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Mitigation of Antimicrobial Resistance (AMR) in G20

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Abstract

Antimicrobial resistance (AMR) is a recognised global threat to health security. However, mainstreaming responses to this threat into public policy has remained elusive, and anti-AMR measures have been limited to health interventions. AMR is caused by global factors, including sustained and irresponsible antibiotic use in humans and animals, as well as climate change. Hence its effective management also requires global collaborative efforts. This policy brief provides an overview of AMR, its significance, and the current landscape of policies, national action plans, and funding for AMR research and surveillance within the G20 countries. It also highlights the need for concerted action and international cooperation to address this critical issue.

Keywords: Antimicrobial resistance, G20, Pandemic, NAPs

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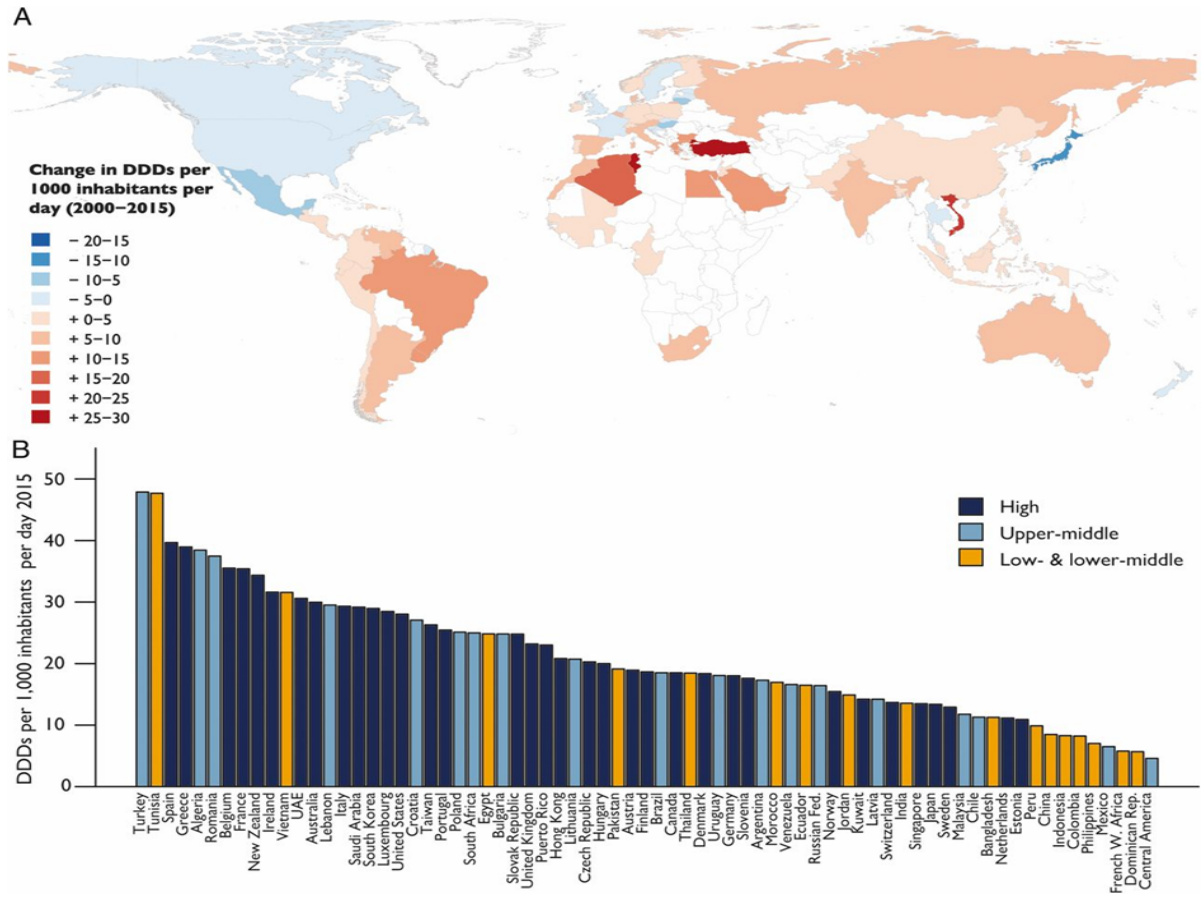
1. Introduction

Antimicrobial resistance (AMR) refers to the ability of microorganisms, including bacteria, viruses, fungi, and parasites, to withstand the effects of antimicrobial drugs, rendering them ineffective in treating infections. This can aggravate illness, leading to disability or death in cases where such extreme consequences were once preventable through medication. This phenomenon, which arises as pathogens evolve to escape drugs, is exacerbated by the misuse of antimicrobial agents in human healthcare and animal agriculture. AMR undermines the effectiveness of existing treatments, leading to increased morbidity, mortality, and healthcare costs, as well as compromising the success of surgeries, transplants, and cancer chemotherapy.

The emergence of AMR can be traced back to the 1940s, shortly after the widespread use of penicillin began (Review on Antimicrobial Resistance, 20161). Since then, AMR has grown into a serious global health threat. It is estimated that AMR causes 700,000 deaths yearly, which is expected to rise to 10 million deaths by 2050. The economic cost of AMR is also significant, estimated to be $100 billion per year (Review on Antimicrobial Resistance, 2014). The World Bank estimates that by 2050, AMR could cause global economic damage equivalent to the shocks experienced during the 2008 financial crisis, with an annual GDP loss of 3.8 per cent (World Bank, 2017).

A causal factor for AMR is indiscriminate antibiotic use. Analysing the global trends in antibiotic use, it is evident that there is a significant geographical disparity. In high-income countries, such as those in North America and Western Europe, there has been a concerted effort to curb the overuse of antibiotics, leading to a relative decrease in their consumption (Figure 1). This is largely due to increased awareness of the risks of antibiotic resistance, and the implementation of stringent antibiotic stewardship programs. However, in many low to middle-income countries (LMIC), there has been a 65% increase in antibiotic use between 2000 and 2015. Among G20 countries, Turkiye and Brazil have seen the largest increase in consumption (Klein et al., 2018).

Figure 1: Change in Defined Daily Dose (DDD) of antibiotics per 1000 inhabitants per day (2000-2015)



Adapted from (Klein et al., 2018). DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults.

This rise is attributed to factors such as population growth, economic development, increased access to medicines, the prevalence of infectious diseases, and lack of regulation in antibiotic sales. The lack of stringent regulatory mechanisms and easy availability of antibiotics has led to their overuse. The WHO's 2021 report emphasises that escalated antibiotic consumption in Low-and-Middle Income Countries (LMICs) is leading to the proliferation of antibiotic-resistant bacteria (World Health Organisation, 2021a). This not only jeopardizes the health of populations in these countries, but also has far-reaching global consequences, due to the spread of resistant strains.

