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SEPARATING FACT FROM FICTION – HOW LOCALIZATION BARRIERS FAIL WHERE POSITIVE NON-DISCRIMINATORY INCENTIVES SUCCEED

A Global Assessment of Localization Policies and Incentivizing Life Science Investment and Innovation

This report was commissioned by the Pharmaceutical Research and Manufacturers of America (PhRMA). The views represented here are those of the authors only.

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DEFINITIONS

Localization barriers

The definition of localization barriers used in this report will be that of the USTR which has defined localization barriers within a trade concept. The Trade Representative defines "localization barriers to trade" as those: "measures designed to protect, favor, or stimulate domestic industries, service providers, and/or intellectual property (IP) at the expense of goods, services, or IP from other countries."[1]

Non-discriminatory incentives

Standing in stark contrast to localization barriers are non-discriminatory incentives. In this report such incentives are defined as those measures, policies, rules and regulations that do not discriminate against foreign entities or provide favourable treatment for local or localized entities.

LIST OF ABBREVIATIONS

API	Active pharmaceutical ingredient
BNDES	Brazilian Development Bank
CONACYT	*Consejo Nacional de Ciencia y Tecnología*
EDL	Essential Drug List
EMA	European Medicines Agency
EU	European Union
FDA	US Food and Drug Administration
FDI	Foreign direct investment
FONDEF	*Fondo de Fomento al Desarrollo Científico y Tecnológico*
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GMP	Good manufacturing practices
GPO	Government Pharmaceutical Organization (Thailand)
ICT	Information and communications technology
IEPI	Ecuador's Intellectual Property Institute
IP	Intellectual property
LCRs	Local content requirements
M&A	Mergers and acquisitions
MCT	Multi-center (clinical) trial
MNE	Multi-national entity
NDA	New drug application
OECD	Organization for Economic Co-operation and Development
P&R	Pricing and reimbursement
PDP	Product development partnership
PPP	Public private partnership
R&D	Research and development
RDP	Regulatory data protection
SMEs	Small and medium-sized enterprises
UNCTAD	United Nations Conference on Trade and Development
USTR	United States Trade Representative
VAT	Value added tax
WTO	World Trade Organization

EXECUTIVE SUMMARY

The competition for foreign investment is today more intense than ever. Globalization and the relatively free flows of capital and information mean that more and more public and private actors view all countries in the world as a potential host for their activities.

The desire to attract greater flows of foreign direct investment (general as well as sector specific) has promoted a growing number of countries to launch ambitious policies seeking to "localize" innovation and economic activity. While active government efforts to increase attractiveness to domestic and international investment are nothing new, in a growing number of countries these localization policies seek to mandate or coerce local economic activity and investment. These localization barriers are the name given to those laws, rules and measures taken by governments to build or increase a domestic economic capacity in a given industry or area of economic activity. These policies can vary from the general – for example requiring majority local ownership of any incorporated entities for all industries – to the sector-specific – with similar mandates but for specific industries.

A key distinction: Localization barriers versus non-discriminatory incentives

Although there is some inherent variation – and many countries actually have contradicting policies – there is a clear distinction between localization barriers and non-discriminatory incentive-based policies. Localization barriers stand in stark contrast to non-discriminatory incentive based laws and rules which seek to create an enabling environment for innovation and investment.

Incentive-based policies are often characterized by a "bottom-up" approach, in which companies elect to invest in a country on their own initiative, and one that benefits various parties involved, including the companies themselves. Such policies also aim to attract foreign investment in the country through providing positive incentives across the board, such as tax benefits, and ensuring needed conditions are in place, including modern infrastructure and a robust regulatory framework.

In contrast, localization barriers often consist of punitive incentives and mandatory requirements for investment. These barriers tend to take a "top-down" approach, with the government dictating, often in narrow terms, how and in what manner companies should invest in the country. It is often the case that these objectives for investment are not necessarily in the companies' interests or within their existing capabilities. These policies include those that put companies seeking to enter the market at a disadvantage if they do not opt to localize their operations in the prescribed manner. They also tend to place actual restrictions on companies' ability to enter the market at all without localization. The most extreme policies are outright import bans and direct appropriation of know-how or materials by a country through, for example, forced technology transfer.

Biopharmaceuticals and localization – An Area of Growing Concern

Localization barriers aimed at biopharmaceuticals have gained momentum in recent years, particularly in emerging markets. Governments in these markets often express a desire to grow the local biopharmaceutical market through investment and innovation (for instance, in and around long-term strategies for the development of the sector) including through FDI. Nevertheless, while some countries have sought to achieve these objectives primarily through non-discriminatory positive incentives for investment, other countries have taken a decidedly different approach, requiring different degrees of investment in predefined areas (varying by country) from foreign companies that seek to access the local market.

The purpose of this paper is threefold:

1. to discuss the broader issue of localization barriers;

2. to discuss their application to the biopharmaceutical sector; and

3. to provide examples of the negative impact localization barriers have on levels of economic activity and contrast this with the positive impact non-discriminatory incentive-based policies have.

Specifically, this paper seeks to, first, provide a succinct overview of the different types of localization barriers in place in a range of emerging markets and affecting biopharmaceuticals as well as other high-tech sectors. What policies are countries pursuing? And what are some of the big global trends?

Second, the paper outlines the implications of these measures for strategic government objectives, including the stated purpose of the measures themselves, such as local investment and innovation, access to medicines, cost containment and international trade.

Finally, the paper discusses examples from developed high income countries as well as emerging markets that have used non-discriminatory positive incentives to build an environment that attracts investment and development of a local life sciences sector.

In terms of countries covered the paper draws on a broad range of experiences from both emerging and developed markets. These include both large and small markets as well as countries with a tradition of localization barriers and those experimenting with new policies. Specific attention will be paid to the experiences of the following countries: Algeria, Brazil, China, Denmark, India, Indonesia, Ireland, Russia, Singapore, South Africa, Turkey, Thailand and Vietnam.

Key findings

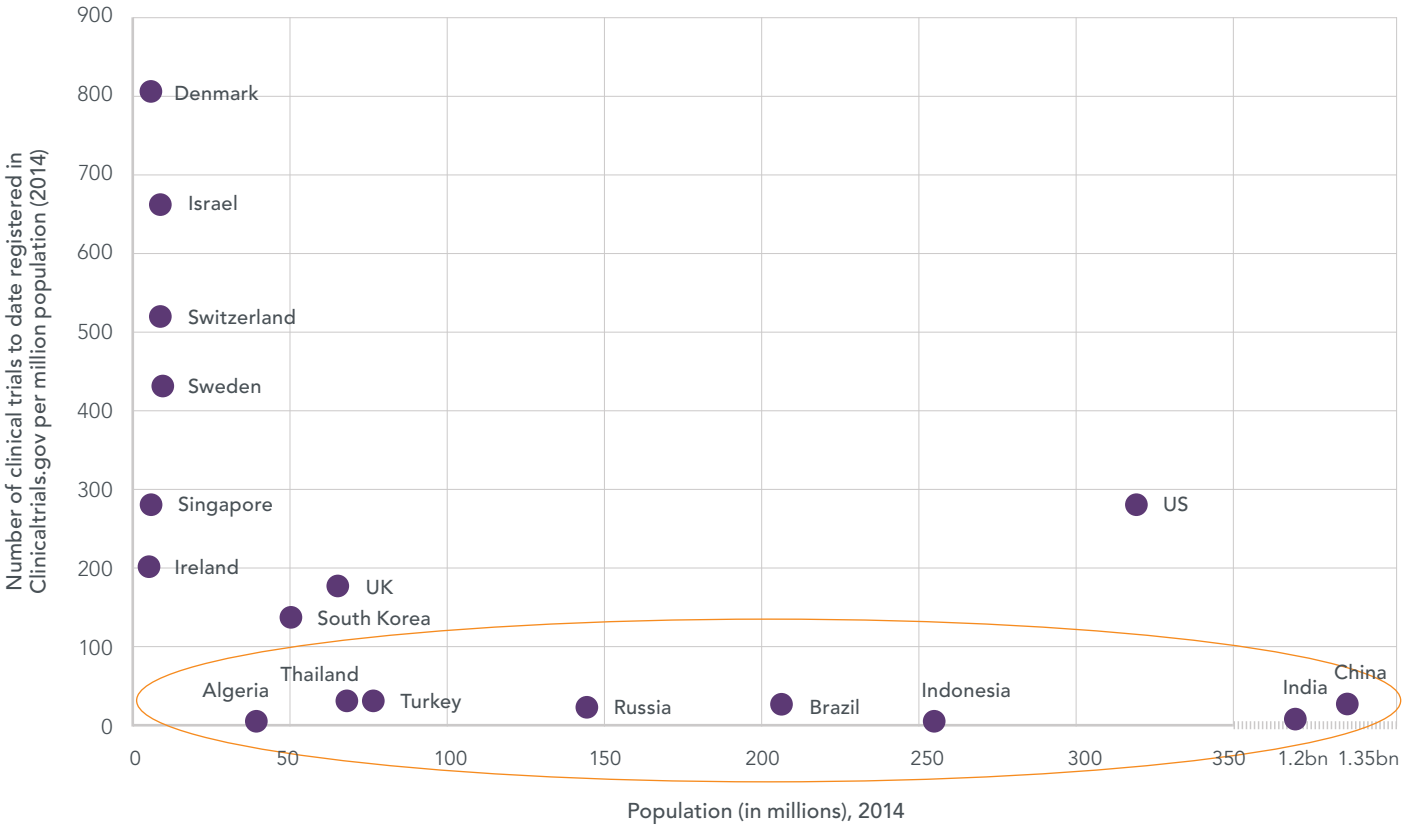
Key finding 1: More in number and more draconian – Localization barriers have grown in number and intensity over the last decade

This paper finds that over the last 5-10 years policies aimed at favoring local industries through the use of localization barriers and requirements have steadily increased. Numerous financial and trade bodies including the European Central Bank and Global Trade Alert (an initiative housed by the Center for Economic Policy Research, a think tank) have documented a recent trend toward the increased use of trade barriers, particularly non-tariff or indirect tools, that have the goal of discriminating against imported goods and boosting local industrial sectors. During the period 2012-2014 between 500 and 700 new trade restrictions were introduced every year globally. In particular, industrial aspirations and concern over their dependence on global supply chains have led many emerging markets to seek to bolster or create indigenous sectors, including through introducing protectionist-like measures. Between 2008 and 2014, roughly 400 of the documented trade-restricting actions were explicitly aimed at supporting national industries through, for instance, local content requirements and procurement policies favoring domestic companies and products (with local content and procurement-related measures among the fastest growing). Indeed, the erecting of localization barriers has increased significantly over the last decade. Many of these barriers have also become more restrictive and punitive conditioning market access on compliance.

