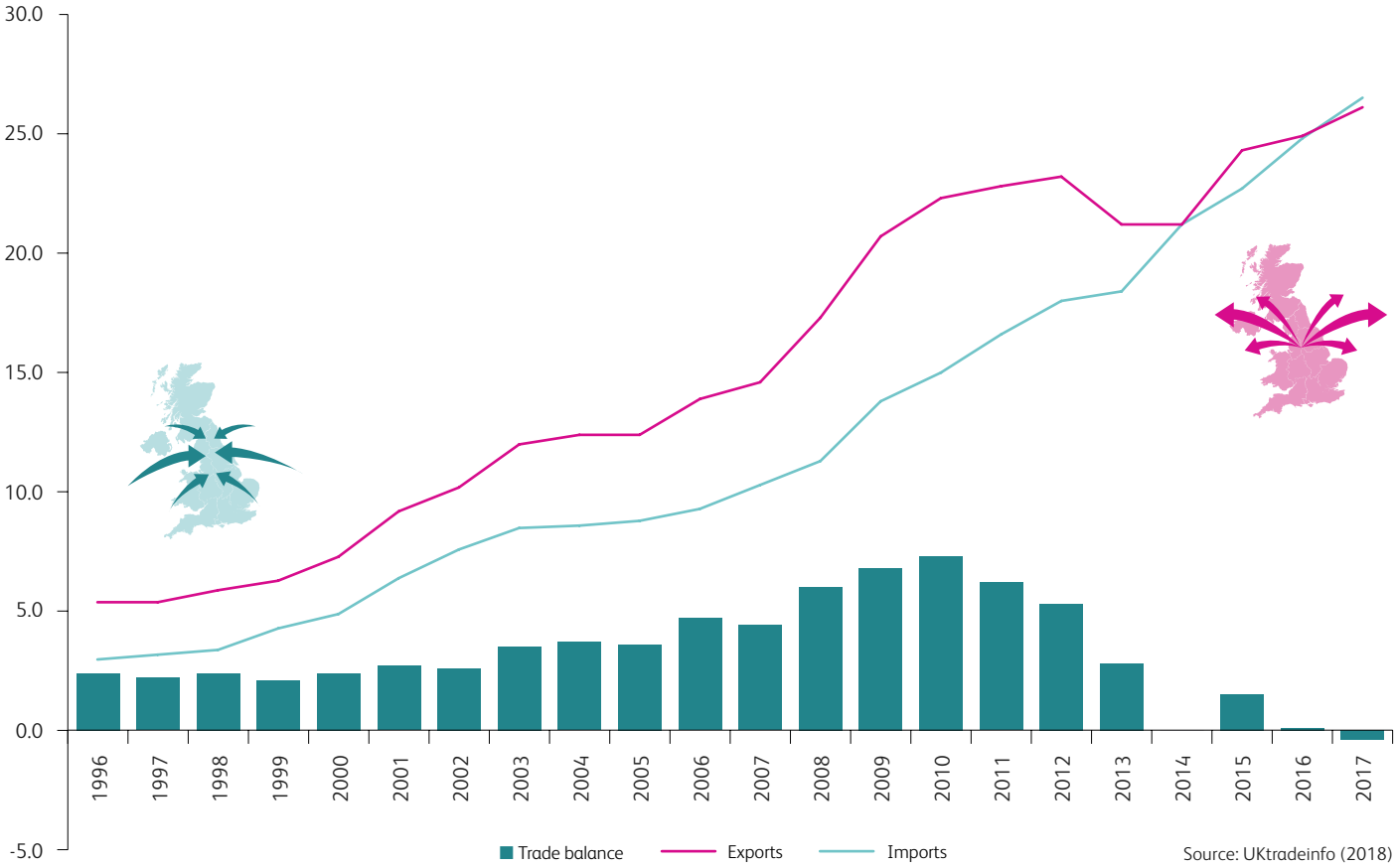
The pharmaceutical market is without doubt one of the most important in the UK economy for trade. In 2017, trade in the sector accounted for 6.2 % of total UK trade (7.6 % of total exports and 5.3 % of total imports).

Trade evolution

In 2017, the pharmaceutical market ran a small trade deficit of £382 million after hovering around the perfect trade balance since 2014. However, this is a quite new situation. Indeed the sector used to run large trade surpluses peaking in 2010 at £7.3 billion.

The pharmaceutical trade balance is finely balanced but in the past it use to run large surpluses

Pharmaceutical sector's exports, imports and trade balance value (£ billions)



Source: UKtradeinfo (2018)

As the graph shows, this reversal was a mix of declining exports after 2012 and steady import growth. People with a keen eye for graphs may have noticed that the trade balance graph follows broadly the same trajectory as the productivity graph does. This is unfortunately not a coincidence. As we stressed in our previous bulletin on mechanical equipment, productivity is the key for international competitiveness. Declining productivity has therefore had a detrimental effect on the sector's trade position.