Broad-spectrum antibiotics such as cephalosporins, fluoroquinolones, and carbapenems are among the most consumed in LMICs (Klein et al., 2018). These antibiotics are known for their ability to target a wide range of bacteria. Moreover, there is a significant consumption of over-the-counter antibiotics, without prescriptions, including amoxicillin, tetracyclines, and trimethoprim/sulfamethoxazole combinations (Morgan et al., 2011).

The rampant use of antibiotics has resulted in several pathogens developing resistance. These include:

- Klebsiella pneumoniae - This bacterium associated with pneumonia in patient populations with alcohol use disorder or diabetes mellitus has developed resistance to carbapenems, which are considered last-resort antibiotics for treating severe infections (Nordmann and Poirel, 2014).

- Escherichia coli (*E. coli*) - An increasing number of *E. coli* strains have become resistant to commonly used antibiotics, leading to complications in treating infections such as urinary tract infections (Tacconelli et al., 2017).

- Staphylococcus aureus - Methicillin-resistant Staphylococcus aureus (MRSA) is a well-known antibiotic-resistant bacterium, which is difficult to treat and is a cause for concern in hospital settings, particulary for wound care (Chambers and DeLeo, 2009).

- Mycobacterium tuberculosis (MDR-TB and XDR-TB) - Multi-drug resistant (MDR) and extensively drug-resistant (XDR) tuberculosis are forms of tuberculosis that are resistant to at least the two main first-line drugs (Seung et al., 2015).

- Neisseria gonorrhoeae - This bacterium, which causes gonorrhea, has developed resistance to a large number of antibiotics and is now termed as a “superbug” due to its ability to evade multiple drugs (Unemo and Shafer, 2014).

The World Health Organisation (WHO) has identified a list of priority microbes (Appendix 1), that are considered to pose the greatest threat to human health due to antimicrobial resistance (AMR). However, even the WHO priority microbes list is not exhaustive, and other microbes that pose a threat to human health due to AMR may exist.

The global nature of AMR evolution demands a global response for its mitigation. No single country or groups of country can effectively mitigate the rise and spread of AMR pathogens. Hence, the WHO has become a nodal agency in the global response to AMR.

2. Global actions against AMR

2.1 World Health Organisation's Global Action Plan

The WHO has developed the Global Action Plan (GAP) on Antimicrobial Resistance, which serves as a comprehensive framework for addressing AMR at the global, regional, and national levels (World Health Organisation, 2021b).

The action plan is built on five strategic pillars, aiming to:

- Enhance awareness and understanding of AMR through effective communication, education, and training.
- Strengthen knowledge and evidence base through surveillance and research.
- Reduce the incidence of infection through sanitation, hygiene, and infection prevention measures.
- Optimise the use of antimicrobial medicines in human and animal health.
- Develop an economic case for sustainable investment and increase investment in new medicines, diagnostic tools, vaccines, and other interventions.

A salient feature of this plan is the adoption of the **One Health approach**, which is an integrative effort of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals, and the environment. This approach is indispensable given the intricate interconnectedness of human, animal, and environmental health.

2.2 WHO's GLASS initiative:

The WHO Global Antimicrobial Resistance Surveillance System (GLASS) operates as an integral component of the WHO-GAP. GLASS bolsters the second strategic objective of GAP, fortifying the knowledge base through robust surveillance. This enables a data-driven approach in understanding the magnitude of AMR, and facilitates informed decision-making for national and global interventions.

GLASS was launched in 2015 to boost AMR surveillance and inform strategies to contain AMR. The system started with surveillance of AMR in bacteria causing common human infections, and has expanded its scope to include surveillance of antimicrobial consumption (AMC), invasive fungal infections, and a One Health surveillance model relevant to human health. By the end of 2022, GLASS incorporated data from 127 countries, territories, and areas (World Health Organisation, 2022).

2.3 The Quadripartite

The Quadripartite Collaboration for One Health coordinates joint One Health work through global activities addressing health risks at the human-animal-food-plant-environment interfaces (FAO et al., 2022). The organisations in this collaboration are the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP), the World Health Organization (WHO), and the World Organisation for Animal Health (WOAH).

2.4 Pandemic Treaty

The pandemic treaty is a currently-under-discussion international agreement to build capacity and guide countries in the event of a public health emergency. The initial draft of the pandemic treaty did not dwell on AMR. However, after significant lobbying from public health experts and civil society organisations, AMR was included in the most recent draft (Lindsay et al., 2021).

The revised version includes a number of provisions related to AMR, including

- The need to strengthen surveillance and monitoring of AMR.
- The need to promote the rational use of antimicrobials.
- The need to develop and implement national action plans to address AMR.

However, some experts have argued that the revised treaty does not go far enough to address AMR. They have called for the treaty to include specific commitments to:

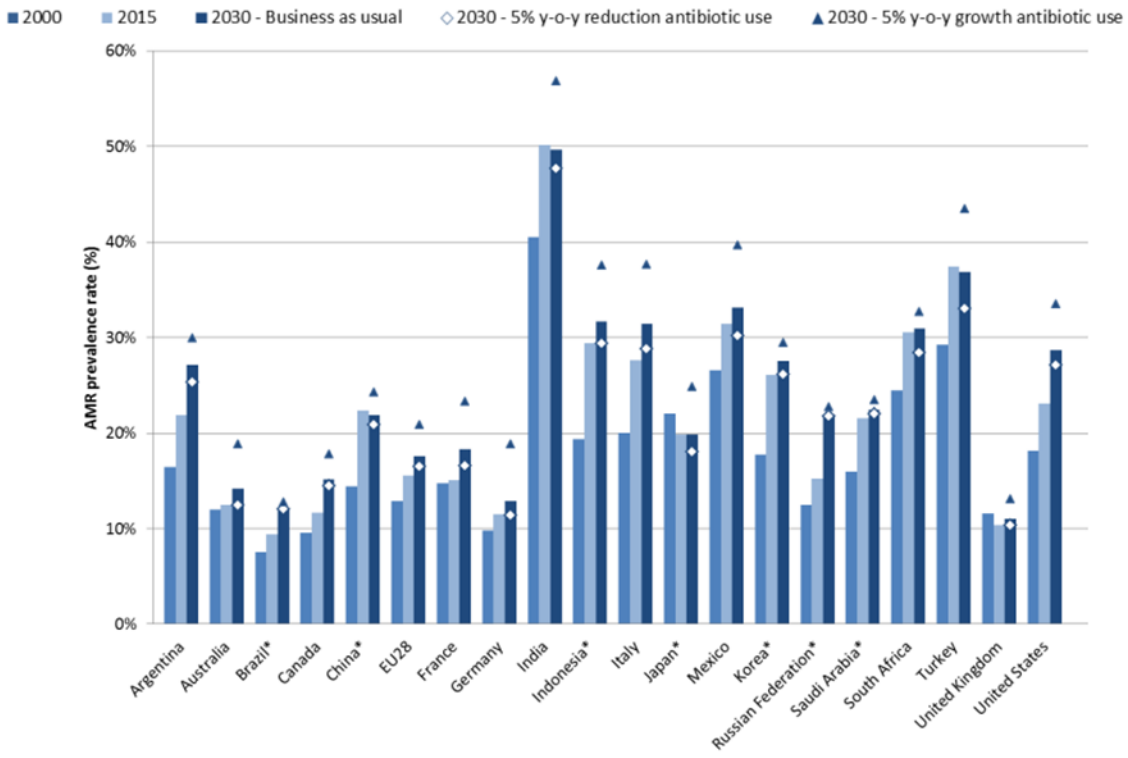
- Investing in research and development of new antimicrobials.
- Enhancing access to existing antimicrobials.
- Addressing the drivers of AMR, such as the use of antimicrobials in agriculture.