Key finding 2: Localization barriers do not have the desired positive impact on economic activity or innovation

Examining a range of countries that have raised localization barriers in an effort to boost domestic biopharmaceutical industrial capacity, manufacturing and R&D capabilities the paper finds that these policies have often failed to live up to their stated goals. With regards to the biopharmaceutical sector the clearest indication that localization barriers have not succeeded is the low level of clinical research (a proxy of high-level and sustained biopharmaceutical investment) in countries with such barriers in place. This despite

Clinical research, sample developed and emerging markets

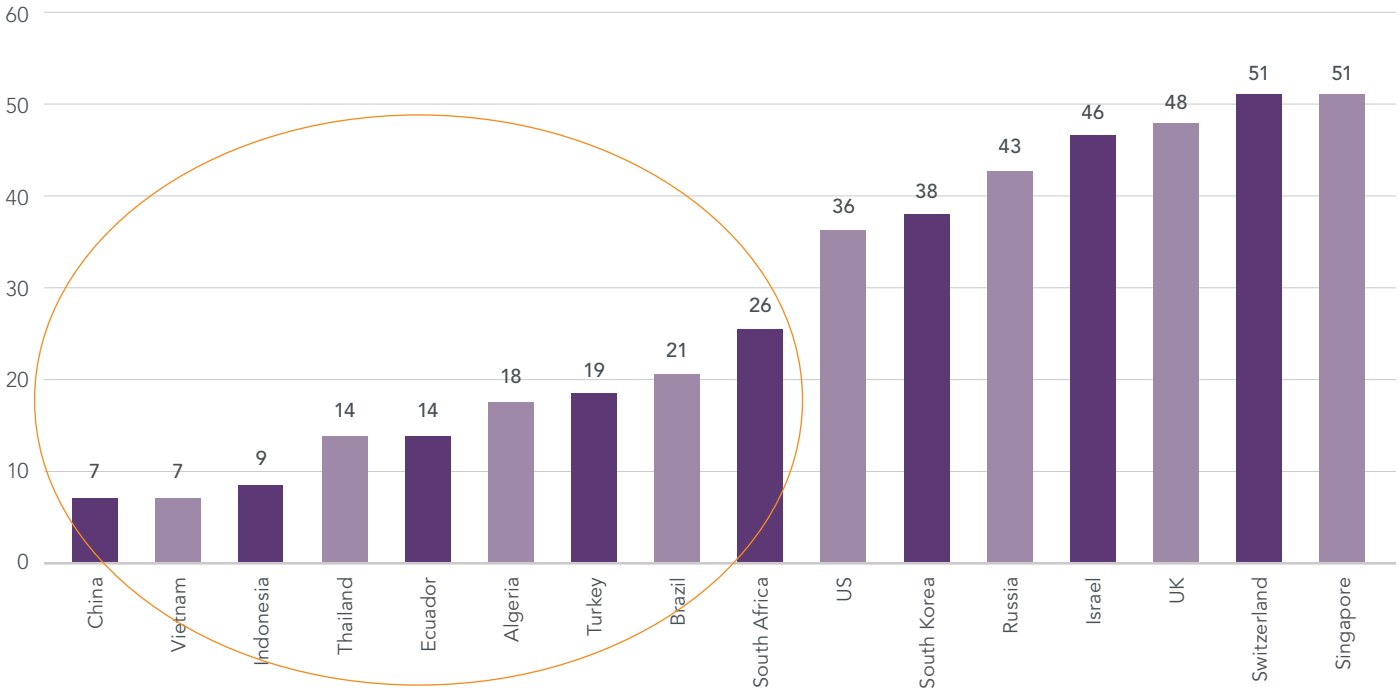


the fact that these countries exhibit some of the strongest biopharmaceutical market growth rates and significant market size and potential. The paper also finds that these negative results stand in stark contrast to the success of markets that focus on creating an enabling environment through positive non-discriminatory incentives and policies. The above figure displays the discrepancy in clinical research levels between a sample of countries; the countries circled in red are countries with a strong history and tendency of mandatory localization policies.

Similarly many countries that have erected localization barriers have seen limited growth in knowledge-intensive employment which includes high-tech sectors such as biopharmaceutical R&D. Countries like China, Vietnam, Indonesia, Algeria and Turkey all have relatively low levels of knowledge intensive employment as a percentage share of their total workforce. The below chart shows the percentage share of the workforce employed in knowledge-intensive activities in a selection of countries. Except for Russia (which is an outlier with a historically well-educated workforce) the countries that have the highest share of the workforce in knowledge-intensive jobs are those without localization barriers. In contrast countries with extensive localization barriers in place tend to have lower shares.

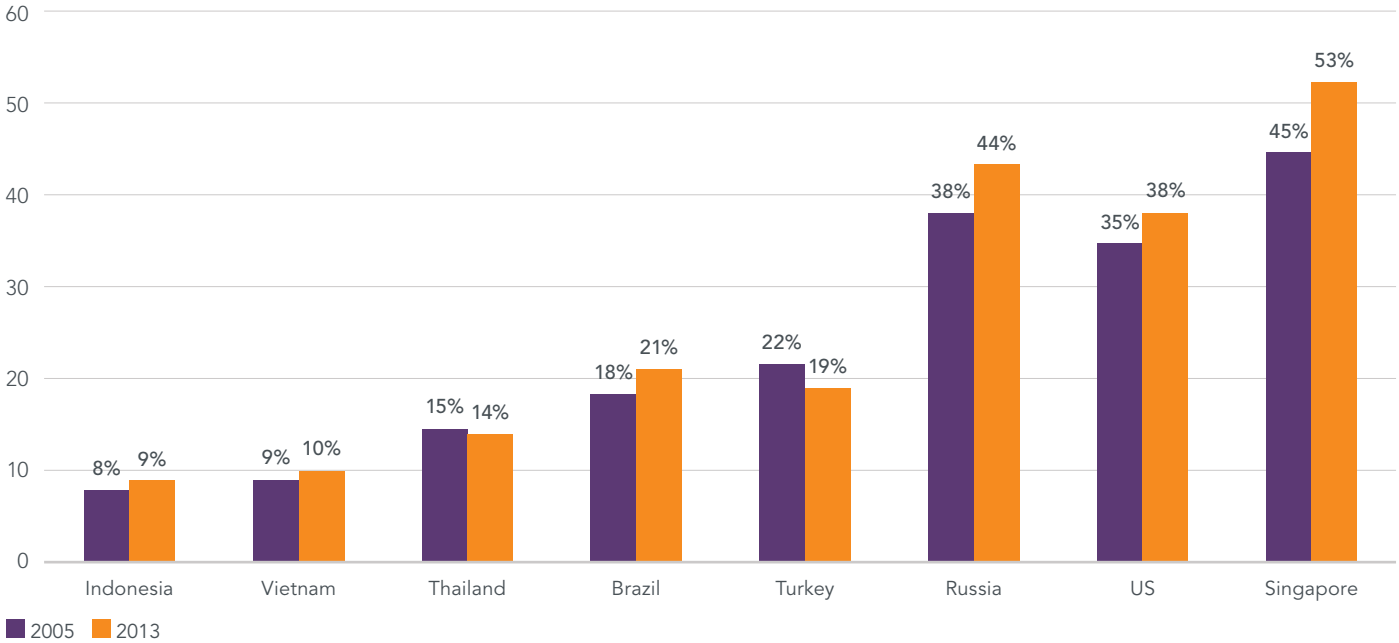
Significantly, this has not improved over time with the introduction of more onerous localization requirements. For example, in many countries introducing strict localization requirements like Turkey, Indonesia, Vietnam and Thailand, the share of the workforce in knowledge-intensive industries has essentially stood still since 2005. It has not increased as a result of localization policies. Instead, in some cases, the share has actually fallen during this time period. The below chart shows the change in the share of the workforce in knowledge-intensive industries comparing data from 2005 with 2013 (the latest available year).

Share of workforce employed in knowledge-intensive activities (%)



Source: ILOSTAT database, Employment distribution by occupation, ISCO-88 categories 1, 2 and 3

Share of workforce employed in knowledge-intensive activities (%), 2005 vs. 2013



Source: ILOSTAT database, Employment distribution by occupation, ISCO-88 categories 1, 2 and 3; data for Indonesia (2007 and 2013) and Vietnam (2009 and 2013)

Summing up the negative impact of localization barriers: Six myths and facts

Building on the data and case studies discussed in the paper, the paper ends by summing up the impact of localization barriers and requirements through six 'Myths and Facts' with country specific examples from the preceding analysis. These myths are some of the most common assumptions about the beneficial impact localization requirements can have. The corresponding facts show how these assumptions are not borne out by empirical evidence and country experiences. Each myth and fact is followed by specific examples of country experiences and evidence that can be used as arguments and data against the myths.

These 'Myths and Facts' have been divided up thematically and cover the following areas:

1. Domestic manufacturing capacity
2. Domestic biopharmaceutical R&D
3. High-tech FDI
4. Access to essential and cutting edge medicines
5. Health system cost savings
6. Effect on imports

INTRODUCTION

The competition for foreign investment is today more intense than ever. The latest data from UNCTAD suggests that although having decreased from previous peaks global FDI flows for 2014 totaled USD 1.3 trillion.[2]

Globalization and the relatively free flows of capital and information mean that more and more public and private actors view all countries in the world as a potential host for their activities. Indeed, the figures from UNCTAD show the continuing internationalization and strength of investment by multinational corporations. For example, measured by the production of MNE foreign affiliates 2014 saw a rise in sales by 7.6 per cent and employment by foreign affiliates reached 75 million globally.[3]

The desire to attract greater flows of foreign direct investment (general as well as sector specific) has promoted a growing number of countries to launch ambitious policies seeking to "localize" innovation and economic activity. While active government efforts to increase attractiveness to domestic and international investment are nothing new, in a growing number of countries these localization policies seek to mandate or coerce local economic activity and investment through in fact raising localization barriers.

The purpose of this paper is threefold:

1. to discuss the broader issue of localization barriers;

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Second, the paper outlines the implications of these measures for strategic government objectives. This includes the stated purpose of the measures themselves, such as, local investment and innovation, access to medicines, cost containment and international trade.

Finally, the paper discusses examples from developed high income countries as well as emerging markets that have used non-discriminatory positive incentives to build an environment that attracts investment and development of a local life sciences sector.

In terms of countries covered the paper will draw on a broad range of experiences from both emerging and developed markets. These include both large and small markets as well as countries with a tradition of introducing and utilizing localization barriers and those experimenting with new policies. Specific attention will be paid to the experiences of the following countries: Algeria, Brazil, China, Denmark, India, Indonesia, Ireland, Russia South Africa, Turkey, Thailand and Vietnam.

The report is organized along the following five sections.

Section 1 provides a background and conceptual discussion of different types of localization policies affecting biopharmaceuticals as well as other high-tech sectors. Specifically, this section sets the discussion of biopharmaceutical localization policies within a broader debate of general cross-sectoral localization barriers that affect many different industries. This section defines and distinguishes between localization barriers and those measures that are based on creating an enabling environment and providing non-discriminatory positive incentives. Finally, it also discusses localization barriers and requirements within the context of international trade agreements.

Section 2, maps the major global developments with regards to localization policies. It looks at how the number of barriers, laws and rules pertaining to localization has increased over the last decade. The section provides a detailed discussion and examples of localization barriers from across the world giving examples of both general and biopharmaceutical specific barriers. The section also includes a number of case studies of countries that have introduced positive measures and non-discriminatory incentives aimed at encouraging investment and innovation in the local market.

Section 3 attempts to analyze the economic impact of erecting localization barriers. Specifically this section seeks to understand how these barriers have affected countries levels of economic activity on a range of general and biopharmaceutical indicators including FDI, trade and clinical research.

Based on the preceding sections, the final section, section 4, provides a set of six evidence-based arguments against localization barriers. These arguments can be used generically or within specific markets to argue against the introduction and use of these barriers.

1 BACKGROUND AND BROADER NATIONAL AND INTERNATIONAL POLICY CONTEXT TO LOCALIZATION BARRIERS

What are localization barriers and why do countries seek to introduce them?

Localization policies are the name given to those laws, rules and measures taken by governments to build or increase a domestic economic capacity in a given industry or area of economic activity. These policies can vary from the general – for example requiring majority local ownership of any incorporated entities for all industries – to the sector-specific – with similar mandates but for specific industries.

Why do countries seek to "localize"? Growing domestic industrial capacity is a natural objective of countries, and is in fact in countries' national interest for several reasons.[4]

First, it is linked to the ability of a country, where domestic production is feasible and efficient, to supply its population's needs – both in actual terms as well as in providing a sense of national autonomy and independence. For many countries self-sufficiency – particularly in strategic industries or sectors – is critical.

Second, building local industries provides countries with a basis on which to compete regionally and globally; a strong local industry acts as a springboard for positioning a given country/industry to compete in international markets enhancing the appeal and production of local actors.[5]

Finally, and perhaps most importantly, efforts to grow a given country's domestic industrial capacity is an integral facet of economic and societal development. This is particularly pronounced for high-tech industries (including the life sciences) where developing a local and national high-tech capability is intrinsically linked with a country's level of economic development. Most countries wish to strengthen and grow the economic contribution of knowledge-intensive industries, innovation and more sophisticated and technically complex manufacturing. Climbing the value chain in this respect not only grows national output but has numerous socio-economic benefits including the creation and diffusion of high-skilled human capital.

Requirements for the use of local content have been in place for a number of years all across the world. Typically, these requirements have been more pronounced for certain industries and sectors. For example, the oil and gas industry has for many years been subject to varying requirements of localizing production, engaging local communities and/or the use of local content and/or labor in many countries.[6] Countries tend to promote investment in and growth of local industrial activities through a wide range of policies, including rules, regulations, incentives and sanctions.[7] Such policies may be aimed at domestic entities as well as foreign companies, with the idea that they would locate a portion of their operations in a given country.

Industrial policies for high-tech fields (including the life sciences) typically target three pillars of industrial capabilities:

1. **Manufacturing capabilities** – production facilities and materials (for example, active pharmaceutical ingredients);

2. **Research capabilities –** including knowledge and know-how, and infrastructure; and

3. **Commercial capabilities** – including marketing, supply chains and international trade platforms.