46.9% of pharmaceutical companies are either an importer and/or an exporter **(33.5% for total manufacturing)**

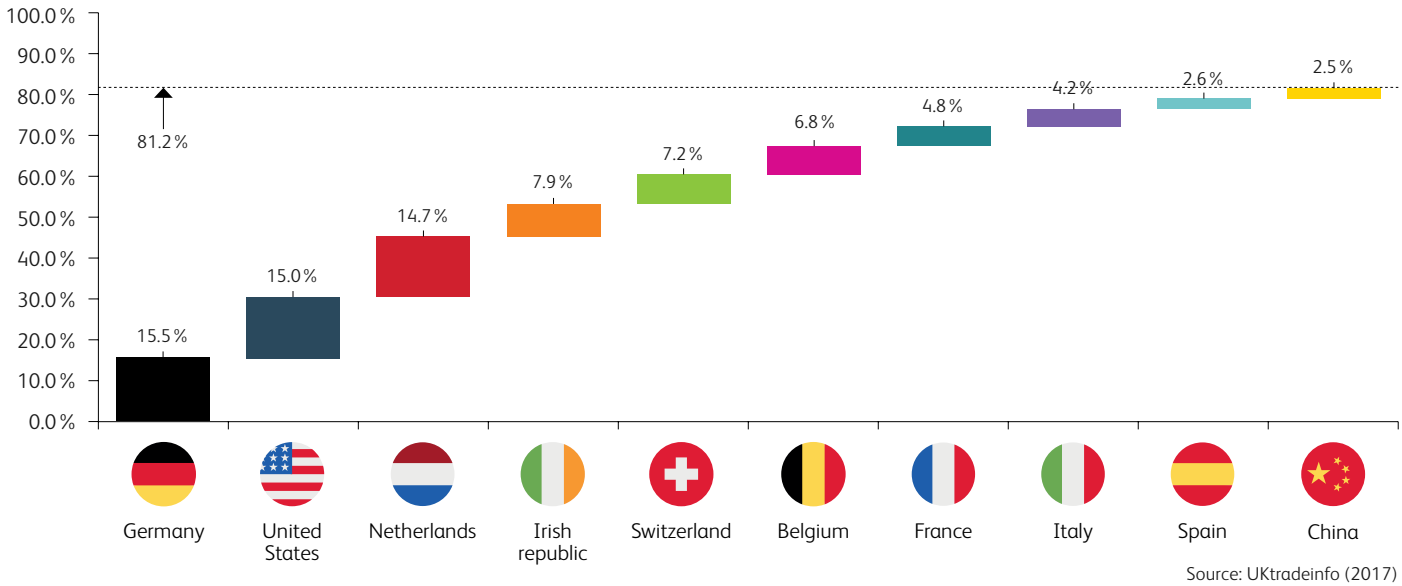
Source: ONS (2017)

Top trade partners

The top ten ranking for pharmaceutical trade partners is full of well-known countries, however there are a few interesting characteristics which may help us understanding the sector better.

The pharmaceutical trade market is highly concentrated

Top ten pharmaceutical trading partners by share of total trade (exports + imports)



Source: UKtradeinfo (2017)

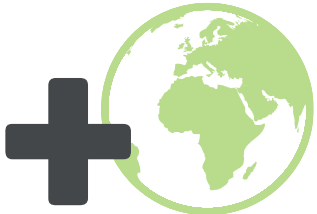
Not surprisingly, the main trade partner is the European Union which accounts for 63 % of total trade. Looking at single countries, the data show that Germany is the UK's main trade partner, followed by the US and the Netherlands.

Here the first characteristic: it appears that the Rotterdam-Antwerp effect is an extremely important one for pharmaceuticals. The Netherlands and Belgium together account for more than 21 % of total trade. This cannot be justified by the small populations of these two countries, neither the size of their pharmaceutical sectors (the Netherlands and Belgium pharmaceutical sectors are roughly 11 % and 36 % the size of the UK's).

So the reason behind this huge amount of trade must be found in relation to the transportation methods used to trade these goods. Antwerp and in particular Rotterdam are the two main European ports and, according to European rules, traded goods must be recorded as soon as they enter/leave the European Union. This inflates the trade numbers for the Netherlands and, to a lesser extent, Belgium[10].

The second characteristic, which is related to the previous one, is the concentration of trade. As the graph shows, the top 10 trade partners make up more than 81 % of total trade. As said this is partially related to the Rotterdam-Antwerp effect since pharmaceutical products leaving or entering the UK may pass through these large ports. However, another important reason is related to the strict regulations applied to pharmaceutical products. This is a constraint in particular when pharmaceuticals are entering the market. Indeed as we will see shortly, the only non-EU country in the sector's top 10 import partners is the US.