While global action is necessary, forums such as WHO may not be able to rapidly drive change to keep pace with the development of AMR. Smaller forums, which represent global interests and have enough resources to guide action, are ideal platforms to take action against AMR. The G20 thus lends itself to be a necessary player in the fight to prevent spread of AMR.

3. Role of G20

The G20 is a collective of the world's largest economies, with an 85% share of the global economy and 65% share of the global population. The G20 countries also house a significant share of the global AMR burden, which is expected to grow unless the use of antibiotics is reined in (Figure 2). At the G20 health track meetings, where discussions can influence global health and economic policies, taking action on AMR is not only a matter of global health security but also a question of economic sustainability and stability. By investing in robust surveillance and monitoring systems, facilitating equitable access to vaccines, therapeutics, and diagnostic tools, and fostering international cooperation and collaboration, G20 nations can significantly contribute to the containment of AMR. These actions can lead to better health outcomes, a more resilient global health infrastructure, and a stronger, more sustainable global economy, thereby creating a far-reaching positive impact.

Figure 2: AMR prevalence rates in G20 countries



Source: (OECD et al., 2017)

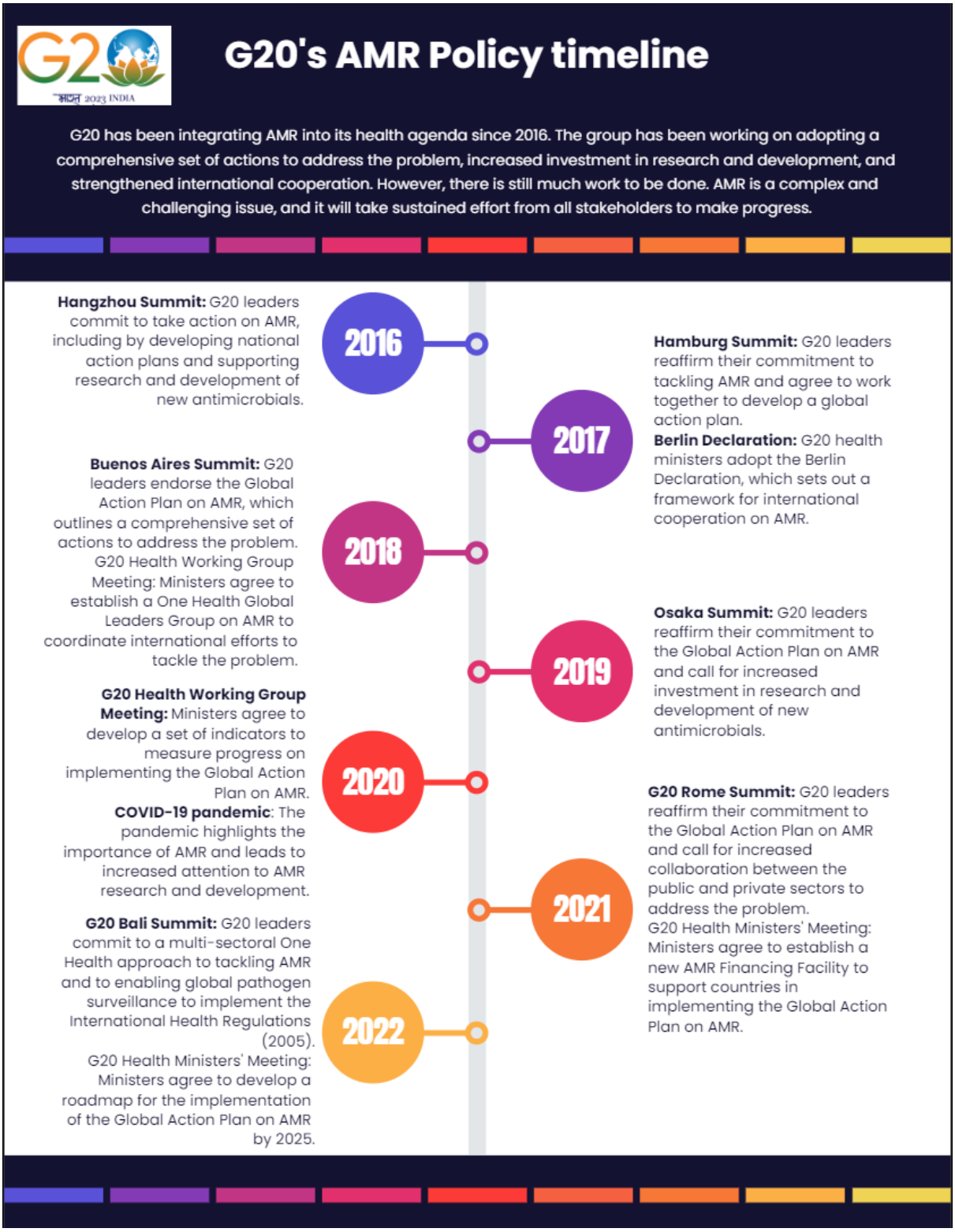
3.1 Previous actions of G20 pertaining to AMR

The G20 has recognised AMR as a major challenge, integrating it into its agenda as a key health priority to ensure global health security and economic stability.

- The issue of AMR was introduced as a key issue in the 2016 Hangzhou Summit,
- The 2017 Hamburg Summit resolved to maximise the impact of existing and new antimicrobial basic and clinical research initiatives, as well as of product development (G20 Leaders Declaration, 2017).
- In 2018, the G20 adopted its Action Plan on Antimicrobial Resistance at Buenos Aires. This plan recognised the global public health threats posed by AMR, and acknowledged the urgency of addressing this issue. It also acknowledged the disproportionate impact of AMR on LMICs, which often lack sufficient resources for healthcare services, quality medicines, surveillance programs, waste management systems, and wastewater treatment.
- The 2022 Bali Summit further committed to a multi-sectoral One Health approach and to enable global pathogen surveillance to implement the International Health Regulations (G20 Leaders Declaration, 2020).

The COVID-19 pandemic has disrupted AMR governance, and increased inequality of access to healthcare and essential medicines in LMICs. The G20 aims to ensure that investments in the COVID-19 response enhance national capacity to respond effectively to AMR.

Figure 3: A timeline of G20 commitments on AMR.



Source: Compiled by the authors.