1.1 Biopharmaceuticals – a growing target for localization barriers

Localization measures aimed at biopharmaceuticals have gained momentum in recent years, particularly in emerging markets. Governments in these markets often express a desire to grow the local biopharmaceutical market through investment and innovation (for instance, in and around long-term strategies for the development of the sector) including through FDI. Nevertheless, while some countries have sought to achieve these objectives primarily through non-discriminatory positive incentives for investment, other countries have taken a decidedly different approach, erecting localization barriers and requiring different degrees of investment in predefined areas (varying by country) from foreign companies that seek to access the local market.

For example, some localization barriers may directly target foreign companies, for instance through providing preferential treatment to products or companies that are localized. Such policies may also indirectly discriminate against foreign companies. For example, localization barriers can include measures that make market access (for instance, in registration or procurement) conditional on manufacturing being localized. Some of the most extreme barriers are import restrictions and technology transfer rules that effectively close market access to foreign companies and/or require handing over of a product, technology or know-how to local entities (such as through compulsory licensing).

There are also differences in definition of what constitutes local. Some countries, for instance Russia and Turkey, have identified explicit criteria for a company or product to be considered local – at least half of the manufacturing cost or production of the drug substance must take place in the markets.[8] Other markets have prioritized specific areas of need; Brazil has introduced incentives and rules for investment in biosimilars and vaccines.[9] Still others – either directly or indirectly – call for investment in the local biopharmaceutical sector to meet localization requirements or benefit from preferential treatment. Vietnam, Indonesia, Thailand and Algeria are examples of markets that do so explicitly.[10]

Finally, localization barriers often target one or more area of the biopharmaceutical life cycle, from R&D and the regulatory environment to market access and business conditions.

On the following page Table 1 provides examples of both general and biopharmaceutical specific localization barriers in place in a sample of six countries. These countries are all emerging or developing markets, big and small, with a tradition of erecting both general and life sciences targeted barriers. They thus provide a good starting point to get an overview of the types of barriers that are most commonly employed. The details of these policies and their impact – as well as similar policies in other countries – are discussed in full in the following sections.

TABLE 1 Localization barriers: Sample of recent policy developments in key emerging markets

Country	Key Policies and Developments
Russia	• Ban (proposed) placed on imported medicines for state tenders if two or more generic versions are available from local manufacturers • Recent changes to the definition of "local" require pharmaceutical companies to produce the API or final deliverable form of a product within the country • Only drug products that were tested in a local clinical trial can be submitted for registration • 15% preferential price afforded to local products in state and municipal procurements • Local manufacturers of products on EDL benefit from inflation-linked price increase
Turkey	• Recent measures applicable to high-tech products define domestic goods as those with at least 51% of the total cost derived from local materials or labor and require that "substantive stages" of the manufacturing process occur within the country • Currently circulating proposal to delist imported products once a locally produced generic or therapeutic alternative becomes available • Regulatory and reimbursement-related prioritization of locally-manufactured products • Public tender law revised to provide mandatory 15% pricing advantage for local products • Significant product registration delays resulting from complex GMP inspections required particularly for international facilities; also limits incentives for import of such products if a local generic or therapeutic alternative is available
China	• New regulation imposes significant regulatory hurdles requiring local clinical trials and penalizes companies conducting international multi-center trials (prolonged approval process) • New regulations also require local clinical trials for Class III ("high-risk") medical devices • National Health and Planning Commission discussing rules that would require top hospitals to only purchase domestically produced medical devices • Existing indigenous innovation policies (sharing of know-how in exchange for market access e.g. via government tenders) • Special 'import registration' required
Indonesia	• Decree 1010 requires a manufacturing license for market authorization • Foreign pharmaceutical companies must produce a product domestically five years after the product has gone off patent; exemptions may be given where needed technology is not sufficiently available at the local or regional level • Foreign ownership of pharmaceutical manufacturers in the country is restricted to 85% (maximum)
Algeria	• Government ban on the importation of 800+ drug products that have locally produced generic equivalents • Imported products subject to strict price referencing, innovative products with generic equivalents are price referenced against a generic product in the same therapeutic class • 25% preferential price afforded to domestic bidders in public procurement contracts • Domestic companies engaged in foreign trade are required to be at least 51% owned by local Algerian shareholders

1.2 Localization barriers versus creating a non-discriminatory incentive-based environment

The above described localization barriers stand in stark contrast to non-discriminatory incentive based laws and rules which seek to create an enabling environment for innovation and investment. Incentive-based policies are often characterized by a "bottom-up" approach, in which companies elect to invest in a country on their own initiative, and one that benefits various parties involved, including the companies themselves. Such policies also aim to attract foreign investment in the country through providing positive non-discriminatory incentives across the board, such as tax benefits, and ensuring needed conditions are in place, including modern infrastructure and a robust regulatory framework.

TABLE 2 Non-discriminatory incentive-based policies

Incentive based approach
Equal treatment for local and foreign companies
Promote conditions enabling innovation: - Scientific capabilities - R&D frameworks - International-standard regulatory system - Robust legal/IP environment
Direct incentives (R&D tax credits)
Equal treatment for local and foreign companies

TABLE 3 Localization barriers

Barriers
Registration requirements: – Direct (local clinical trials) – Indirect (int'l firms face red tape)
Preferential treatment if local in P&R, procurement, tax/admin – Direct (price preferences, minimum investment levels) – Indirect (local industry favored)
Import bans
Direct appropriation/IP transfers

In contrast, as described above localization barriers and requirements for investment tend to take a "top-down" approach, with the government dictating, often in narrow terms, how and in what manner companies should invest in the country. It is often the case that these objectives for investment are not necessarily in the companies' interests or within their existing capabilities. These barriers include those that put companies seeking to enter the market at a disadvantage if they do not opt to localize their operations in the prescribed manner. They also tend to place actual restrictions on companies' ability to enter the market at all without localization. As mentioned, the most extreme policies are outright import bans and direct appropriation of know-how or materials by a country through, for example, forced technology transfer and compulsory licensing of IP.

Opposite tables 2 and 3 provide an overview of the differences between localization barriers and incentive-based non-discriminatory policies with specific examples for the life sciences sector.

It is important to note that within a given country these policies are not mutually exclusive. Often countries have in place both barriers and non-discriminatory incentives. Although in some areas these policy streams overlap, in other ways they are contradictory and counterproductive. On the one hand, protectionist-like barriers target the cultivation of the domestic industry through, for instance (for the biopharmaceutical industry) providing significant advantages in product registration and market access to local products (the definition of which may differ country by country). Yet, because these policies put imported products and international companies at a disadvantage, they limit incentives for foreign direct investment, technology transfer and trade involving research-based biopharmaceutical companies – key channels for engendering local innovative capacity. On top of failing to achieve the intended objective in terms of building up the local industry, in many cases these protectionist-like policies also conflict with other major government missions, such as maintaining public health, cost containment and international trade initiatives.

As is discussed in more detail through case study analysis at the end of section 2, this narrow, top-

down approach stands in direct contrast to more hands-off non-discriminatory policies that instead seek to promote a wide range of conditions necessary for investing in full-cycle research, development and production of medicines and medical devices. Many countries are currently pursuing various forms of a holistic national innovation strategy that encourages investment by international biopharmaceutical companies, and have concretely succeeded in building a homegrown biopharmaceutical sector.

1.3 Free trade versus protectionism: Localization barriers and international trade agreements

The erecting of localization barriers across a wide range of sectors is not a new phenomenon – the WTO, UNCTAD and other international organizations have sought to address such requirements, including those mandating domestic manufacturing, for several decades. Indeed, in many cases the most fundamental principles of international trade enshrined in both the GATT and WTO agreements (including National Treatment and Most Favored Nation) are in conflict with many localization policies. For example, the WTO Agreement on Trade Related Investment Measures prohibits local content requirements, which require a certain portion or parts of a product to be locally-produced or sourced.[11]

Moreover, domestic manufacturing policies have been found to violate WTO rules on several occasions.[12] Most recently the EU and Brazil have been engaged in a WTO dispute settlement process.[13] The dispute centers on preferential tax treatment for domestic goods and local content requirements within the Brazilian automotive and electronics and technology industries.[14] The EU argues that these requirements are a breach of the founding WTO principles including the principle of most favored nation.[15] At the time of research no settlement or dispute resolution had been issued.

2 LOCALIZATION BARRIERS – A GROWING FORM OF PROTECTIONISM

Localization barriers are on the rise. The trend towards increasing the number of barriers can be seen across the globe and is particularly pronounced in many emerging markets.

2.1 The rising threat of localization barriers since the mid-2000s

Numerous financial and trade bodies have documented a recent trend toward use of trade barriers, particularly non-tariff or indirect tools, that have the goal of discriminating against imported goods and boosting local industrial sectors.[16] For instance, according to the Global Trade Alert during the period 2012-2014 between 500 and 700 new trade restrictions were introduced every year globally.[17] In particular, industrial aspirations and concern over their dependence on global supply chains have led many emerging markets to seek to bolster or create indigenous sectors, including through introducing protectionist-like measures. Between 2008 and 2014, roughly 400 of the documented trade-restricting actions were explicitly aimed at supporting national industries through, for instance, local content requirements and procurement policies favoring domestic companies and products (with local content and procurement-related measures among the fastest growing).[18]

A good example of an area in which existing localization policies have become more onerous include local manufacturing requirements for biopharmaceuticals. Up until recently it was possible for foreign manufacturers in many countries to fulfill these requirements by simply repackaging and labeling products. However, over the last two years new policies have been introduced in some of the biggest markets making the manufacturing requirements much more prescriptive and burdensome. A good illustrative example of this change in policy comes from Russia. Up until recently it was possible to qualify as local by investing in very basic manufacturing operations in Russia, i.e. packaging or labeling. However, since 2013 the Russian government has focused on tightening manufacturing requirements for qualifying as "local", creating a working group focused on a revised list of localization criteria for pharmaceuticals[19] and introducing additional preferences for local manufacturers, for instance requiring production of pharmaceutical substances in order to qualify for preferential treatment in drug tenders.[20] Specifically, from January 2016, products undergoing only the packaging phase in Russia will no longer be considered "locally-produced".[21] On top of packaging or labeling, criteria for qualifying as a locally produced drug will involve the local production of the active substance or delivery form.[22]

In many countries both general and sector specific localization barriers have increased. For example, in Algeria (which has traditionally had in place an industrial and economic policy focused on localization and barriers to foreign entry) new cross-sectoral and biopharmaceutical specific localization policies have been introduced or intensified since 2005. For example, Algeria has for many years had in place restrictions on foreign ownership. Based on pre-existing measures in the oil and gas sector, the 2009 Complementary Finance Law introduced limitations on foreign investment to a minority stake (49% or below) in any industrial sector.[23] An additional restriction requires that the foreign investment generate positive currency balance for its entire duration. In an example of intensification of a pre-existing policy the 2014 Financial Law extended 2009 rules to companies only engaged in importation (and not domestic manufacturing activities), which were previously allowed to be foreign owned up to a 70% limit.[24] Similarly, a range of mandatory policies have been introduced that target the biopharmaceutical industry. The most punitive is the outright ban of imports of innovative medicines. Restrictions on drug imports have

been in place since October 2008 and have been further expanded since then. To date over 300 products are listed as excluded from import.[25] In April 2015 the Minister of Health announced that 200 additional drugs would be added to the list of banned products, based on the idea that they can now be produced locally.[26]

2.2 Cross-sectoral localization barriers – country examples

As mentioned, localization requirements are not exclusive to the biopharmaceutical industry. In fact, many of the most restrictive laws and rules in place are cross-sectoral and affect industries from all sectors of the economy. This sub-section provides a few illustrative examples of general localization policies from a range of big and small markets. The purpose is to give a sense of the types of cross-sectoral localization barriers that many countries have in place which are not necessarily biopharmaceutical specific. As discussed in the preceding sub-section Algeria has in place a number of general policies that seek to localize manufacturing and related industrial activities. But there are also examples from other countries

For instance, despite its general support for innovation, Brazilian investment policy has traditionally emphasized local content requirements and efforts aimed at adding value to local production.[27] This trend has accelerated since 2010/11 under the government's "Plano Maior Brazil" (Bigger Brazil Plan), which sets out strategic targets for domestic investment and innovation.[28] Notably, the plan aimed for investment spending to reach 22.4% of GDP by 2014 (up from 18.4% in 2010) and private R&D investment to reach 0.9% of GDP (up from 0.6%).[29] Various implementing measures have been adopted since the launch of the plan. For instance, the 2010 Law 12,349 ("Buy Brazilian Act") established preferences for businesses producing goods in Brazil, or ones that have invested in research and technology development in the country. These companies are granted a preference margin (calculated on the basis of the lowest offered price of a foreign product) of up to 25% over an equivalent bid from an importing company.[30] In addition, Decree 8304 (2014) introduces local content requirements to qualify for export assistance, whereby a 3% subsidy is granted to products with less than 40% of inputs imported (raised to 65% for some sectors, including pharmaceuticals).[31] Other tax measures for the export of automobile and ICT products for which most production stages are carried out in Brazil have also been in place since 2012.[32] As mentioned above, these measures have come under fire by the EU, which requested the establishment of a panel by the WTO Dispute Settlement Body for violating the national treatment principle.[33] Brazil has also tied the degree of local production to preferential prices in government procurement. For example, 60% of government funding spent on tenders for the roll-out of 4G wireless networks must be applied to locally-sourced infrastructure and technical services, with this figure required to rise to 70% by 2017.[34]

These cross-sectoral barriers are not confined only to large markets such as Brazil or geographically to Latin America. Instead, smaller markets across the world also exhibit the same tendencies. For example, both Thailand and Vietnam have in place cross-sectoral policies that seek to restrict and condition foreign investment.