TOP 5 SURPLUS MARKETS



US £4.7BN
CHINA £0.8BN
JAPAN £0.7BN
SPAIN £0.5BN
AUSTRALIA £0.4BN

TOP 5 DEFICIT MARKETS

NETHERLANDS £-4.0BN
SWITERLAND £-2.8BN
BELGIUM £-2.4BN
IRISH REPUBLIC £-1.6BN
DENMARK £-0.4BN

[10]For more detailed analysis see our Chemicals Sector Bulletin

Source: UKtradeinfo (2017)

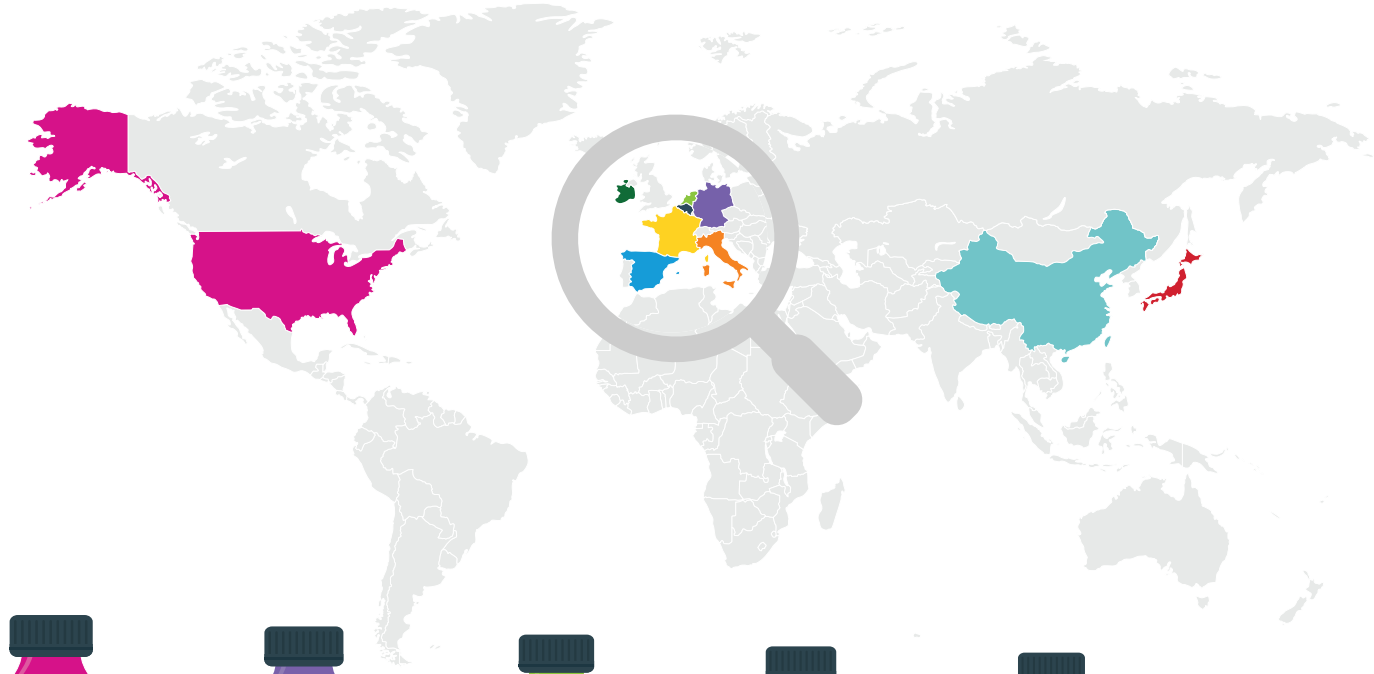
EXPORTS

The UK is the fifth largest pharmaceuticals exporter in the world after Germany, Switzerland, US, and Belgium[11]. As we underlined earlier on, exports are the main driver of demand in the sector, with only two sectors more export intensive than pharmaceuticals: mechanical equipment and other transport.

The top 10 export markets confirms what we said in the trade introduction, with the list composed of big western economies, and China. Interestingly China is also the sector's top growing export market in the period following the financial crisis, as the appetite for "western" pharmaceuticals increases at the expense of traditional Chinese medication. Exports to China grew together with foreign direct investment and helped to penetrate the market. Another factor in China's rising importance as an export destination was its recent decision to remove tariffs on several foreign drugs, allowing exporters greater access to the market.