To address the AMR threat, the G20 has emphasised the need for global surveillance and monitoring of humans, animals, plants, food, and the environment. It has urged countries to join GLASS and participate in regional AMR surveillance networks. It has also highlighted the necessity

of the Quadripartite platform for linking and referring to current initiatives for AMR and AMU surveillance data across sectors. The SECURE initiative is a new G20 commitment to expanding sustainable access to antibiotics by improving surveillance of AMR, promoting the rational use of antibiotics, and investing in research and development of new antibiotics (World Health Organisation, n.d.)

The G20 has also called for scaling up collaborative, coordinated, One Health AMR surveillance, risk assessment, and interventions. It recommends that countries strengthen AMR surveillance across humans, animals and environment through improved use of local data. It also suggests focusing on prevention-oriented actions, and supporting LMICs to mitigate the risks posed by AMR (FAO et al., 2022). It encourages countries to monitor the WHO priority microbes, including but not limited to Escherichia coli and methicillin-resistant Staphylococcus aureus (MRSA), and other nationally-determined priority pathogens.

The G20 aims to increase equitable access to vaccines, therapeutics, diagnostic tools (VTDs), and innovative preventive tools, to prevent and control infections in humans, plants, and animals. It emphasises the importance of responsible and prudent use of antimicrobials in all settings. It also recognises the need to enhance global efforts to increase the availability of new and existing VTDs for human and animal health.

Of the multiple regional governance initiatives in which G20 countries participate, only 4 do not have a policy or declaration regarding AMR. (Appendix 2) Although the G20's commitments are significant, implementation and funding have to be more consistent, under the guidance of a unified international framework (Clift, 2019).

In the next sections, we analyse individual national action plans and their implementation by G20 countries.

3.2 Common Policies and National Action Plans of G20 Countries

National Action Plans (NAP) serve as comprehensive frameworks that guide countries in coordinating and implementing measures to combat antimicrobial resistance. The G20 countries have developed their NAPs based on WHO GAP objectives. NAPs facilitate the engagement of multiple stakeholders, including the government, healthcare professionals, the agricultural sector, and the public, which is crucial given the multifaceted nature of AMR. Given the evolving nature of AMR, NAPs are time-bound, and need to be periodically revised to update strategies. Although all G20 countries have created NAPs, only China, France, Indonesia, the Republic of Korea, South Africa, the USA, Belgium, Ireland, Malta, Portugal, Slovenia, and Sweden have active NAPs as of 2023. There is an urgent need for the other countries to update and renew their NAPs.

All NAPs have recurring themes, which are based on the WHO GAP's objectives. These include strategies for promoting responsible antimicrobial use, strengthening surveillance systems, enhancing infection prevention and control practices, and fostering research and development of new

antimicrobials and alternative treatments. Some plans are, however, more detailed, with defined calls to action and targets.

For example, The UK's National Action Plan on AMR (2019-2024) adopts a "One Health" approach, encompassing humans, animals, and the environment. One of its highlights is the laying out of precise targets: to reduce antibiotic use in humans by 15% and in animals by 25% by 2024. The UK's plan also emphasises global leadership, with commitments to support other countries in enhancing their AMR surveillance and stewardship programs. It discusses funding for AMR research, including models such as imposing an antibiotic investment charge on the pharmaceutical sector in a pay or play model. It also presents a detailed AMR systems map, outlining causes of AMR in various settings. The plan is part of the UK's 20-year plan on tackling AMR, which shows their foresight in understanding and attempting to mitigate the development of AMR (HM Government, 2019).

Sharing best practices and collaborating on common goals within the G20 framework can foster knowledge exchange and drive progress in AMR management. Analysis of individual NAPs shows special features in select NAPs, which may be of utility to other countries.

Table 1: Special features of the NAPs of individual G20 countries.

Countries	Special Features	Analysis
Argentina	Encourages innovation in antimicrobials, non-antibiotic growth promoters, and diagnostic tests for the identification and characterization of resistant bacteria.	This NAP recognises the use of antibiotics in animal husbandry as a growth promoter and not only as an antimicrobial agent. It recognises that substituting the growth promoting function of antibiotics will be essential for their replacement in this vertical.
Canada	Increase effective implementation of infection prevention measures, particularly for populations disproportionately impacted by AMR, such as remote, Northern, and isolated communities.	The Canada NAP recognises that certain sub-populations, particularly those living in crowded areas or with restricted healthcare access, are disproportionately impacted by AMR and require additional support.

China	Establish an appropriate clinical antimicrobial drug sensitivity breakpoint standard system [2]for China. Develop and promote the use of safe, efficient, and low-residue veterinary traditional Chinese medicine.	China aims to contextualise AMR measures to local conditions, and create an appropriate technical guideline for AMR in China. The NAP also seeks to study the use of traditional Chinese medicine as an alternative to the use of antibiotics.
Germany	To reduce the transmission of resistant bacteria along the food chain, the policy includes consistently pursuing successful control programs for salmonella in poultry farming, further developing the concept of process hygiene criteria for food production, and expanding these to cover the border aspect of resistance problems. Transferring certified professional development programs to experts in antibiotic prescription (ABS officers) in a structured Curricular Advanced Training Programme of the chambers of physicians.	The German NAP highlights the importance of studying AMR in food chains. As part of their strategy, the German NAP has also created a structured training programme, which is a pre-requisite for becoming an antibiotic stewardship appointee or expert at a hospital or clinic.
India	Focuses on the importance of developing new vaccines and diagnostics for AMR. Developing Infection Prevention Control (IPC) standards for each level of healthcare facility, not just tertiary care centres. Establishing functional hospital infection control committees (HICCs) to provide leadership to the IPC programs at the institutional level.	India's plan calls for the development of vaccines as a substitute for antibiotics. It also recognises the need to maintain standards at all healthcare settings, not only tertiary hospitals.

Indonesia	Includes specific section on the importance of improving sanitation and hygiene.	Indonesia recognises the importance of improving basic hygiene as a part of the long-term plan to avoid infections and consequently, AMR.
Italy	Electronic prescribing systems.	The Italian NAP proposes the use of electronic prescribing systems as a method to monitor and regulate antibiotic use.
Japan	Tax incentives for pharmaceutical companies and funding for research institutions.	Japan, which has a long history of producing novel antibiotics, provides for tax incentives for companies to research alternatives to antibiotics.
Mexico	Unique initiative is the "Antibiotic Guardians" campaign, which aims to raise public awareness about the risks associated with AMR and promote responsible use of antibiotics. The campaign encourages individuals to take a pledge to become an "Antibiotic Guardian" by committing to use antibiotics only when necessary and as prescribed by a healthcare professional.	Mexico has an outlined awareness campaign, co-opting individuals to become Antibiotic Guardians.
South Korea	Includes a specific section on the importance of developing new economic models for the sustainable development of antibiotics.	South Korea recognises the need for new economic models for incentivising development of antibiotics.
United States	Focus on data infrastructure, and assistance to LMICs.	This NAP recognises the need to address data asymmetry to control AMR, and to address disparities in health infrastructure between the US and LMICs.