Though Thailand broadly welcomes foreign investment,[35] several general barriers exist. Thailand maintains discriminatory tax policies for imported products applicable to many different sectors.[36] Explicit foreign ownership and management restrictions also exist and stricter requirements are under consideration for various sectors (including the ICT and insurance sectors). As an example, 75% of shares (carrying no less than 75% voting rights) within foreign insurance companies must belong to Thai nationals.[37] (Foreign ownership limitations do not apply to US companies, as they are guaranteed national treatment under the US-Thailand Treaty of Amity.[38])

Vietnam has in place a mix of policies aimed at supporting the growth of its local industry. On the one hand, particularly in recent years the government has introduced various positive incentives for investment in local R&D and in high-tech sectors more generally, although local companies receive more extensive benefits than foreign entities. All entities (local or foreign) benefit from a one-year tax exemption for income derived

from R&D, exemption from import tariffs on R&D materials and land rental used for R&D activities, and eligibility for funding from the National High Tech Development Program.[39] Additional R&D incentives, including R&D tax breaks and a reduced corporate tax rate, are available for high-tech SMEs.[40] A recent revision of the 2008 Law on High Technology, aimed at attracting more high-value foreign investment,[41] lowers some of the requirements for large companies to benefit from R&D incentives.[42] Also, in 2014 the Government updated and extended the already rather exhaustive list of high-tech products or technology prioritized for investment by foreign firms. On a general basis, such investments have to contribute to import substitution and improve the domestic science and technology's capacities.[43] The list also includes production of "new-generation biologicals for preservation and processing of pharmaceutical materials". On the other hand, top-down requirements and limitations aimed at boosting domestic industry are also in place or are planned. Public procurement rules are one key channel with localization barriers across a wide range of sectors, including pharmaceuticals. Most recently, building on existing requirements, under the revised Law on Public Procurement, which entered into force in 2014, imported products are banned from participating in public tenders if a bid from a local equivalent exists.[44] In addition, the new rules contain a local content requirement: bids in which domestic production represents at least 25% of the total cost of the product are given priority.[45] Other measures protecting local sectors include price ceilings for foreign products (for instance, in the agriculture and food sectors) and licensing requirements (applied to heavy manufacturing).[46] Localization requirements are also increasingly applied to the service sector. Among measures currently under consideration, a draft Decree on Information Technology Services proposes limiting public procurement of information technology services to Vietnamese suppliers only.[47]

2.3 Biopharmaceutical localization barriers – country examples

As discussed above, policies that target the biopharmaceutical sector tend to target various stages of a product's life cycle whether it be development, manufacturing or sale. Below localization policies are discussed within the context of the four major elements of a biopharmaceutical product's development and use, namely:

1. R&D

2. Regulatory process (including market approval)

3. Market access (including pricing and reimbursement and procurement)

4. Tax and commercial environment

The below discussion provides examples of both non-discriminatory, positive, incentive-based policies (where they are present) and localization barriers. As throughout the paper examples are primarily drawn from the countries listed in the Introduction with a tradition of localization policies. But where relevant examples exist from other countries these are included.

Policies affecting R&D

In the area of R&D, on the one hand, positive measures can include government schemes that promote and enable investment in innovative activities through a range of financial, administrative and structural support. Brazil's BNDES Profarma credit line, Chile's FONDEF fund for applied research, Mexico CONACYT program for PPPs, Korea's KoNECT scheme for clinical trial infrastructure, Israel's special visas for high-tech investors and the operating of clinical research networks in Ireland and Singapore are examples of these types of schemes. Positive incentives for R&D also include measures and policy frameworks that support the presence of high quality human and infrastructure capabilities in the market. The creation of local biomedical clusters and technology parks in Singapore, Ireland and, recently, India, Russia and Algeria illustrate the types of efforts that have taken place (or are taking place) to build the life sciences base in different markets.

On the other hand, policies that amount to barriers include those that require undertaking R&D that would have otherwise not been necessary leading to additional costs and delays to market access. For example, a number of countries mandate the conduct of local clinical trials as a condition of market registration. These requirements for additional local clinical trials are often based on industrial policy and efforts to build local research capacity. They form part of broader policies seeking to localize biopharmaceutical R&D through mandatory requirements. In China, for instance, since 2014 in order to obtain market authorization for higher-risk (Class III) medical devices local clinical trials must be conducted.[48] Similarly in Russia since 2010 under Federal Law N.61 "On Circulation of Medicines" there is an obligation to conduct local clinical trials in Russia by all companies (including foreign ones) as a condition of the registration of medicine.[49] Only products recognized as orphan drugs, for which international clinical trials have been held, can be registered without local trials. Even more demanding requirements include forced transfer of technology or know-how within, for instance, public-private research partnerships (for instance, certain of Brazil's Productive Development Partnerships), which may result in substantial intellectual and financial losses for research-based biopharmaceutical companies. (The conditioning of market access on the sharing of IP and proprietary technologies is a growing area of concern and discussed separately in sub-section 2.4.)

Policies affecting the regulatory process

Positive policies in the regulatory sphere entail measures that bring standards in line with international norms and reduce red tape and delays for pharmaceuticals across the board as well as specifically for imported or innovative products. Generally speaking, these types of measures reduce the cost and additional investment associated with addressing market-specific requirements, and aid in predictability and risk reduction for investors. These include efforts to streamline and harmonize regulatory standards with international best practices or provide special fast-track approval pathways for innovative or specialty drugs.

Standing in direct contrast are policies that require various degrees of investment in order to obtain market authorization (both those that are applicable only to imported products as well as to all products in the market). These types of policies add time and costs, at times quite substantial, to the regulatory process, further delaying or limiting effective market access for companies opting not to make the desired investment in the local market. A wide range of policies falling into this category is visible across different markets today. Examples include: making product registration conditional on local clinical trials (as mentioned), local manufacturing of the product itself (for instance, as in Indonesia) or establishment of a local facility more generally may also be required for registration. Imported products face disadvantages in registration, labeling, prescription and dispensation – to illustrate, in China, imported biopharmaceuticals do not benefit from fast-track approval and have higher fees. Market authorization in some countries also involves market-specific red tape, such as Turkey's rules for on-site GMP inspection by local authorities. Apart from market approval, challenges surrounding the import and licensing process, such as delays, lack of predictability and quotas (for instance, seen in Indonesia and Algeria), represent additional measures that place foreign investors and products at a disadvantage if they do not localize their operations.

Policies affecting market access

In terms of policies that make a market relatively more attractive for investors, these include measures or schemes that recognize the additional value of innovative treatments and generally provide a predictable and fair P&R and purchasing environment. Conversely, measures that disadvantage imported products in terms of price cuts or restrictions on reimbursement limit the ability to achieve effective market access and return on investment for biopharmaceutical companies that do not make the level or kind of investment sought after in the market (including localization of substantial manufacturing operations). Examples of these types of policies include price advantages for locally developed or manufactured products, such as linking price to inflation and production cost changes (as in Russia) and pharmacy mark-ups (as in Algeria). Additional measures also include difficulty listing, or de-listing of, imported products on essential drug lists or reimbursement formularies, such as has been proposed in Turkey as a manner of import substitution.

Public procurement is also a common area for localization policies to target, including for biopharmaceuticals – and mainly in a challenging manner. At one extreme, policies include those that introduce bans on participation in government tenders by foreign companies, both formally and de facto. These include measures in place or proposed in Russia (if two or more locally produced generic versions are available) and China (for medical devices in leading hospitals) as well as de facto in Thailand, with the almost 100% dominance of the state owned pharmaceutical enterprise GPO. Localization policies targeting procurement also comprise requirements that make purchasing of imported products, or preferential treatment to local products in public tenders, conditional on a certain degree of localization (ranging from end-stage manufacturing to substantial manufacturing to R&D and technology transfer). One manner of doing this, which is also visible across other sectors, is the use of local content requirements. Countries utilize LCRs explicitly; for instance South Africa operates a 70% LCR for capsules and pills and is discussing extending the requirement to other biopharmaceutical products. In other countries, the LCR is indirectly visible in

the sense that products are required to involve minimum level of production using local materials and manpower in order to be considered local (for instance, as mentioned, in Russia and Turkey).

Policies affecting the tax and commercial environment

Within the business environment, biopharmaceutical companies may face a number of policies that run the gamut from incentives-based to mandatory. On the one hand, these include positive measures that provide incentives for investment in R&D or manufacturing in the country, such as tax credits or generally low corporate tax rates. Such measures may also include policy efforts aimed at enabling supportive investment conditions, such as streamlining of administrative requirements, strengthening IP protection or nurturing a local venture capital market. While usually cross-sectoral these tax credits can also be biopharmaceutical specific. For example, China has a number of tax incentives in place to encourage R&D and high technology manufacturing from R&D deductions, exemption from VAT, technology transfer special rates, as well as a host of sector specific incentives. There is a super deduction available equal to 150% of qualifying R&D spending.[50] Moreover, high-tech and innovative companies (this includes the biopharmaceutical and industrial biotechnology sectors) can receive a special reduced corporation tax rate of 15%. Similarly, India offers a number of general and biotech specific tax incentives. The primary tax incentive is a 200% biotech specific R&D deduction.[51] The facility and expenses for which the deduction is for must be pre-qualified by the Indian Government. In addition, there are general R&D deductions (up to 100%) as well as super deductions for contracted out research to Indian entities.[52]

On the other hand, mandatory policies affecting the business environment also exist, not least outright import bans on biopharmaceutical products (such as in Algeria) or requirements for local entities to own rights in a company in order to operate in the market (such as local ownership requirements in Indonesia and Algeria and Chinese rules mandating IP ownership among local affiliates). There may also be requirements for partnering with local companies, such as mandatory distributor partnerships in Vietnam which in turn entail additional costs and limitations (and in some cases may even represent barriers to market entry if distributors with adequate capabilities are not available). Finally, imported products may be placed at a disadvantage within the tax regime, resulting in higher costs for investors (as in India and Brazil).

2.4 Forced to share – Intellectual Property, technology transfer and localization barriers

A growing area of focus for countries localization policies are requirements for the forced sharing of IP and proprietary technologies with local entities. Often in an effort to boost domestic technological capacity and innovation many countries have embarked on a series of policy initiatives that condition market access with the sharing of IP. These localization policies can be either direct – with clearly stated conditions of market access being the sharing of technologies or the issuing of a compulsory license – or indirect, whereby effective market access (for example within public procurement) is blocked unless IP is shared with a local partner. Examples of these policies range from large to small markets. The below sub-sections provide a few illustrative country examples of how these policies have been implemented.

Brazil

As mentioned, Brazilian foreign investment policies have traditionally emphasized cross-sectoral local content requirements and encouraging efforts aimed at increasing and adding value to local production. Increasingly, many of these localization policies are targeting the sharing of IP and transfer of technology. For example, as part of a wider policy of encouraging investment and capacity-building in biopharmaceutical R&D and manufacturing the Brazilian Government has been seeking to partner with multinational innovators through PDPs. Most recently, a new PDP regulation (Portaria 2531/14) was adopted with the stated objective of making existing partnership selection processes more transparent and predictable. However, these new regulations also contain requirements that introduce more invasive requirements for transfer of know-how and technologies. Specifically, private entities involved in a PDP must transfer the Drug Master File or the master cell bank (for small molecule and biological products, respectively).