Top 10 export markets

Value of exports (£billion) and % of total exports



United States: 24.0% | £6.3bn

Germany: 15.2% | £4.0bn

Netherlands: 7.2% | £1.9bn

Irish Republic: 4.9% | £1.3bn

France: 4.8% | £1.3bn

China: 4.1% | £1.1bn

Italy: 4.0% | £1.0bn

Spain: 3.6% | £0.9bn

Japan: 3.1% | £0.8bn

Belgium 2.2% | £0.6bn

[11]UNCTAD (2016)

Source: UKtradeinfo (2017)

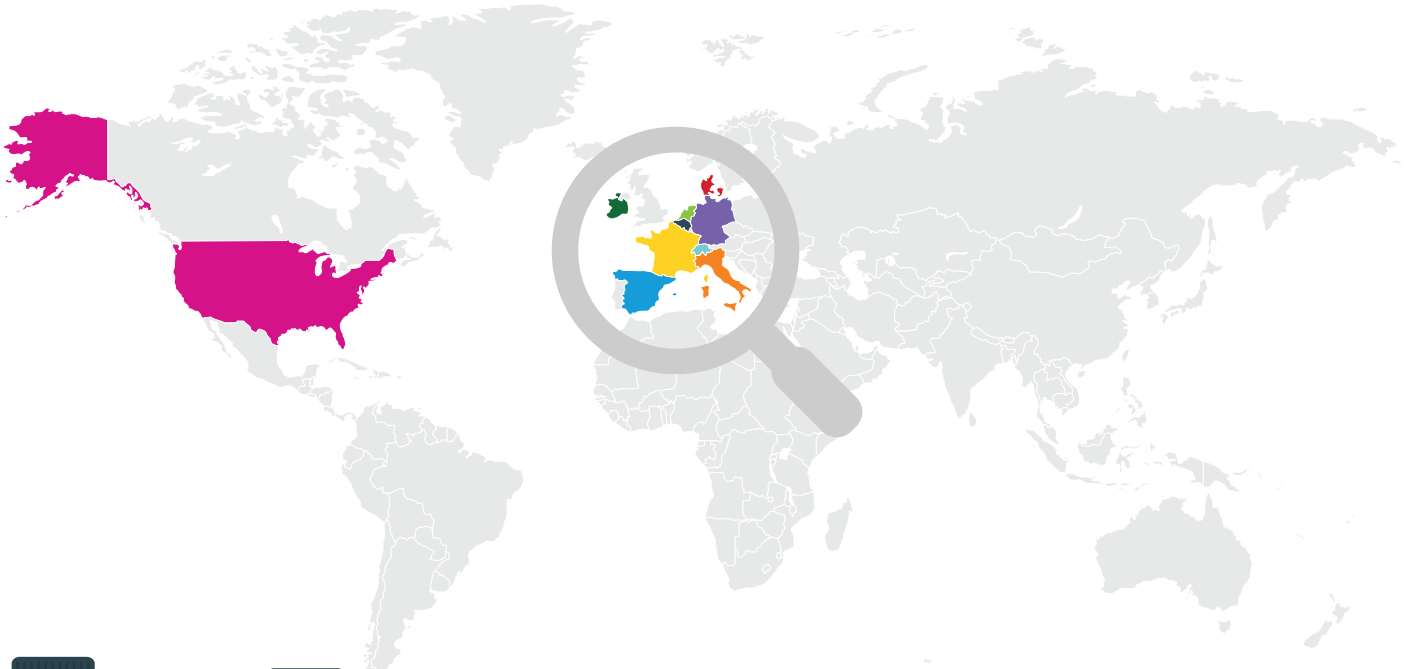
IMPORTS

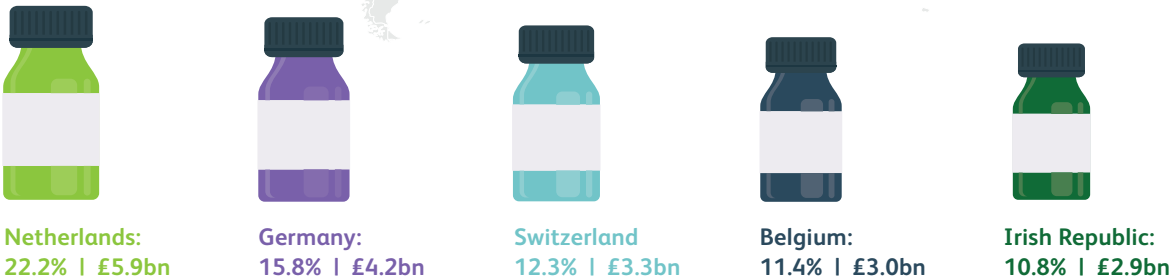
The pharmaceutical market - by the very nature of its products - is highly regulated. This has a clear effect on imports. In 2017 only 16 countries had a share of imports of at least 0.5%, with China (1.0%) and India (1.4%) the only two countries in this list outside of traditional western economies.

Regulation convergence, proximity, and the presence of big pharmaceutical players has resulted in a disproportionate share of imports from the EU at almost 80% of the total. However, once again, the Rotterdam-Antwerp effect is likely to have played a big role in this. The top import country is the Netherlands with a share of 22% and Belgium is fourth with 11%. The implications of the UK leaving the European Union and the prospect of factors that could impede trade are therefore clear, given it is a heavily globalised and trade orienteered industry.