Austria	Conducting health literacy survey of population.	Austria's NAP recognises the need to understand health literacy as a first step to running successful awareness campaigns.
United Kingdom	Targets to: Halve healthcare associated Gram-negative blood stream infections; Reduce the number of specific drug-resistant infections in people by 10% by 2025; Reduce UK antimicrobial use in humans by 15% by 2024; Reduce UK antibiotic use in food-producing animals by 25% between 2016 and 2020 and define new objectives by 2021 for 2025; and Be able to report on the percentage of prescriptions supported by a diagnostic test or decision support tool by 2024.	United Kingdom outlines specific targets to achieve with respect to reduction of infections in humans and animals.
Belgium	Reducing environmental contamination with antimicrobials and resistant bacteria.	This NAP highlights the need to curb the release of antibiotics into the environment.
Ireland	The CellCheck program Optimising feedback of computerized meat inspection findings and Precision Livestock Farming monitors on farm to improve pig health.	Ireland rationalises the use of antibiotics in the animal sector, promoting other methods to improve health of animals and thereby, lowering antibiotic use.

Denmark	The number of redeemed prescriptions for antibiotics in the primary healthcare sector should be reduced from 460 prescriptions per 1000 inhabitants per year in 2016 to 350 prescriptions per 1000 inhabitants per year in 2020. There should be a change in the use of broad-spectrum to narrow-spectrum antibiotics. Consumption of antibiotics that are critically important for the treatment of infections should be reduced.	The Danish NAP also recommends specific targets for reducing antibiotic use, and a move from broad-spectrum to narrow-spectrum antibiotics to reduce AMR risk. The NAP has specific targets for other parameters related to AMR, such as proportion of Penicillin prescribed, or rational use of antibiotics in hospitals. In contrast to other targets, Denmark achieved its goal of reducing prescriptions by 2020 (Lundsby and Sönksen, n.d.).
Slovakia	Focus on increasing the national production of raw materials of animal origin due to the risk of importing unknown bacteria with genetically determined antibacterial resistance and risk to public health.	This NAP looks at ways to reduce import produce and thereby reduce the risk of importing AMR bacteria.

3.4 Implementation of NAPs across G20 countries

Most G20 countries have a national action plan on AMR, but there is a wide variation in the level of implementation. Various studies have found that highly developed nations have more detailed and better implemented plans than LMICs (Charani et al., 2023; Willemsen et al., 2022; Patel et al., 2023). For example, Australia, Canada, and France have fully implemented their national action plans, while Argentina, Brazil, and India have only partially implemented their plans (Munkholm and Rubin, 2020).

There is a lack of coordination between different sectors in addressing AMR in some G20 countries. For example, in Argentina, the Ministry of Health is responsible for developing the national action plan on AMR, but the Ministry of Agriculture is responsible for implementing the plan. This lack of coordination can make it difficult to develop and implement effective policies and interventions.

4. Funding for AMR Research and Surveillance

There is a need for more investment in research and development of new antimicrobials in all G20 countries. The current pipeline of new antimicrobials is not sufficient to meet the challenges of AMR. Sufficient funding is crucial to drive research, surveillance, and implementation of AMR-related initiatives. However, the funding for AMR varies across G20 countries.

In 2021, the United States was the largest investor in AMR R&D, with an estimated investment of $4.5 billion. China was the second largest investor, with an estimated investment of $3.5 billion. Japan, Germany, and the United Kingdom were also significant investors, with estimated investments of $2.5 billion, $2 billion, and $1.5 billion, respectively. Other G20 countries invested significantly less in AMR R&D. For example, India invested an estimated $0.5 billion, and Russia invested an estimated $0.2 billion. Appendix 3 lists research spending on AMR for all the G20 countries.

The investment landscape for AMR R&D is growing, but it is still not enough. In 2021, there was an estimated $8.9 billion invested in AMR R&D, up from $7.2 billion in 2020. However, this is still far below the $10 billion per year that is estimated to be needed to address the AMR crisis (Global AMR R&D Hub, 2021).

There is a need for more investment in neglected areas of AMR R&D. Some areas of AMR R&D, such as the development of new diagnostics and vaccines, are still under-funded.

5. Recommendations for G20

As the President of the G20 in 2023, India has a crucial role to play in addressing AMR within the G20 framework. India's leadership can provide an opportunity to emphasise the importance of AMR management and strengthen collaboration among G20 countries. Here are some key areas which can be highlighted:

1) Advocacy and Awareness: India can actively advocate for AMR as a priority agenda item during the G20 Health Track discussions by:

- Setting up a permanent taskforce and secretariat to ensure continual commitment and preserve institutional memory on G20 efforts. The functioning of this taskforce can be based on the Northern Dimension Partnership in Public Health and Social Well-Being, a cooperation platform of ten partner countries and several international organizations, including the WHO and the European Commission, which operates on different levels, including activities such as high-level ministerial dialogues and an extensive network of experts (Northern Dimension Partnership in Public Health and Social Well-Being, n.d.).
- Working with other G20 countries to develop a joint statement on AMR, which should set a global AMR reduction target by a pre-defined date.

- Championing an international funding mechanism, taking cues from the Global Fund, that focuses on AMR R&D. India can host a pledging conference, inviting G20 and other nations to contribute to this dedicated fund.
- Launching AMR Awareness Campaign with Cultural Sensitivity: Building on India's extensive experience in public health campaigns, such as Polio and Swachh Bharat, create a template for an international AMR awareness campaign, incorporating cultural and linguistic diversity for global reach and efficacy (World Health Organisation, 2017).
- Initiating Global Antimicrobial Stewardship Program: Learning from the successful implementation of the Antimicrobial Stewardship Program in Kerala, India can promote a globalised version of this initiative within G20, with adaptable frameworks for different healthcare settings (Government of Kerala, 2018).
- Advocating for changing prescribing practices: Doctors and other healthcare providers should prescribe antibiotics only when necessary, and for the shortest possible duration. For this, introduce the Antimicrobial Stewardship Programs (ASP), similar to the CDC's Core Elements, to improve antibiotic prescribing. Implement regular training and auditing for healthcare providers to ensure adherence to the protocols.Follow electronic prescription system as outlined in the Italian NAP.
- Launching Public Education Campaigns on AMR: Utilise the 'e-Bug' program model, developed by Public Health England, which successfully engages schools and communities through educational resources, to raise awareness about the responsible use of antibiotics (Public Health Agency, n.d.).
- Developing innovative measures to ensure dosage completion: AMR risk is high when patients suffering from microbial infections do not finish their recommended dosages. This creates an opportunity for pathogens to be exposed to low doses of the antibiotic and developing mechanisms of resistance. The G20 can hold competitions to devise awareness campaigns, novel packaging methods, incentive structures etc. to increase patient compliance.