China

China has for several years pursued an overarching approach to investment and innovation that both directly and indirectly requires localization in order to access the market. Indeed, some of the most notable localization barriers in place worldwide are China's "indigenous innovation" policies launched in the Plan for the Development of Science and Technology (2006-2020).[53] Over the last decade, a range of policies, including public procurement laws, IP laws, mandatory technology standards and technology transfer requirements, have been used to obtain foreign investment and know-how in a highly top-down and forced manner. Examples of such policies include joint ventures and technology transfer deals, whereby technology intensive industries trade technology for market access or government entities must favor foreign suppliers that provide training services or transfer of know-how. These have been common practice in China for several years, despite being prohibited by the WTO.[54] One illustration of this is the fact that while there is a specially reduced corporation tax of 15% (compared to 25%) for all high-tech companies, foreign entities must transfer ownership of their IP to a local entity in order to qualify.[55] In addition, licensing of foreign IP to local entities is subject to wide flexibilities on the local entities' part, including the ability to make improvements or reverse engineer the licensed asset without any ownership on the part of the foreign rights holder.[56]

Recent policies suggest that the tendency to require localization in order to access the market continues. In 2015 the Ministry of Commerce issued a new Foreign Investment Law that, generally speaking, further undermines WTO rules, including the national treatment principle.[57] In certain areas, investors must obtain administrative approval prior to investment, while in other areas instead of pre-approval investors must submit detailed annual reports. The law also requires certain companies, such as those operating in a joint venture with a local company, to restructure to meet certain local requirements. Similarly for biopharmaceuticals through the "Technical Guideline for the Research,

Development and Evaluation of Biosimilars" only locally produced drugs (including biologics) benefit from the exclusivity protection afforded through a "monitoring period" (akin to RDP).[58] The 2015 State Council circular put forward a new definition for "new drugs" that is stricter than the current one and requires an extensive level of investment – first global launch in China – in order to benefit from a range of existing advantages. Specifically, the current definition of new drug comprises drugs already marketed elsewhere but not yet in China, however under the new rules only drugs not yet marketed anywhere in the world will be considered as "new" in China, and thus qualified for certain benefits such as the five-year monitoring period. Moreover, under new biosimilar legislation, biologics reportedly must not only have the first worldwide launch in China but also be produced there in order to qualify for the 5 year marketing exclusivity.[59] Similarly, new guidance expected will reportedly reinforce requirements for stringent transfer pricing tax schemes that require a higher amount of global value chain profits from multinational companies to be conducted and "booked" in China (including transfer and "enhancement" of IP) as well as greater tax presence in China (for instance, requiring a subsidiary in China in order to market in the country).[60]

Ecuador

Ecuador has since 2010 been an active user of compulsory licensing for biopharmaceutical products. Nine licenses have been granted since 2010 and twelve more are being considered. These licenses have been issued on a basis of being a cost containment mechanism and policy of encouraging domestic innovation. Indeed, the patent coordinator for Ecuador's Intellectual Property Institute (IEPI) currently states on the Institute's website that the underlying purpose of issuing compulsory licenses was to deliberately cut the cost of medicines.[61] It is further stated that an additional goal of the Government's compulsory licensing regime is to strengthen domestic pharmaceutical manufacturing and R&D capacity, ultimately replacing existing imports.

India

India has in place a number of policies making market access contingent on the sharing or divulging of intellectual property. For example, through its 2012 decision in the Nexavar compulsory licensing case, the Controller General of Patents, Designs and Trademarks set a precedent of requiring foreign innovators to manufacture in India as a condition of "working the patent" in order to avoid forced licensing of their inventions to third parties. In the following appeal to the Bombay High Court, the Court further interpreted the working requirement to specify that satisfaction of the working requirement "would need to be decided on a case to case basis" and that "the patent holder would nevertheless have to satisfy the authorities under the Act as to why the patented invention was not being manufactured in India."[62] While no new compulsory licenses were issued in 2015 there were a number of negative developments suggesting that this remains an important part of India's policy framework. First, the Commerce and Industry Minister stated in response to parliamentary questions that, at the request of the Department of Health and Family Welfare, the Government was still considering the issuance of a compulsory license for the oncology drug dasatinib.[63] Second, while in a positive development the Controller General rejected the requests from Lee Pharma for the issuing of a compulsory license for saxagliptin (a product developed by BMS and AstraZeneca for the treatment of type II diabetes) one of the stated reasons for this rejection was a commercial consideration i.e. that the difference in proposed price was only marginal and not whether or not there was a bona fide public health emergency justifying the issuing of the license.

Indonesia

The Indonesian Ministry of Health Decree 1010/ MENKES/PER/ XI/2008 introduced significant IP-based barriers to accessing the Indonesian biopharmaceutical market. Specifically, this decree conditions foreign rights-holders market access on either (1) establishing a local manufacturing capability or (2) licensing their intellectual property to an existing firm with a local manufacturing capacity. In essence, this decree requires companies to set up a manufacturing plant in the country or partner with an existing local manufacturer, and thereby transfer know-how and other commercially-sensitive information, in order to receive market authorization.[64] Furthermore, products with patent expirations of more than five years (or off-patent products that have been imported into the country for more than five years) must be produced locally.[65] Under Decree 1799/2010 the manufacturing requirement was relaxed slightly, permitting domestic labeling and packaging activities to qualify as domestic production.[66]

3 FAILURE TO LAUNCH – HOW LOCALIZATION BARRIERS ARE FAILING TO GENERATE POSITIVE ECONOMIC ACTIVITY AND INCREASE INNOVATION

The preceding sections discussion of localization has largely been descriptive, mapping what individual countries are doing and seeking to draw out some key global trends. The purpose of this section is to build on this by deepening the analysis and address the question of the impact of localization policies and barriers.

As noted in section 1, fundamentally countries see localization policies and erection of barriers as an effective form of industrial and economic policy to further their own economic development. But is this borne out by the facts?

This section will assess the impact of localization policies looking at both the macro perspective analyzing flows of general FDI, trade and clinical research (as a proxy for biomedical FDI) as well as provide a stark contrast through case study analysis of markets that have been able to build internationally competitive biopharmaceutical environments using positive, non-discriminatory incentive based efforts as opposed to mandatory localization policies.

3.1 Decreasing economic attractiveness – Localization barriers and levels of FDI, global trade, clinical research and knowledge-intensive employment

The increase in recent years of localization barriers and other protectionist policies has triggered new studies on top of an already robust body of literature[67] suggesting that while protectionism may in some cases provide support to the local industry in the short-term, over the long-term it tends to result in negative economic effects. Trade restrictions on a given product are associated with reduced imports and exports in relation to that product and other market segments. A 2015 OECD study of a sample of 12 local content requirements in different markets found that these policies alone resulted in losses of imports of more than USD10 billion.[68] In addition, studies examining the impact of trade barriers introduced during the recent financial crisis find that trade flows affected by restrictive policies dropped by an average of 5-8% compared to flows not affected by such policies.[69]

Looking at levels of FDI, countries that introduced protectionist measures during the same period also experienced drops in investment. Based on World Bank and UNCTAD data, among these countries the average country experienced 27.1% less FDI in 2009 compared with 2006, while the average country among those that did not introduce such measures experienced an increase in FDI of 7% during the period.[70]

Protectionist policies especially damage high-tech or R&D-intensive sectors by limiting technology transfer, innovation and, ultimately, the development of a local industry capable of supplying other markets. Recent modeling based on data on investment by American multinationals in Portugal finds that policies targeting domestic firms, such as subsidies, that exclude foreign investors (rather than those that benefit all firms, such as a tax cut) discourage FDI, reduce the rate of innovation, and slow down the realization of positive welfare effects of innovation.[71] In contrast, by opening up key markets countries can expect to grow exports.[72]

In fact most of the evidence on country experiences strongly suggests that raising localization barriers – especially those that focus exclusively on benefiting domestic companies

– do not on balance stimulate a local innovative industry. Providing only isolated support or preferential treatment does not enable companies (domestic and foreign alike) to invest in manufacturing or R&D operations in a country if other conditions, such as the necessary technical capabilities, infrastructure, supply chain networks and regulatory standards, are not in place. Rather, a more effective strategy seems to involve a range of non-discriminatory framework policies that promote voluntary FDI, technology diffusion and sharing of international expertise, and provide the necessary human, financial and technological inputs for local firms to develop and grow.[73] This is particularly the case for biopharmaceuticals. Existing evidence shows that for countries seeking to build a competitive biopharmaceutical sector, policies that open up the market and provide other supportive conditions for biopharmaceutical R&D and advanced manufacturing are the most successful.[74] To illustrate this point with empirical data the following sub-section assesses the prevalence of clinical research comparing levels of clinical trial activity (as a proxy for biopharmaceutical investment) between countries that have raised localization barriers and others that focus on non-discriminatory incentive-based policies. This will be followed by a discussion of levels of knowledge-intensive employment as a share of the total workforce. High-tech sectors such as biopharmaceutical R&D require highly skilled labor. Yet as the evidence below suggests many countries that have erected localization barriers have seen limited growth in knowledge-intensive employment which includes high-tech sectors such as biopharmaceutical R&D. Countries like China, Vietnam, Indonesia, Algeria and Turkey all have relatively low levels of knowledge intensive employment as a percentage share of their total workforce. Significantly, this has not improved over time with the introduction of more onerous localization requirements.

Levels of clinical research and localization barriers

Different countries have experimented with fostering a local biopharmaceutical industry and have witnessed tremendous success. Detailed success stories from Denmark, Ireland, Singapore and the US are described in the following sub-section. But before diving into these individual case studies it is instructive to see the global picture through the lens of clinical research and, specifically, which countries are able to attract high levels of clinical trials.

Global clinical trials

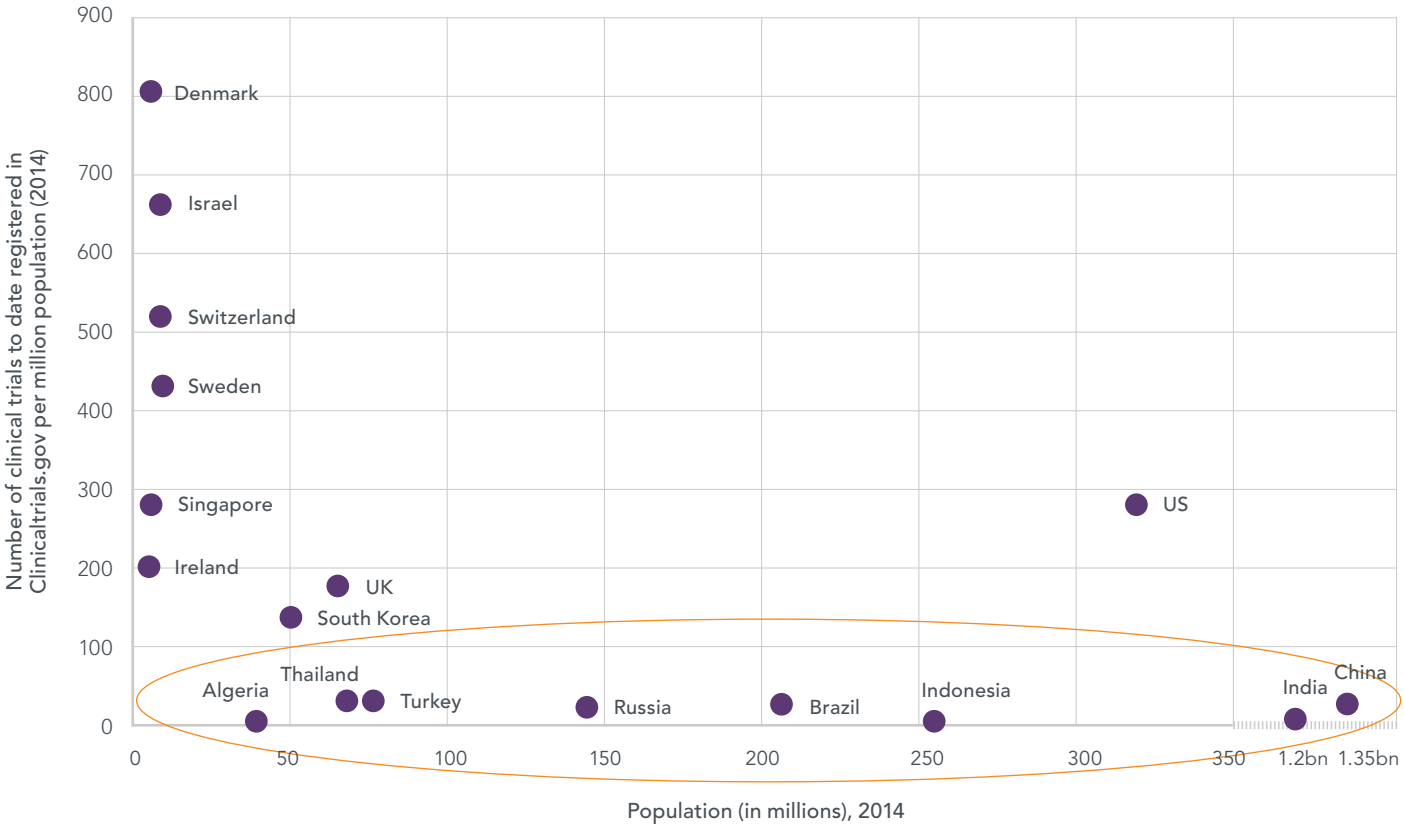
Examining clinical trial activity globally it is possible to get a good sense about the relative attractiveness of a given country to biomedical investment. As survey evidence of local executives suggests, while it is true that decisions about where to allocate investment and trials are not solely attributable to the policy environment in a given country the policy environment is a key driver and enabler of investment.[75] Developing a biopharmaceutical product and conducting clinical trials is a highly complex endeavor requiring advanced R&D infrastructure, highly trained individuals as well as state of the art support services. It is telling that when examining the level of clinical research and intensity (levels of clinical trials adjusted to population size) countries that have erected localization barriers – regardless of the attractiveness as a biopharmaceutical market – are not able to attract particularly high levels of clinical research.