Top 10 import markets

Value of imports (£billion) and % of total imports





Netherlands: 22.2% | £5.9bn

Germany: 15.8% | £4.2bn

Switzerland 12.3% | £3.3bn

Belgium: 11.4% | £3.0bn

Irish Republic: 10.8% | £2.9bn

United States: 6.0% | £1.6bn

France: 4.8% | £1.3bn

Italy: 4.4% | £1.2bn

Denmark: 1.9% | £0.5bn

Spain: 1.5% | £0.4bn

Source: UKtradeinfo (2017)

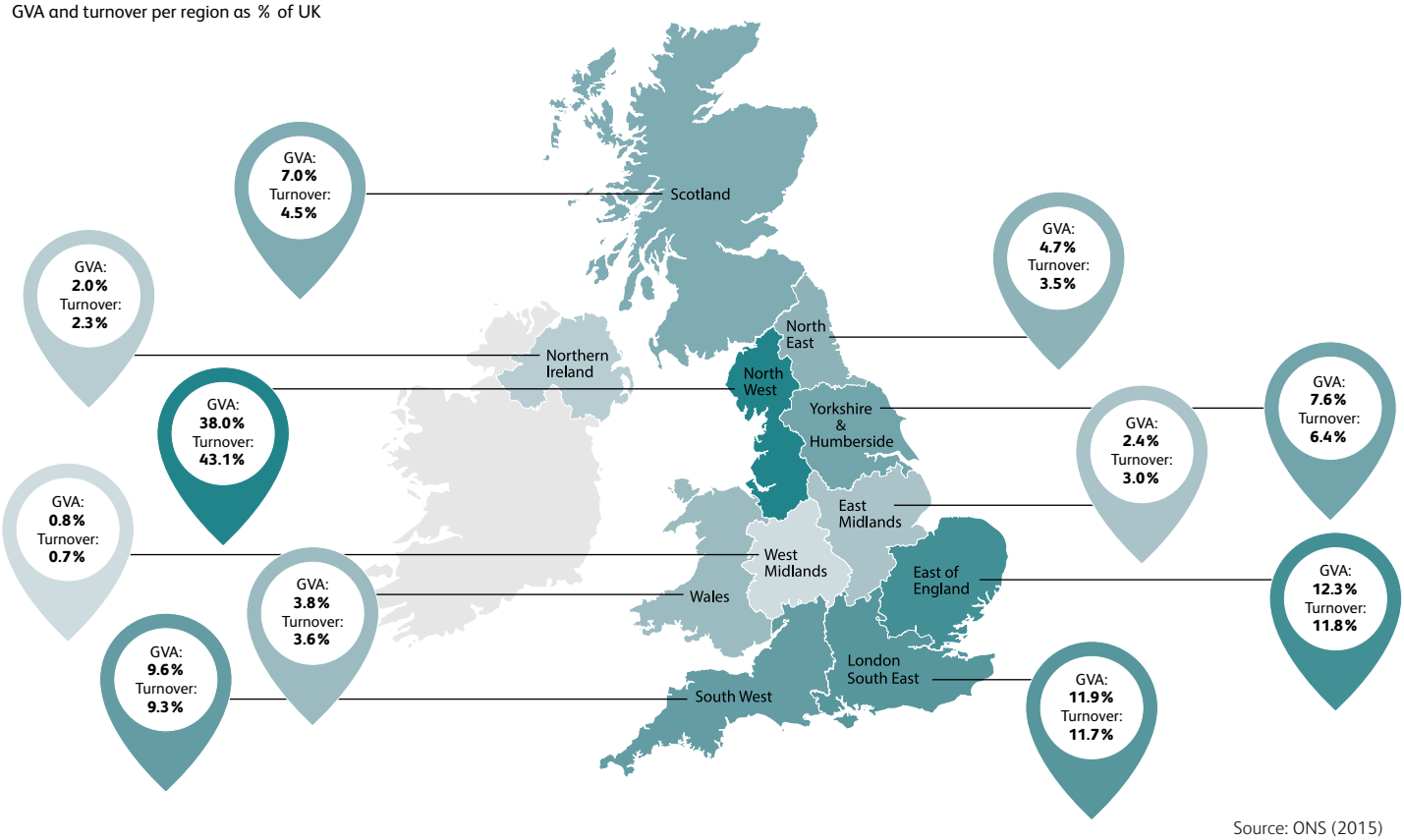
REGIONAL PERFORMANCE

Given its growing importance and development, it is no surprise that the pharmaceuticals sector has a presence across all UK regions. However there is one region in particular where the sector is concentrated – the North West. The region is responsible for a huge 38% of output, and 43% of turnover, significantly more than any other region. These figures point to a significant pharmaceutical manufacturing hub in the region. Indeed the North West is home to several global pharmaceutical manufacturing companies. AstraZeneca runs operations in Alderley Park and Macclesfield, Eli Lilly has a plant in Speke, and GSK has a plant in Cumbria. The region is undoubtedly the beating heart of the industry.