2) Collaboration and Research:

The G20 can

- Establish a G20 AMR Innovation Challenge: India can initiate an AMR Innovation Challenge within the G20, modelled after the iGEM to promote the development of new antimicrobials, diagnostics, and vaccines (iGEM, n.d.).
- Work with developing countries to develop regional AMR action plans
- Foster international research on alternative AMR Therapies: Facilitate smaller multilateral groups of countries to foster international research collaborations on alternative AMR therapies.

- Increase investment in AMR R&D: This investment should be directed towards early-stage research, neglected areas of AMR R&D, and international collaboration.
- Share best practices for incentivising research: AMR research requires innovative funding mechanisms. The US has proposed the Pasteur Act to incentivise companies to conduct AMR research, but more innovative methods led by multi-government front might be required.
    - Adopt the 'Innovative Medicines Initiative' model, a European public-private partnership that encourages pharmaceutical innovation, for fostering an ecosystem of antimicrobial innovation (Innovative Medicines Initiative, n.d.).
    - Adopt the "Priority Review Voucher" program, similar to what has been successfully implemented by the FDA in the US, to incentivize pharmaceutical companies for antibiotic development.
    - Simultaneously, employ the "Health Impact Fund" model to establish pricing that balances company ROI with patient affordability (United States Government, 2020).
- Establish an AMR-focused counterpart to the Coalition for Epidemic Preparedness Innovations (CEPI) to expedite research and development of vaccines and diagnostics and facilitate collaborations between public and private sectors.

3) Capacity Building for better surveillance and management of AMR

- All G20 countries should sign up to GLASS, to report data on both AMR and antibiotic consumption. Currently, most countries participate in GLASS for AMR data, but several of the G20 countries do not capture or share data on antibiotic consumption (Appendix 4).
- Provide technical assistance to developing countries in the areas of AMR surveillance, prevention, and treatment.
- Encourage addressing social determinants in AMR Policies: Utilising the experience of Indian NGOs in addressing social determinants of health, India can encourage the G20 to incorporate social determinants into AMR strategies, fostering policies and programs that are more inclusive and holistic. G20 countries should implement the Social Determinants of Health Framework by the WHO to holistically address poverty, inequality, and healthcare access in AMR policies (World Health Organisation 2022b).
- Build AMR surveillance capacity in low-income Countries: Taking inspiration from India's capacity-building efforts such as the Indian Technical and Economic Cooperation, India can spearhead a G20 initiative focusing on capacity-building in AMR surveillance and laboratory infrastructure in low-income countries (The Indian Technical and Economic Cooperation Programme, n.d.).

    - G20 countries can utilise the "Fleming Fund" model, which has been successfully implemented in the UK to help low and middle-income countries to strengthen their AMR surveillance and laboratory capacity (The Fleming Fund, n.d.).
- Promote South-South cooperation for patent reforms: Facilitate dialogue among developing countries to explore models like the Medicines Patent Pool, which has been successful in promoting access to HIV medications, for fostering innovation and ensuring affordability in the realm of new antibiotics (Medicines Patent Pool, n.d.).

As the President of G20 2023, India can play a pivotal role in advancing the agenda on AMR. By advocating for AMR as a global health priority, sharing knowledge and experiences, fostering collaboration, and promoting sustainable financing, India can contribute to a coordinated and comprehensive response to AMR within the G20 countries and beyond.

Appendix

Table 2: List of priority pathogens as identified by WHO[3]

Name of Bacteria	Priority	Resistance Pattern
Acinetobacter baumannii	Critical	Carbapenem-resistant
Pseudomonas aeruginosa	Critical	Carbapenem-resistant
Enterobacteriaceae	Critical	Carbapenem-resistant, ESBL-producing
Enterococcus faecium	High	Vancomycin-resistant
Staphylococcus aureus	High	Methicillin-resistant, vancomycin-intermediate and resistant
Helicobacter pylori	High	Clarithromycin-resistant
Campylobacter spp.	High	Fluoroquinolone-resistant
Salmonellae	High	Fluoroquinolone-resistant
Neisseria gonorrhoeae	High	Cephalosporin-resistant, fluoroquinolone-resistant
Streptococcus pneumoniae	Medium	Penicillin-non-susceptible
Haemophilus influenzae	Medium	Ampicillin-resistant
Shigella spp.	Medium	Fluoroquinolone-resistant

Table 3: List of G20 countries with the Start and end year for their existing NAP

Countries	Start year	End year
Argentina	2015	-
Australia	2020	-
Brazil	2017	2021
Canada	2015	2021
China	2022	2025
France	2022	2025
India	2017	2021
Indonesia	2020	2024
Italy	2017	2020
Germany	2020	-
Japan	2016	2020

Mexico	2018	-
Republic of Korea	2021	2025
Russian Federation	2017	-
Saudi Arabia	2017	2018
South Africa	2018	2024
Turkey	-	-
United Kingdom of Great Britain and Northern Ireland (the)	2017	2020
United States of America	2020	2025
European Union		
Austria	2021	-
Belgium	2020	2024
Bulgaria	-	-
Croatia	2017	2021
Cyprus	2012	
Czech Republic (the)	2019	2022
Denmark	2017	2020
Estonia	-	-
Finland	2017	2021
Greece	2008	2012
Hungary	-	-
Ireland	2021	2025
Latvia	2019	2020
Lithuania	2017	2021
Luxembourg	2018	2022
Malta	2020	2028
Netherlands	2015	-
Poland	2016	2020
Portugal	2019	2023
Romania	-	-
Slovakia	2019	2021
Slovenia	2019	2024
Spain	2019	2021
Sweden	2020	2023

Table 4: Smaller groupings with participation of G20 countries and their AMR declaration status

Initiative	Countries	AMR Policy/ Declaration
APEC	Australia, China, Japan, South Korea, Indonesia, Mexico, Russia, and the United States	Yes
ASEAN	Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam	Yes
BRICS	Brazil, China, India, Russia, and South Africa	Yes
EU	France, Germany, Italy, and the United Kingdom	Yes
GCC	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates	Yes
G7	Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States	Yes
NAFTA	Canada, Mexico, and the United States	Yes
Organisation of Islamic Cooperation (OIC)	57 countries including Indonesia and Saudi Arabia	Yes
SAARC	Bangladesh, Bhutan, **India**, Nepal, the Maldives, Pakistan, Sri Lanka, and Afghanistan	Yes
UNASUR	**Argentina**, Bolivia, **Brazil**, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela	Yes
African Union (AU)	55 African countries including South Africa	Yes
Arab League	22 countries including Saudi Arabia	No
Gulf Cooperation Council (GCC)	6 countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE	No
Southern African Development Community (SADC)	16 countries including South Africa	No
Organization of American States (OAS)	35 countries: All 35 independent states of the Americas	Yes

Eurasian Economic Union (EAEU)	5 countries: Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia	No
Shanghai Cooperation Organisation (SCO)	8 countries: China, India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Uzbekistan	No
Mercado Común del Sur (MERCOSUR)	4 countries: Argentina, Brazil, Paraguay, Uruguay	Yes
Organisation for Economic Co-operation and Development (OECD)	38 countries including United States, United Kingdom, Germany, Japan, France, Canada, Australia, etc.	Yes