On the next page Figure 1 shows how countries with localization barriers in place – such as Algeria, Thailand, Russia, Brazil, Turkey, India and China – tend to see much lower levels of clinical research activity than countries with more positive and non-discriminatory incentive based policies. Crucially, this phenomenon is not exclusive to big developed countries such as the US with large domestic markets, but also smaller countries that are primarily developing biopharmaceutical products for export. Denmark, Ireland, Israel, Switzerland, Sweden, South Korea and Singapore are a few examples of countries that do not have in place localization barriers and instead enable and attract biopharmaceutical research through incentive based policies.

Knowledge-intensive employment

Employment growth is a key sign of a healthy economy, particularly growth of jobs in high tech and knowledge-intensive sectors. Many recent studies indicate that knowledge-intensive sectors, and jobs in those sectors, make a significant contribution to the economy.[76] Knowledge-intensive companies tend to be characterized by

FIGURE 1 Clinical research, sample developed and emerging markets



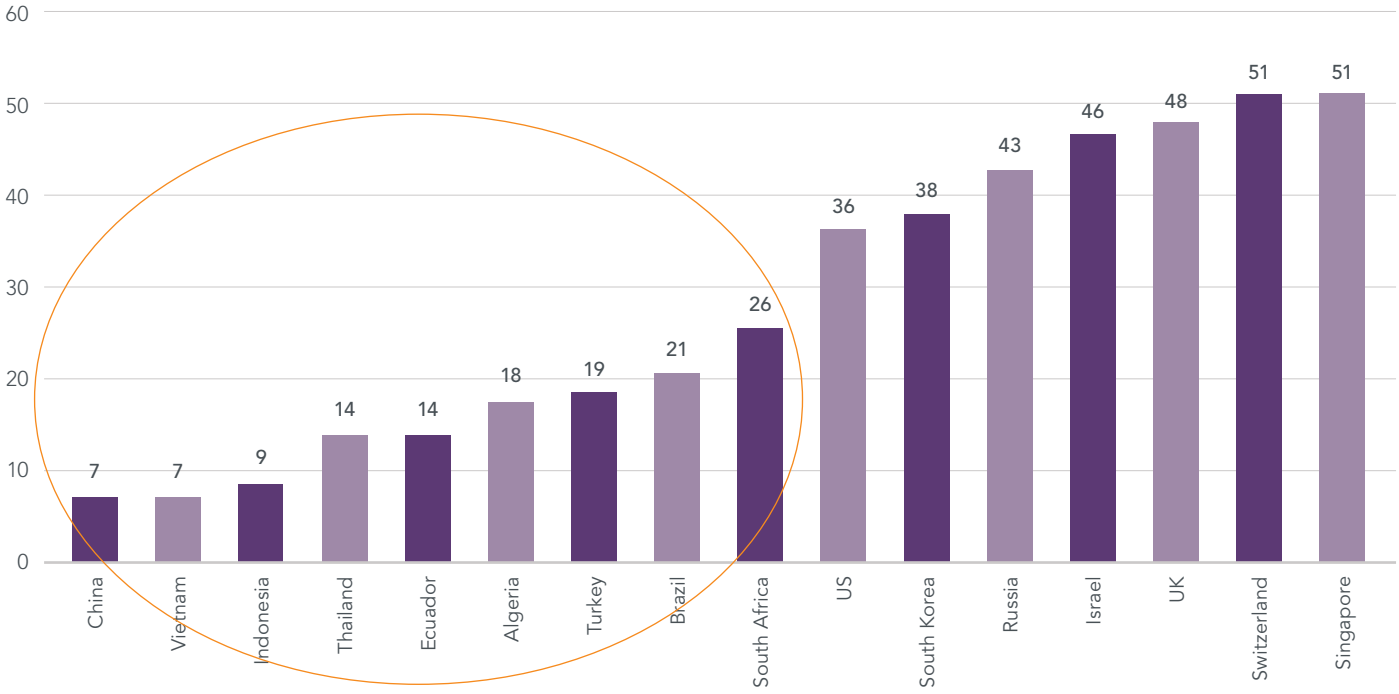
highly educated and skilled employees that bring the skills and capacity for innovative and creative activities. Knowledge-intensive sectors, including the biopharmaceutical sector, have also been shown to generate greater profits and sales per employee compared to relatively less knowledge-intensive industries, and ultimately greater contribution to GDP.[77]

High-tech sectors such as biopharmaceutical R&D require highly skilled labor. Yet many countries that have erected localization barriers have seen limited growth in knowledge-intensive employment which includes high-tech sectors such as biopharmaceutical R&D. Countries like China, Vietnam, Indonesia, Algeria and Turkey all have relatively low levels of knowledge intensive employment as a percentage share of their total workforce. Significantly, this has not improved over time with the introduction of more onerous localization requirements.

On the following page Figures 2 and 3 show how (with the exception of Russia) most countries discussed in this paper which have raised localization barriers have a relatively low share of their workforce in knowledge-intensive industries. In contrast countries with no barriers to entry and non-discriminatory, incentive based policies in place also see higher levels of knowledge-intensive employment. While there are many factors affecting employment and the composition of a given country's labor force this data does suggest that localization barriers do not help stimulate knowledge-intensive job creation. Indeed, as Figure 3 illustrates, in countries such as Turkey, Vietnam and Indonesia – which have all introduced increasingly burdensome localization requirements since 2005 – growth in knowledge-intensive job creation has been minimal.

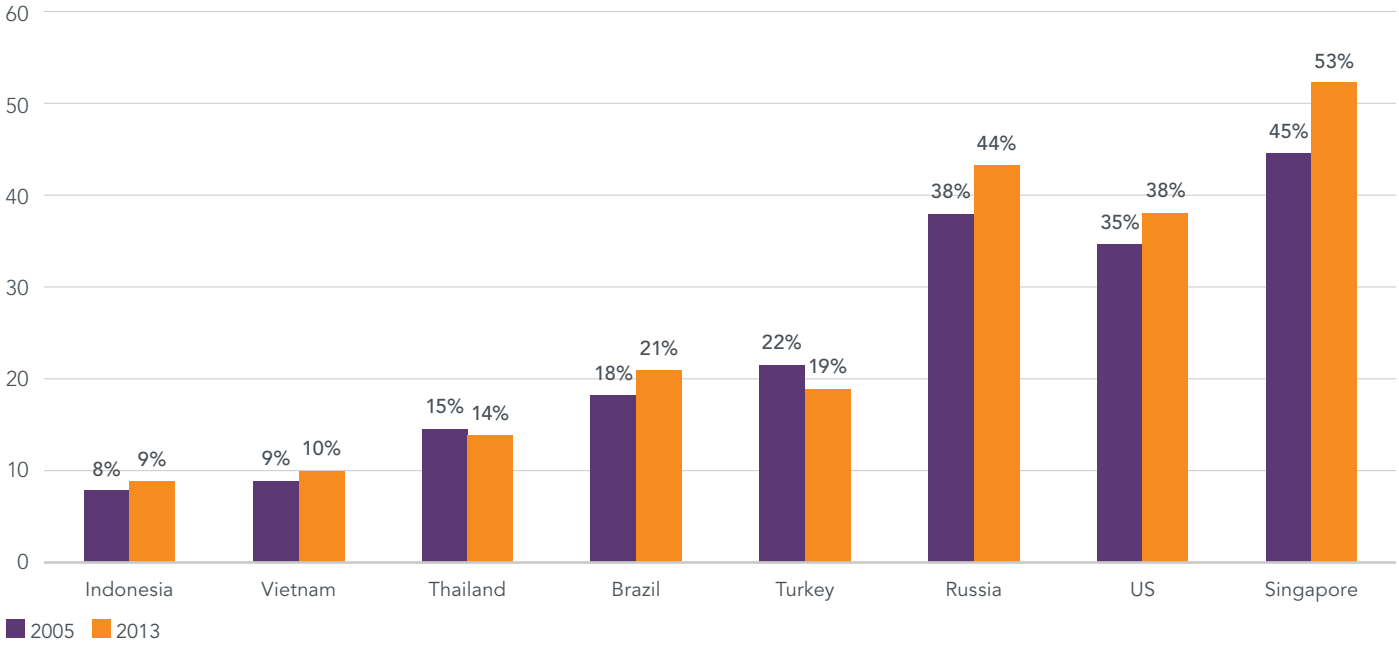
The following sub-section provides a deeper dive into the micro environment looking at the policy lessons learned from some of these country success stories.

FIGURE 2 Share of workforce employed in knowledge-intensive activities (%), ILOSTAT, 2013 or latest available year [78]



Source: ILOSTAT (2016)

FIGURE 3 Share of workforce employed in knowledge-intensive activities (%), 2005 vs. 2013



Source: ILOSTAT (2016)

3.2 Learning from others: Positive lessons of non-discriminatory incentive-based policies case study analysis of Denmark, Ireland, Singapore and the US

An alternative to raising localization barriers is to allow the growth of the local industry to occur spontaneously and in a natural progression through affording the necessary positive incentives and macroeconomic conditions. Existing empirical evidence indicates that in contrast to forced localization measures, such an approach can be highly effective in building a domestic innovative biopharmaceutical industry that is capable of supplying the local market with high-quality, affordable medicines over the long-term and becoming internationally competitive.

Different countries have experimented with fostering in such a manner a local biopharmaceutical industry and have witnessed tremendous success. Their experiences shed light on which policies could be introduced or strengthened in emerging markets in order to encourage market-based growth of local industries. This sub-section will examine the approaches implemented in Denmark, Ireland, Singapore and the US.

How Denmark became one of Europe's Innovation Leaders

Denmark has excelled at creating a local biopharmaceutical environment, earning the title of one of Europe's "Innovation Leaders".[79] It has done so by providing companies with access to an educated workforce, tax credits for R&D, government funding for biotechnology companies and strong intellectual property protections.