Other notable regions include the East of England and London and the South East, where a number of companies have set up operations. For instance west London is home to GSK's global headquarters.

Output and turnover in the pharmaceutical sector across UK regions

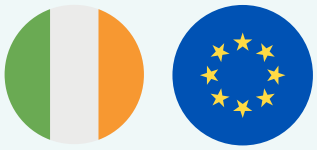
GVA and turnover per region as % of UK



Source: ONS (2015)

RISKS

The pharmaceuticals sector is well developed and one of the fastest growing industries in UK manufacturing. Furthermore its importance is only likely to rise as technology advances and populations continue to age. As a result the sector is protected from long term decline. That said there are still a number of risks that could harm pharmaceutical manufacturers over the coming years and have a negative effect on the industry. Brexit is perhaps the topmost risk, but there are further concerns regarding cyber security and the UK's open framework to foreign takeovers.

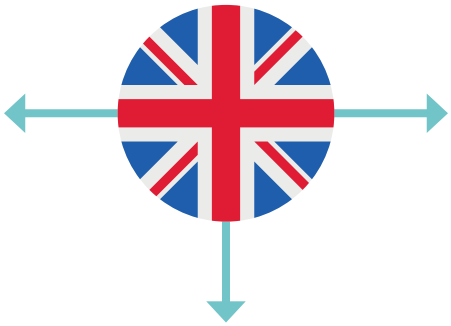


Non-tariff barriers

The UK pharmaceutical sector, as we have seen is export intensive, with the EU market the largest destination for pharmaceutical exports. Fortunately the EU has long adopted zero most-favoured-nation tariffs (even for international extra-EU transactions) for pharmaceutical products. Therefore even in the case of a hard Brexit direct tariffs would not be implemented.

However, tariffs are not the only risk. Other non-tariff barriers could significantly hamper pharmaceutical trade. In particular, border and custom checks could create delays in transferring pharmaceutical products between member countries. Longer lead times and increased paperwork caused by these custom bottlenecks could affect service levels and margins – especially for pharmaceutical products which have a short shelf life. This is particularly true for the UK-Ireland border.

BREXIT



Regulatory framework

Pharmaceutical products, given their nature as a substance that effect your health, have strict regulatory conditions. In the European Economic Area, the current product standard is authorised by the London based European Medicines Agency (EMA), meaning that all drugs approved by EMA are automatically granted access to the UK's market. The EMA is set to move to Amsterdam no later than March 2019 and if the UK's post-Brexit relationship with the EU does not include a shared regulatory framework, access to the market would be subject to additional process[12].

Labour and R&D disruption

One of the key characteristics of the pharmaceutical industry is its high intensity in research and development.

These activities rely on two key factors: skilled labour supply and research funding. Both factors could be at risk in the post-Brexit era. For the former, the UK has attracted a large number of skilled workers from abroad, most of which are EU citizens. If the UK leaves the Single Market, and with it the free movement of labour across the bloc, this could have a significant effect on labour supply. For the latter, the UK has benefited greatly from Horizon 2020 – an EU Research and Innovation programme. Indeed the UK ranks second only to Germany in terms of the number of project participations across the program, with UK researchers and innovators awarded 15% of all agreed funds to date, totalling around 4 billion euros[13]. If leaving the Single Market means a lack of access to this type of funding, this gap will need to be filled.

[12]Bruegal – Pharmaceutical industry at risk from Brexit
[13]BEIS – UK participation in Horizon 2020

Cyber security

Given the huge sums of money involved, as well as the time invested in creating a new pharmaceutical product, nothing is more valuable to a pharmaceutical company than the formula for one of its new drugs. The protection and security of intellectual property is therefore high on the agenda for all pharmaceutical manufacturers. This has gained even greater prominence in recent years thanks to increases in cyber theft in the digital age. Reports of hackers breaking into firms and stealing their trade secrets is of enormous concern. Equally troubling however, is that the theft of intellectual property is increasingly being carried out by company "insiders". Implementing and maintaining sophisticated cyber security systems to protect against cyber theft is crucial for modern day pharmaceutical manufacturers.

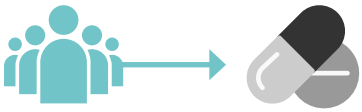
UK's open takeover framework can leave pharmaceutical companies exposed

While mergers and acquisitions are a key characteristic of the pharmaceutical sector, the UK's current framework leaves itself exposed to some of the potential negative effects of takeovers. Indeed the UK, it is widely accepted, has one of the most open and permissive frameworks to foreign takeovers in the world, and while takeovers have broadly been a force for good in the UK, there are examples where they have had a detrimental effect. These negative effects include job losses, the hollowing out of the domestic supply chain and in particular for the pharmaceutical sector, asset stripping and cutting of R&D activity[14]. Hence there was much concern when American owned Pfizer, with its track record of asset stripping and R&D cutting, attempted to take over AstraZeneca in 2014. A more robust vetting framework would protect pharmaceutical manufacturers from these risks.