Table 5: Status of antibiotic use, funding and number of projects for AMR

G20 Countries	Antibiotic consumption in DDDs (The Global Health Observatory, n.d.)	Funding for AMR research (USD millions)	Number of Projects
United States	20	1,107.40	50
United Kingdom	21.5	120.6	15
Sweden	20.9	33.2	15
Denmark	20.8	25.6	14
Germany	22.9	507.4	200
Japan	19.7	234.6	90
Australia	19.9	120.6	50
France	23	347.4	140
South Korea	23.4	174.6	60
Netherlands	20.9	55.6	25
Spain	20.9	94.6	35
Austria	21.2	19.8	9
Ireland	20.9	18.6	9
Greece	21.1	22.4	10
Italy	22.8	243.4	90
China	10.5	107	47

Belgium	21.2	15.2	10
Latvia	20.8	4.8	3
Croatia	21.1	10.4	5
Canada	23.3	61.4	27
Portugal	21	12.6	6
Saudi Arabia	28.1	36	15
Slovenia	20.9	11.2	6
Finland	20.8	22.4	10
Estonia	20.8	6.6	4
Mexico	22.7	24.6	11
Russia	14.9	43.6	18
Indonesia	19.2	10.8	6
India	23.5	30.6	14
Slovakia	20.9	12	6
Lithuania	20.8	7.2	4
Czech Republic	21.1	24.6	11
Poland	21	20.4	9
Cyprus	21.1	3.6	2
South Africa	21.4	40.6	16
Türkiye	24	33.6	
Malta	21	2.4	1
Bulgaria	20.5	7.2	4
Hungary	21	10.8	5
Luxembourg	21	12.6	6
Romania	20.8	13.2	6

Table 6: G20 countries and this status on AMR/AMC surveillance through GLASS

Country	AMR (Anti-microbial resistance)	AMC (Anti-microbial consumption)
Australia	Y	
Canada	Y	
China		
France	Y	
Germany	Y	Y
India	Y	
Indonesia	Y	Y
Italy	Y	Y
Japan	Y	
Mexico		
Republic of Korea	Y	
Russian Federation	Y	Y
Kingdom of Saudi Arabia	Y	
Republic of South Africa	Y	
the Republic of Türkiye	Y	
United Kingdom	Y	Y
United States of America	Y	

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Notes

[1] "The Review on Antimicrobial Resistance (AMR), was commissioned in 2014 by David Cameron, the then UK Prime Minister. The Review was helmed by economist Jim O'Neill and analysed the global problem of rising drug resistance. It also proposed concrete actions to tackle AMR internationally. The Review on AMR was jointly supported by the UK Government and Wellcome Trust, although operated with full independence from both. Established as a two-year, time-limited process, the Review engaged widely with international stakeholders, and produced its final report and recommendations in the summer of 2016.

[2] An antimicrobial drug sensitivity breakpoint system assesses the susceptibility of micro-organisms at particular concentration of antibiotics and is used to classify bacteria into 3 interpretive categories – susceptible, intermediate or resistant.

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IPPR

Unifying India's Healthcare Markets

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Abstract

This paper delves into the structure of the healthcare market in India, contending the existence of three distinct markets: the government monopsony market, the institutional market, and the retail market. Each of these markets has unique characteristics in terms of healthcare service provisioning, pricing, and accessibility. We underscore systemic failures resulting from a lack of clarity about the structure of these markets, including disparities in service provision, lack of awareness about available services, and skewed incentives favouring private sector provisioning. We suggest unification of India's disparate healthcare markets, advocating for a more prominent role for the government. The proposed unification is a modification of the school voucher program, aimed at ensuring competitiveness on the supply side, and thereby improving service quality. While acknowledging the challenges of scale and state capacity, we argue that the proposal is worthy of further discussion and research, given its potential to harness the government's purchasing power to improve accessibility, affordability, and promote a competitive landscape that encourages innovation and quality in healthcare services.

Keywords: Universal Health Coverage, Benevolent Monopsonist, Market Unification, Healthcare

JEL Codes: I10, I14, I15

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1. Introduction

Two separate aspects – 'provisioning of public health' and 'healthcare markets' - are often lumped together in India as one market, and not just by the media or the layperson. Schemes and programmes launched by the government are also not cognizant of what should, in fact, be thought of as three separate markets: the government monopsony market, the institutional market and the retail market.

These three markets have very different structures in terms of:

- The provisioning of healthcare services
- The pricing of healthcare (both goods and services)
- The procurement of medical goods
- The accessibility of healthcare services

A lack of clarity about how one ought to think about the healthcare sector in India has led to a morass of regulations pertaining to the creation of different markets, with predictably confused outcomes - such as the same drug being available at different prices depending upon which healthcare scheme provides it.[1]

Such confused outcomes are only the tip of the iceberg, in the sense that the malaise caused by the lack of clarity about the very structure of the healthcare system in India has led to multiple systemic failures. These include:

- A lack of awareness on the ground about the availability of healthcare services, particularly among the poorer sections of society, who are the main targets of government schemes (Yadapalli, Pal and Babu 2018);
- Even when there is awareness of the existence of the scheme itself, there is ignorance about coverage, limitations, and restrictions (Yadapalli, Pal and Babu 2018);
- A markedly better provisioning of these services to government employees at lower prices. (While this is not in and of itself a systemic failure, the fact that others get a lower quality of service at higher prices can be counted as a failure.)
- An incentivization towards provisioning of healthcare services exclusively through the private sector, rather than building out government-funded health infrastructure.

Each of these has contributed to the market for healthcare in India being inefficient. It is our aim in this paper to document and highlight these failures, and to suggest how such outcomes could be avoided.

In the first section, we define and contextualise the Indian healthcare market. We do this by examining how the market for healthcare in India has been defined and segmented. We analyse its evolution and segmentation over time, and analyse the implications of the segmentation in terms of

coverage, pricing, and outcomes, with specific regard to equity in terms of accessibility. We point out the obvious shortcomings that can be currently seen because of the segregation of India's healthcare market.

In the second section, we compare the structuring of the healthcare market in India with six different healthcare markets across the world, and identify key strengths and weaknesses of the current structure. We also point out aspects of these markets that could be incorporated into India's healthcare market to make it more efficient and equitable.

In the third section, we highlight the importance of the law of one price, and how the Indian healthcare market fails this litmus test of efficiency. This section also includes a discussion on how the opacity in India's healthcare markets results in a failure of efficient price discovery. Following this, we propose a way to unify India's disparate healthcare markets, with a more prominent role for the government than has been hitherto the case. We also discuss in this section the importance of utilising the Indian government's potential monopsony power.

Finally, we conclude by providing an estimate of the costs and benefits associated with such unification, examine some of the risks associated with such a proposal, and suggest how they might be overcome.