Underlying Denmark's dynamic biotechnology and biopharmaceutical industry is a highly educated science and business base. In 2010 the country spent 8% of GDP on educational institutions, above the OECD average of 6.2%. Additionally, expenditure per student stood at $12,848, compared to the OECD average of $9,313.[80] Early results show that the focus on education is paying off. In 2000, 29% of 25-34 year olds obtained a tertiary degree; as of 2012, this number had risen to 40%.[81] Amongst these students, 19% earned a degree in health and welfare, above the OECD average of 13%, and 41% earned a degree in social sciences, business or law, above the OECD average of 31%.[82]

Moreover, the Danish biopharmaceutical market has gained prominence through a series of government-backed measures aimed at making the country an attractive place for R&D, including biopharmaceutical R&D. Since 2009, 3% of GDP has been spent on R&D, with 2% coming from private spending and 1% from public.[83] Denmark offers an attractive corporate tax rate of 24.5% (expected to be lowered to 22% by 2016[84]), which is 2.1% below than the 2014 OECD average.[85] Further, Danish tax law allows biopharmaceutical companies to immediately write-off of capital expenditures for R&D in Denmark and apply for a tax credit of 25% on R&D costs of up to DKK 25 million (~ €3.3 million).[86] An additional incentive to locate in Denmark is that access to these tax incentives is available even if the R&D is performed outside of the country.[87]

Denmark also provides a number of funding measures to help young and innovative biotechnology companies thrive. In 2014, Innovation Fund Denmark had a budget of DKK5.3 billion (~€710 million) to provide funding to research-based companies that focused on innovative, technical-based solutions to solve societal problems in the country; DKK1.6 billion (~€215 million) of the total funding went to companies focused on diseases.[88] Separately, The Danish Growth Fund is a state-run fund that collaborates with private sector partners to provide funding for small and medium sized companies. The fund is particularly active in the biotechnology space, directly and indirectly facilitating DKK 5 billion (~€670 million) of investment in the sector since 2000. As of 2014, these biotechnology companies employed 1,000+ people with revenues of DKK 4 billion (~€540 million).[89] A third government funding mechanism is allocated through the Danish Council for Strategic Research. The Council places a particular emphasis on international pharmaceutical research collaboration and in the past two years has provided funding for collaboration on biotechnology projects with European partners, India and China.[90]

To ensure that Denmark is an attractive environment at all stages of the research process the government has taken steps to create a supportive clinical trial environment. To this end, the government has rolled out the "one-stop-shop" initiative. This program enhances collaboration between industry and hospitals by creating a standard clinical trial agreement allowing a company to access the countries hospital system in an efficient manner.[91] This cooperative environment is furthered through the government's creation of biotech clusters. Cooperation is particularly active at the Medicon Valley Biotech Cluster where over 300 life science companies, 12 universities, and 32 hospitals (together employing 40,000 people) operate.[92] Further, the Danish Health and Medicines Authority has gained a reputation for rapidly approving successful trials,[93] ensuring that companies taking advantage of these collaborative mechanisms will be able to bring products to market in a timely manner.

Strong intellectual property protections provide an additional incentive for biopharmaceutical companies to invest in Denmark. Denmark ranks 10th on the 2014 International Property Rights Index and third for the subset ranking on patent protection (standing first in Western Europe). Denmark's robust IP regime has created a dynamic and sophisticated patenting environment. Denmark is above the OECD average in terms of several measurements of patenting activity, including triadic patents filed, patenting firms less than 5 years old, patents filed by universities and public labs, and international co-patent filing.[94]

Further, the market access environment in Denmark is fairly supportive of innovative biopharmaceuticals. Denmark provides a relatively free pricing model for patented medications. Medication prices are tracked by the Danish Medicines Agency and distributed nationwide every two weeks, ensuring price consistency across the country.[95] Patients also receive a wealth of information on available products. By law, pharmacist must first offer a patient the cheapest alternative within a group of substitutable products; however, the patient is free to choose a higher priced alternative.[96]

In fostering an environment that provides local and foreign companies alike with a range of conditions needed for biopharmaceutical innovation, Denmark has successfully built up a local biopharmaceutical sector that is advanced, globally competitive and yields several economic benefits. At the end of 2013, the Danish biopharmaceutical industry employed 70,000 people, making it the second largest biopharmaceutical sector in the world based on employment and in per capita terms. The local industry is also extremely productive, measured on a drug per inhabitant basis; Denmark has the second largest commercial drug pipeline in Europe in per capita terms, with 232 drugs in different stages of development,[97] and one of the highest levels of per capita clinical trial activity.[98] The burgeoning sector has paid dividends for the government. Over 90% of all biopharmaceuticals produced in Denmark are exported, representing 10% of total Danish exports.[99]

The benefits derived from Danish policies can be seen on the micro level as well. Homegrown companies such as Novo Nordisk and Lundbeck are major players in the international pharmaceutical industry, with DKK 83 billion (~€11 billion)[100] and DKK 15 billion (~€2 billion) in annual sales respectively.[101] Both companies are highly invested in developing new and innovate products. Lundbeck earmarks 20% of yearly revenues towards developing new treatment options,[102] while 18% of Novo Nordisk's total workforce is focused on R&D[103]. The focus on new products has allowed each company to expand beyond national borders. For instance, in 2013 99.4% of Novo Nordisk product sales were to consumers outside of Denmark[104] and 44% of Lundbeck's sales were to markets outside of Europe.[105] The 2014 acquisition of the Danish biopharmaceutical company Santaris Pharma by Roche further displays the success of Denmark's policies. Santaris was born out of a university research product and was able to grow thanks to cooperation with multinational pharmaceutical companies located in Denmark. Roche reportedly decided to acquire the company based on recent research breakthroughs and the attractiveness of basing a research facility in Denmark.[106]

Ireland: A small country with a thriving biopharmaceutical sector

To attract global pharmaceutical companies Ireland has aggressively implemented business-friendly policies. These include low tax rates and substantial tax credits for R&D, government-backed funding initiatives and strong intellectual property protections.

Similar to Denmark, companies operating in Ireland can take advantage of the country's highly educated population. Forty percent of Irish adults have attained tertiary education, compared to the OECD average of 32%.[107] Further, in 2012 17% of newly enrolled tertiary education students were pursuing a degree in the sciences, 7 percentage points above the OECD average[108]. To further ensure a robust science base, the government has backed the creation of various research institutes focused on biotech and life sciences, such as the National Institute for Bioprocessing Research and Training. The facility's primary goal is to attract more pharmaceutical companies to the country through training personnel and conducting research.[109]

On top of an educated population, pharmaceutical companies have relocated to the country to take advantage of R&D incentives and low tax rates. Ireland's corporate tax rate of 12.5% is amongst the lowest in the world, far below the average global corporate tax rate of 22.6%.[110] The government has displayed a steadfast commitment to R&D, spending €8 billion on R&D in 2012-2013 alone,[111] and providing a 25% tax credit on all facilities built for R&D purposes (provided that the 35% of the facility is used for R&D for four years after completion).[112]

In addition, the government assists companies through a number of different funds and grants. Early stage companies have access to the Innovative High Potential Start Up Fund that provides funding in the form of equity investment and the R&D: Small Projects fund that provides R&D grants of €150,000 or less. For companies requiring more funding, the R&D: Standard Projects fund provides R&D grants of up to €650,000 and the Technical Feasibility Study Grant assists companies investigating the viability of a new manufacturing process.[113]

Along with grants for individual pharmaceutical companies, the Irish government places a high value on collaboration and offers corporations generous incentives for working with local businesses or universities. One program that could be very useful to pharmaceutical companies conducting novel research is the Industry-led Research Networks Programme (ILRP). This program is designed to mitigate the risk of companies conducting cutting edge research by allowing a consortium of companies working in similar areas to contract the research out to publicly-funded institutions.[114] Pharmaceutical companies may also access the Technology Gateway Program that facilitates partnerships between industry and "Technology Gateways" located around the country,[115] such as the Shannon Applied Biotechnology Centre, the Pharmaceutical & Molecular Biotechnology Research Centre, and the Microsensors for Clinical Research and Analysis Gateway.[116]

Multinational biopharmaceutical companies have taken notice of the Irish government's effort to attract business. 120 international pharmaceutical

companies have established domestic operations in the country, including nine of the ten largest. Moreover, Ireland has become a top destination in Western Europe to conduct clinical trials (on a per capita basis), and over 48,000 people are directly or indirectly employed by the industry.[117] FDI has jumped considerably in recent years from 10% of GDP in 2011 to 21.5% of GDP in 2013.[118] This steady increase in FDI has resulted in the creation of 161,000 new jobs.[119] The interest in Ireland from multinational companies is also reflected in the country's M&A activity. During the first half of 2014 M&A deals experienced an over 31% increase compared to the same period in 2013.[120] Strong M&A activity continued throughout 2014, including 23 deals in the pharmaceutical sector.[121]

Companies that have relocated to Ireland are a major contributor to the economy. Pharmaceutical companies exported €55.1 in 2011 or just over half of Ireland's total exports.[122] These exports include the majority of the world's Botox supply and 80% of stents.[123] Ireland has also generated its own multinational pharmaceutical companies, notably Shire Pharmaceuticals. In 2013, Shire had global sales of $4.8 billion across 30 global markets, driven by over $1 billion in sales for its flagship ADHD product Vyvanse.[124]

Still the star pupil: How Singapore remains a global biopharmaceutical powerhouse

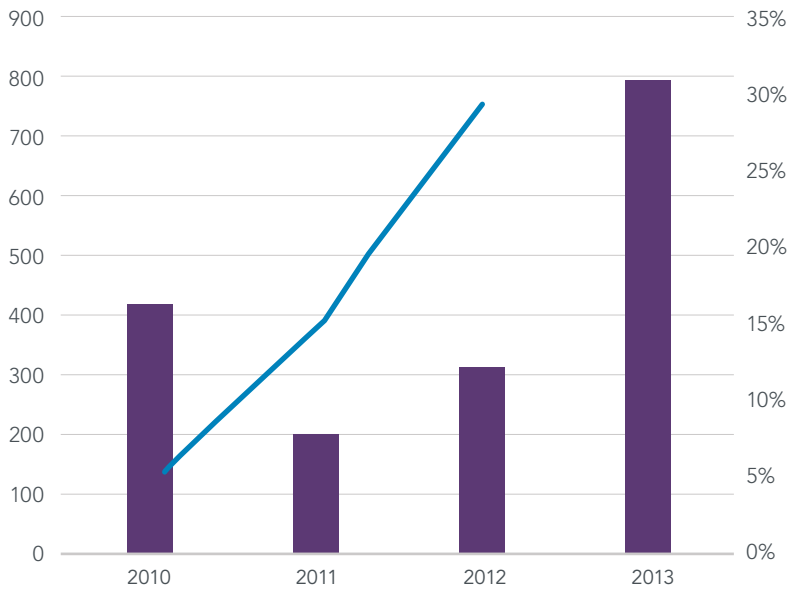
Singapore has developed world-class R&D and manufacturing capabilities and has seen tremendous growth in investment by multinational research-based companies. Manufacturing today alone is estimated at SGD23 billion, a value close to 5 times higher than in 2000.[125] Singapore has seen considerable investment in advanced manufacturing and R&D from leading global biopharmaceutical companies. Bayer Healthcare has partnered with five research institutions in Singapore in order to set up a new Translational Oncology Network to target R&D aimed at the growing cancer burden in Asia.[126] Moreover, over 30 multinational companies have established manufacturing operations in Singapore, including several biologics production facilities.[127] For instance, AbbVie has invested in manufacturing facilities aimed at biologics and small molecule active substances, and Novartis established a plant in 2014 focused on manufacturing monoclonal antibodies using cell culture technology.[128] Importantly, a portion of the most recent manufacturing investments are aimed at the drug development phases, including products used for clinical testing.[129] Over the last few years, Singapore has continued to garner substantive levels of investment in biomedical manufacturing, and concurrently experienced considerable other economic and public health benefits. As Figure 4 shows, in 2013 investment commitments doubled relative to 2010 figures. In this context, Singapore has successfully built an internationally competitive biomedical sector as well as enhanced its ability to supply the domestic market. On top of public-private partnerships with multinational companies, domestic companies have also successfully entered foreign markets. For example, Menarini Asia-Pacific, a local company recently acquired by an Italian group, markets its innovative pharmaceuticals, medical devices and biotech products in 13 Asian countries.[130] Indeed, data from the UNCTADstat database shows that exports of biopharmaceuticals have risen at a striking rate since 2010; in 2012 exports grew 30% compared to 2010 levels.[131]

Moreover, Singapore is known to have one of the top rated health systems in the world, including in terms of its ability to provide wide access to innovative medicines and yet maintain relatively low costs.[133] For instance, Bloomberg's rankings of most efficient health care systems rates Singapore among the very top globally, second only to Hong Kong. Using data from the World Bank, International Monetary Fund and World Health Organization, Singapore's health care cost as a percentage of GDP per capita is found to be at just 4.4%, compared to 8.5% in Japan (ranked third in the analysis) and 11.5% in Switzerland.[134] Based on this figure combined with a life expectancy of almost 82 years, Singapore is given an "efficiency score" of 81.9, the second highest among the ranked countries.[135]

US: Secrets to its success as a biopharma world leader

Many of the policies put in place in Denmark, Ireland and Singapore mirror policies implemented first in other countries, most notably the US, whose innovation strategy over the past 40-50 years has helped propel the country to global dominance

FIGURE 4 Biomedical investment and exports in Singapore, 2010-2013



Sources: MTI, Economic Survey of Singapore (2012, 2013, 2014); Pugatch Consilium calculations based on UNCTADstat (2014)[132]

in the biopharmaceutical sector. Among PhRMA member countries, the US accounts for 62.4% of pharmaceutical sales and 75.6% of R&D investment.[136] One illustration of policies taken to achieve this position are the US' financial incentives for R&D generally and specifically for biopharmaceutical R&D. The US offers a host of pharmaceutical R&D tax credits including credits for research focused on orphan indications and a 20% credit on R&D expenditures. The government also allows R&D tax credits to offset tax liabilities from one year earlier than the credit was earned to 20 years after (a 21 year window).[137]