[14]EEF - Foreign Direct Investment Policy Position (2017)

OPPORTUNITIES

Despite the risks highlighted, the role of the sector in maintaining a healthy and prosperous nation, means its importance and value is protected from long term decline. As a result pharmaceutical manufacturers are well placed to benefit from a number of opportunities on the horizon, in order to grow their output, improve their production processes, and crucially tailor healthcare to meet changing demand requirements.



Standard approach to medicine

Personalised approach to medicine

Personalised medicine

The rise of "personalised" or "precision" medicine is revolutionising the way doctors and pharmaceutical companies approach disease. Using genetic sequencing, medical professionals are now able to separate people with similar symptoms into far narrower groups and target medicines at them. This has huge benefits. It moves drug trialling away from the "one size fits many" approach, helping to remove variable diagnoses and treatment strategies based on generalised demographics. This results in better success rates in drug production, helping to reduce the costs for manufacturers, as well as facilitating more predictive and preventive care by bringing better targeted therapies.

However while the benefits are clear, manufacturers need the right incentives to focus more of their energy on this strand of pharmaceutical manufacturing. This is because while personalised medicines should have a greater success rate and therefore lower costs, their very nature means they are tailored to a relatively small patient population. Therefore the revenue on offer may not be as great compared to the production of drugs for the mass market.

Technology

The possibilities of using technology in pharmaceutical manufacturing are almost endless, with the potential to improve efficiency and reduce costs continuing to evolve. Whether it be through the use of machine learning and artificial intelligence in preliminary drug discovery and testing, or the role of technology in healthcare apps or wearables (such as smartwatches), the sector is continuing to evolve at a rapid pace. One of the most striking recent developments however is the emergence of digital medicine.

Digital medicine, or digital pills, are drugs with an ingestible sensor embedded in them that records when the medication was taken. The system works by sending a message from the pill's sensor to an external system, which then transmits the information to a mobile application so that patients can track the ingestion of the medication on their smart phone. This dynamic should see patients increase their uptake of vital medication, with evidence suggesting that a significant proportion of patients with depression, asthma and HIV do not take medicines as prescribed.

Accelerated Access Pathway

The high costs of developing a drug and getting it to market are prohibitive factors for many manufacturers. The UK government has recognised this and in 2016 commissioned the Accelerated Access Review, which had the ultimate aim of getting the best technologies - be it drugs, devices or diagnostics to patients more quickly and cheaply. In response to the review, last year the government set up an Accelerated Access Collaborative. This will look to develop a streamlined pathway to bring breakthrough products to market and then to patients as quickly as possible. Supporting this will be £86 million in government funding. This new focus on building greater alignment between the various players and stages of pharmaceutical production should support UK pharmaceutical manufacturers in the coming years, and is an opportunity worth seizing.

LONG RUN TRENDS

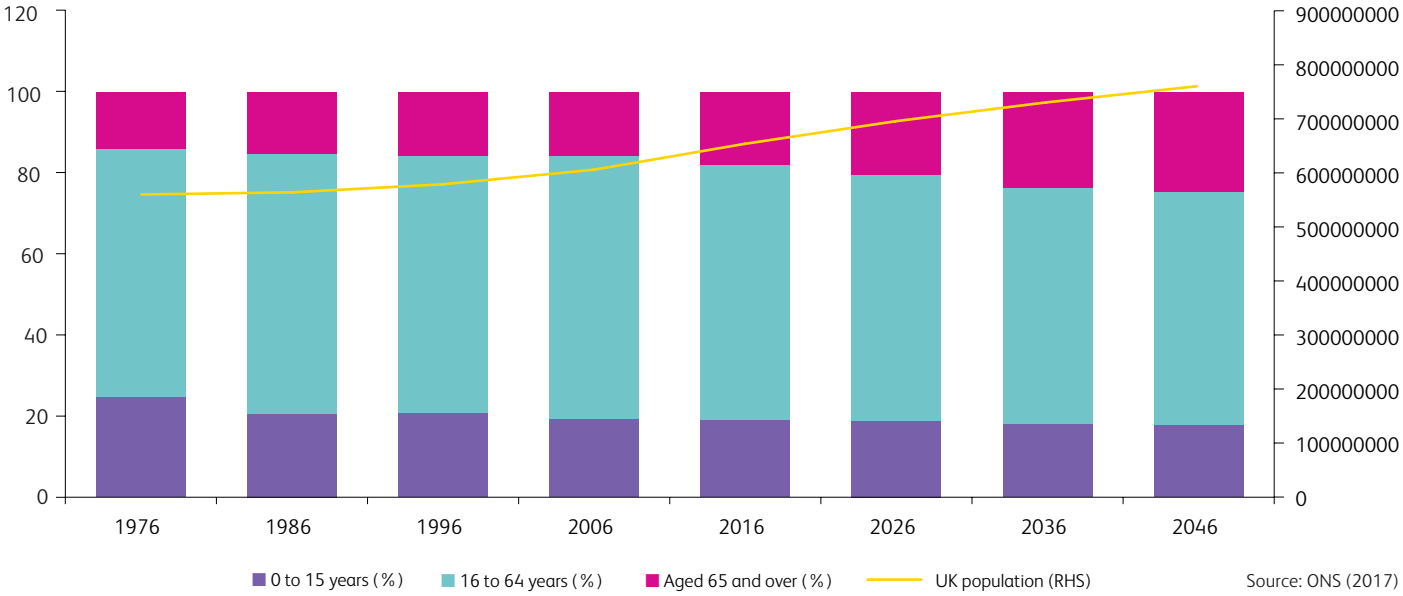
The pharmaceuticals sector must grasp a number of long terms trends, in order to not only cement itself as a leading manufacturing sector, but also to ensure the health and prosperity of the UK population.