In addition to tax incentives, the US government is very active in offering federal research grants. In 2013, the National Institute of Health distributed almost $15 billion in grants for R&D purposes with the average grant size being just over $440,000,[138] the Food and Drug Administration maintains a grant program specifically focused on orphan indications that has distributed $330 million in funding across 530 clinical studies[139], and the National Science Foundation administers the Biotechnology and Biochemical Engineering program that provides research grants typically between $100,000 and $200,000, although companies may petition for a larger appropriation.[140]

An additional key driver of American biopharmaceutical innovation and commercialization has been the success of technology transfer in the US. The Patent and Trademark Law Amendments Act of 1984 and 1986 (commonly referred to as the Bayh-Dole Act) and the Stevenson-Wydler Technology Innovation Act, which was later amended by the Federal Technology Transfer Act of 1986 and the Technology Transfer Commercialization Act in 2003 have all been instrumental in incentivizing technology transfer. These laws gave institutions that received federal support (such as American universities, small businesses and non-profits) control and the rights to any resulting intellectual property of their inventions or research. Studies have found a significant increase in patenting activities at US universities following these pieces of legislation,[141] resulting in an estimated $86-$388 billion (2005 USD) contribution to GDP.[142] In 2012 university related patenting, licensing and start-ups were still strong, with other 22,000 patent applications filed, over 5,000 licenses executed and 705 start-ups formed.[143]

4 SUMMING UP THE NEGATIVE IMPACT OF ERECTING LOCALIZATION BARRIERS: SIX MYTHS AND FACTS

Building on the data and case studies discussed in the paper, the paper ends by summing up the negative impact localization barriers have through six 'Myths and Facts' with country specific examples from the preceding analysis. These myths of localization are some of the most common assumptions about the beneficial impact localization requirements can have.

The corresponding facts show how these assumptions are not borne out by empirical evidence and country experiences. Each myth and fact is followed by specific examples of country experiences and evidence that can be used as arguments and data against the myths.

These 'Myths and Facts' have been divided up thematically and cover the following areas:

1. Domestic manufacturing capacity

2. Domestic biopharmaceutical R&D

3. High-tech FDI

4. Access to essential and cutting edge medicines

5. Health system cost savings

6. Effect on imports

1. Domestic manufacturing capacity

Myth: Mandatory localization requirements lead to an increased local production capacity.

Fact: Countries that have introduced onerous localization requirements to increase domestic biopharmaceutical manufacturing have seen relatively limited returns. Domestic manufacturing capabilities have often not increased or if they have, the increase has been only marginal.

Country examples:

– Since the introduction of the Algerian government's 2011 five year development plan and associated mandatory localization measures (including import bans and preferential treatment of local companies), the share of domestically manufactured products in the market have only risen by an estimated 4% (from 36% of the market in terms of value in 2011 to 40% in 2015); this is well under the target of 70% set for 2015 in 2011.[144]

– Despite objectives to increase local production supported by domestic manufacturing requirements, ownership restrictions and onerous product labeling requirements, to date the Indonesian pharmaceutical sector remains underdeveloped, with just a few domestic companies controlling 60% of the prescription drug market in terms of value.[145] Moreover, raw materials largely come from abroad (90%) and Indonesian companies mainly assemble final products.[146]

2. Domestic biopharmaceutical R&D

Myth: Localization requirements stimulate biopharmaceutical R&D.

Fact: Markets that rely on onerous localization requirements tend not to see high levels of biopharmaceutical R&D. Rather, biopharmaceutical R&D spending either remains low or decreases as investment activity dries up.

Country examples:

– In the context of ongoing government efforts at "indigenous innovation" in China, private investment in R&D by domestic biopharmaceutical companies is very low; on average, Chinese biopharmaceutical companies devote less than 1% of their budgets to R&D, with production and sales focused predominantly on generic products and APIs.[147]

– Despite private R&D spending targets under the "Plano Maior Brazil", R&D investment by pharmaceutical companies active in Brazil (both domestic and multinationals) remains low not exceeding 2.4% of revenues. This is in contrast to 18-23% of sales dedicated to R&D globally among the research-based industry worldwide.[148]

– Despite the Turkish government's targets of increasing R&D by 25%, the deteriorating policy environment has led to more than 23 research-based companies (predominantly non-Turkish international companies) announcing that they had to cancel investments.[149]

– Despite government objectives to boost pharmaceutical R&D as part of its Strategy for Science and Technology Development, under Vietnam's current mandatory localization policies the majority of local pharmaceutical production in the country continues to focus on generics and basic, low-value drugs.[150]

3. High-tech FDI

Myth: Raising localization barriers promote high-tech biopharmaceutical investment or FDI.

Fact: Mandatory and onerous localization requirements drive minimum-level investments, i.e. enough to meet the requirement but no more. Innovative firms are not incentivized to invest beyond the required level of investment (for instance, packaging or labeling). In many countries, despite the introduction of mandatory localization policies, local innovative sectors remain largely dormant or non-existent. Instead, generic and/or basic manufacturing operations continue to dominate the sector, and targets aimed at growth of innovative products are unmet.

Country examples:

– Despite the Algerian government's ongoing emphasis on R&D, investment in the local market remains primarily in end stage and basic operations; even the projects surrounding the new biomedical park of Sidi Abdellah, which is currently involved in 42 investment projects involving pharmaceutical companies, all focus on generic products.[151]

– Under Brazil's localization regime, including via its Productive Development Partnerships, FDI has largely been directed towards biosimilars and generics, with a substantial portion of recent acquisitions of Brazilian companies by the international research-based industry focused on competing in the generics market.[152]

– Russia's emphasis on import substitution and localization requirements is not necessarily driving the level of investment needed to reach its Pharma 2020 objective of producing 60% of patented medicines locally. A recent survey of biopharmaceutical companies active in Russia show only 10% of innovative companies in the sample (manufacturing original drugs) plan to establish a joint venture with a local company, and only 16% of the sample (including foreign generic companies) plan to acquire local facilities.[153] While a slightly larger portion of companies plan to establish completely new facilities, the large majority of these are generic companies.[154]

– In addition, under Russia's current industrial policy regime, the biggest gains in foreign-sponsored local clinical trials since 2010 come from bioequivalence studies (typically conducted for generics and considered to be relatively basic), with a 48% higher number than local innovative trials.[155]

– Notwithstanding long-standing targets for investment in and movement of the local biopharmaceutical sector up the value chain in Thailand, biopharmaceutical imports accounted for more than half the total import value in 2013,[156] multinational biopharmaceutical companies with operations in Thailand engage mainly in re-packaging, contract manufacturing or distribution.[157]

4. Access to medicines

Myth: Domestic manufacturing targets and localization requirements increase access to essential or cutting edge medicines.

Fact: Raising localization barriers do not necessarily increase access to either essential or cutting edge products.

Country examples:

– In Algeria, import bans on over 300 medicines, combined with inadequate resources and infrastructure to produce a number of these products locally, result in drug shortages in key areas; shortages of over 320 mainly chronic disease treatments (including cardiovascular and cancer drugs as well as insulin) were reported in 2015, with many of these recently added to the list of banned imports but not yet supplied by local manufacturers.[158]

– Algeria's imports bans have delayed access to best available treatments, for instance for cancer; looking at 47 oncology drugs approved by the European Medicines Agency over a 13-year period, from 1999 to 2012, only half of them were authorized for market in Algeria by 2014.[159]

– Even though locally produced medicines automatically have on average a 25% price preference in government tenders in Brazil, medicines are often not available when needed; local studies suggest that, on average, 40% of the medicines prescribed in public primary health care were not available when needed.[160]

– Under China's localization requirements, new and advanced medicines are not being made available to Chinese patients; in 2014, close to 60% of sales involving multinational pharmaceutical companies in China consisted of products launched more than ten years ago.[161] In addition, only 21% of all new molecular entities registered globally between 2009 and 2012 were available to Chinese patients in 2013.[162]

– Despite requirements for new drugs to be launched first in China before other markets, neither local or multinational companies are adequately incentivized and/or enabled to develop and produce innovative drugs in the domestic market; out of around 350 drugs approved in 2014, only 2.9% were drugs that had not been marketed anywhere in the world and none were the more advanced biological drugs.[163]

– Despite Indonesia's localization requirements, essential medicines are not readily available; only half of the drugs on the WHO-recommended EDL are supplied in the local market, and a survey of 9,000 health centers in the country found that 85% had less than 80% of the medicines on the country's EDL in stock.[164]

– Despite the emphasis on local production of pharmaceutical (including innovative drugs) as a manner of improving access to medicines, in reality access remains limited in Russia – and has decreased as import substitution policies have intensified in the last few years. While 29% of new molecular entities launched between 2006-2010 were available at the end of 2011,[165] just 22% of those introduced between 2008-2012 were accessible in Russia at the end of 2013.[166]

– In Turkey, between 2011 and 2014 of drugs approved in the US and EU only around 30% were made available in Turkey during the same period, with this figure dropping to 4% between mid-2013 and mid-2014.[167]

– In spite of the strong emphasis on locally produced generic drugs in Vietnam pervasive gaps in access to medicines exist; in 2014 the social health insurance formulary was reduced by around 100 products to just 57, and in turn, a rising number of complaints of lack of access to cancer treatments have been reported.[168]

5. Health system cost savings

Myth: Erecting localization barriers drive down health care costs.

Fact: Countries that erect localization barriers see little to no drop on biopharmaceutical or total health spending.

Country examples:

– Despite a wide range of government cost containment and localization requirements, average patient drug expenditure in Brazil as a percentage of total healthcare spending has not fallen, but rather grown by around 5% over the past 5-8 years according to the most recently available figures.[169]

– Local production of treatments does not necessarily mean needed treatments are more affordable in Indonesia; even including generics, drug prices are higher than those modelled by the WHO.[170]

– In the context of import substitution policies and sanctions, domestically produced medicines have demonstrated less price flexibility than imported products in Russia, with costs passed on to consumers. While on the one hand prices of imports (in terms of total value of imports) decreased in 2014 compared to 2013, the overall prices of medicines in Russian pharmacies grew by 12.7% in 2014, with growth reaching 20% in the last 1.5 months of the year.[171]

– Delays in access to oncology drugs in Turkey, in part due to a burdensome GMP inspection procedure, have paved the way to soaring prices for these products; a 2013 report found out that in some hospitals, oncology drugs that usually cost TL52 (around USD20) were sold for TL900 (around USD300).[172]

– Under Vietnam's local production requirements, drug prices on the lowest-priced generics are still more than 10 times higher than modelling by the WHO would suggest,[173] and are reportedly increasing at an average rate of nearly 8% per year.[174] Moreover, government data indicates that some winning local bids in public tenders can in some cases bring prices 150-250% higher than that of imported products.[175]

6. Effect on imports

Myth: Raising localization barriers lead to less dependence on imports of biopharmaceuticals.

Fact: In many countries imports still dominate the local biopharmaceutical sector despite strict localization requirements.

Country examples:

– In Russia despite the significant effort towards import substitution, the tendency persists to import finished pharmaceutical products rather than produce them locally; according to the Russian Ministry of Industry and Trade, more than 70% of drugs available in Russia in 2014 were produced abroad.[176]

– Despite local content requirements for pharmaceuticals in public tenders in South Africa (aimed at achieving strategic targets around local manufacturing of APIs and biologics) local products remain uncompetitive in the local market; imports of finished products represent around 65% of the total biopharmaceutical market, and APIs 95%.[177] This tendency occurs even though, according to government reports, the local industry operates at less than 50% capacity.[178]

– Utilizing mainly punitive and mandatory localization policies to try and meet government objectives of local production of biopharmaceuticals covering 60% of the domestic market, imports in Turkey still represent more than 50% of the total market.[179]

– Despite targets for local production and import substitution policies, imports continue to cover around half of the domestic pharmaceutical market in Vietnam, and have more than doubled in value terms since 2008.[180]

– Despite targeted funds from the Brazilian Development Bank (BNDES), uptake of locally produced biologics in Brazil has been limited; as of 2014, of the 97 products covered by or produced under a PDP, only 19 were actually being purchased by the Ministry of Health.[181]

– Despite policies that favor local production of generics and APIs 80% of raw materials for India' drug production 80% of raw materials for India' drug production come from China and pharmaceutical imports to India overall have increased by 35% since 2012.[182]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