An ageing population

The UK population is ageing, as it is across the industrialised world. According to projections from the ONS, by 2046 a quarter of the population will be aged 65 or over, compared to just 18% in 2016 and 14% in 1976. A combination of huge advances in medical care, nutrition and sanitation, coupled with falling fertility rates is resulting in changing population dynamics. This brings with it new challenges.

The UK population is ageing

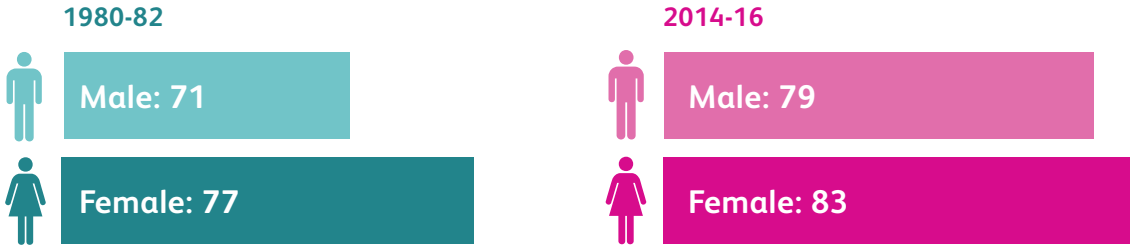
Age distribution of the UK population, 1976 to 2046 (projected)



Source: ONS (2017)

An ageing population creates new demands for health services. Pharmaceutical manufacturers have a significant role to play in how illness and disability is treated in the future. For instance while cardiovascular disease and cancer will see increases, other conditions will surge such as Alzheimer's disease and Chronic Obstructive Pulmonary Disease (COPD). Along with this there will also be heavy over the counter use to battle the aches and pains of aging actively. Pharmaceutical manufacturers will have to develop innovative treatments that fit into the unique needs of an ageing population. The government has itself recognised this, with an ageing society being one of the Industrial Strategy's Grand Challenges.

UK life expectancy males/females



Source: ONS (2017)

Demand from emerging markets set to grow

Emerging markets (including China, Brazil and India) represent an exceptional opportunity for the pharmaceutical industry in the long run. An increased governmental commitment on improving healthcare access in these regions, growing consumer income and wealth, and a growing prevalence of lifestyle diseases such as cancer and diabetes means demand for pharmaceutical products is set to grow hugely in these regions. Indeed according to BMI Research, pharmaceutical revenues from emerging markets could reach $490 billion by 2025, up 227% from the level in 2010 . This therefore represents a growing and relatively untapped market for UK pharmaceutical manufacturers – particularly of generics – to enter. However it will not be easy. Manufacturers will have to look to build trusted relationships with local governments, overcome infrastructure issues as well as competition from local producers.

Pharmaceutical revenues from emerging markets could reach $490 billion by 2025, up 227% from the level in 2010[15]

ABOUT OUR SECTOR BULLETINS

Our sector bulletins give an insight into individual manufacturing sub-sectors. They offer commentary and data on how the sector breaks down, its geographic spread across the UK, as well as their outlook with regards to the UK and global economy. They provide an easy to read, and informative document, which should help to build understanding of specific sectors and how they connect to the rest of the economy.

Please note that all data cited in the report is correct as of May 2018.

If there is anything else you would like to see in our next bulletin, please email your suggestions and comments to mjenkins@eef.org.uk.

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[15]McKinsey&Company - What's next for pharma in emerging markets? (2017)

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