2. Understanding the Indian Market for Healthcare

The question of what constitutes a market often receives insufficient attention in introductory economic literature. Surprisingly, prominent economic resources like The New Palgrave Dictionary of Economics, The Concise Encyclopaedia of Economics (CEE), and even The Economist's "Economics A-Z" section do not dedicate entries to defining a market. In contrast, the legal field has extensively pondered this question, primarily due to the necessity of defining markets in antitrust cases and resolving legal disputes.

The Oxford Dictionary of Economics does have a definition of the market: "A place or institution in which buyers and sellers of a good or asset meet". However, this definition may not satisfy economists or lawyers, as it raises further questions. What precisely constitutes a "place or institution"? Do participants merely meet, or do they engage in transactions as well?

The need to define markets more rigorously arises from antitrust analysis, where a market is considered a collection of products and geographical locations. This delineation is crucial for making inferences about market power and potential anti-competitive effects. In this context, markets are often referred to as "relevant markets" or "antitrust markets", to distinguish them from broader definitions used by business executives, consultants, etc.

One such definition (Directorate For Financial And Enterprise Affairs 2012) is:

> "Market definition is a widely applied analytical framework to examine and to evaluate competitive concerns. The relevant market should be defined in a way such that the competitive constraints a firm faces, i.e. demand and supply side substitution, are captured as accurately as possible. The relevant market is usually defined by applying the hypothetical monopolist test (also known as the SSNIP test), according to which a 'market' comprises all the products and regions for which a hypothetical profit-maximising monopolist would impose a Small but Significant Non-transitory Increase in Price (SSNIP)."

From a legal viewpoint, defining the market is a necessary exercise, as a step towards determining whether or not market power[2] exists, and is being exercised in a fashion that is demonstrably hindering the maximisation of consumer welfare (Directorate For Financial And Enterprise Affairs 2012):

> "Market definition serves several purposes in identifying the scope of competition in a market. The main goal of market definition is to assess the existence, creation or strengthening of market power, which is defined as the ability of the firm to keep the price above the long-run competitive level. The market shares of the respective firms provide an indication of market power. Market definition also facilitates the identification of relevant competitors, and is useful in evaluating the risk of potential coordinated effects in mergers. In addition, identifying the area of competition allows other relevant competition issues to be examined, such as potential barriers to entry. Even when the necessary data to perform the hypothetical monopolist test are not available, this test provides a coherent conceptual framework to define the relevant market. The importance of market definition also extends beyond its role in analysing competition concerns: the concept is used as a basis for calculating fines, for estimating the effects on trade between EU member states and has served as a procedural model for other areas of law."

In India, the definition of a relevant market is along two different (but sometimes overlapping) dimensions: product and geography. In this regard, India has followed what is by and large a matter of international convention (WIPO 2018). As per The Competition Act (2002):

> "(r) "relevant market" means the market which may be determined by the commission with reference to the relevant product market or the relevant geographic market or with reference to both the markets;
>
> (s) "relevant geographic market" means a market comprising the area in which the conditions of competition for supply of goods or provision of services or demand

> of goods or services are distinctly homogeneous and can be distinguished from the conditions prevailing in the neighbouring areas;
>
> (t) "relevant product market" means a market comprising all those products or services which are regarded as interchangeable or substitutable by the consumer, by reason of characteristics of the products or services, their prices and intended use"

The definition of the product market, as per competition law, is based on six separate criteria, as follows (The Competition Act):

a) Physical characteristics or end-use of goods;
b) Price of goods or services;
c) Consumer preferences;
d) Exclusion of in-house production;
e) Existence of specialised producers; and
f) Classification of industrial products.

In practice, however, the issue can turn contentious very quickly. Defining the product market on the basis of demand- and supply-side substitutability has been tricky in the case of rubber tires (CCI 2015), automobiles (Neelakantan 2015), and residential units (Neelakantan 2015) – for reasons of price differentiation, end-user segmentation, and product differentiation, among others.

On the other hand, the definition of the relevant geographic market is based on the following factors:

a) regulatory trade barriers;
b) local specification requirements;
c) national procurement policies;
d) adequate distribution facilities;
e) transport costs;
f) language;
g) consumer preferences;
h) need for secure or regular supplies or rapid after-sales services.

Accurately defining the relevant market is of utmost importance in understanding the competitive dynamics of the healthcare industry in India. While adopting a legal and antitrust-oriented definition of markets provides a comprehensive framework, our purpose is not to establish an antitrust case, but rather to evaluate the structure of healthcare markets in India. The application of this framework

helps us determine whether there exists a singular healthcare market or multiple distinct markets within the country.

The significance of a precise market definition in healthcare stems from the localised nature of healthcare services and the substantial regional variations in the competitive landscape. It is crucial to acknowledge that healthcare markets face notable entry barriers due to regulatory requirements and high fixed costs. Consequently, defining the market with care is essential for identifying potential abuse of dominant position, which can result in increased prices, compromised quality, and limited accessibility to healthcare services. Further, the acceptance (even if implicit) of the existence of separate markets on part of the government weakens its own ability to act as a benevolent monopsonist. It is for these reasons that we use the framework provided by the Competition Act.

By examining India's healthcare markets using the definitions provided by the Competition Act (2002), we can better understand the nature of the industry and its competitive dynamics. This understanding allows us to ensure a competitive and accessible healthcare market in the country, utilising the best available framework, without seeking to prove the existence of monopoly power or conducting a specific antitrust enquiry. Instead, the objective is to assess whether conceiving of a single healthcare market in India is a useful approach from the perspectives of equity and efficiency, or if multiple distinct markets better capture the complex realities of the industry.

2.1. The Three Markets for Healthcare in India

Given this framework, it is our contention that there are three different markets for healthcare in India, rather than (as is usually assumed) just the single unified one. These are:

1. The ***government monopsony market(s)***, where the government is the single buyer for all goods (and services) provided under the healthcare schemes run by the government.
   The government plays a significant role as a major buyer of healthcare services and goods within the healthcare schemes it operates. While we avoid labelling it strictly as an absolute monopsonist, it is undeniable that the government's extensive purchasing power approximates that of a substantial buyer in the market (Ministry of Health and Family Welfare 2023).[3] Through its healthcare schemes, the government exercises considerable influence in shaping the competitive dynamics and pricing structures within the healthcare sector.
   By virtue of being a dominant buyer, the government possesses the ability to negotiate volume-based pricing arrangements with healthcare providers. This unique position allows the government to leverage its purchasing power to secure favourable terms and conditions, including cost-effective rates for services and goods (Ayres and Braithwaite 1992). Moreover, the government's substantial market presence gives it the potential to drive market behaviour and affect the overall functioning of the healthcare industry.

The approximation of this market as being led by a monopsonistic buyer (the government) underscores the need for a careful assessment of the healthcare market structure. Understanding the government's role as a significant buyer sheds light on the complexities of market interactions, pricing mechanisms, and competition within the healthcare sector. It emphasises the importance of striking a balance between harnessing the government's purchasing power to improve accessibility and affordability, while promoting a competitive landscape that encourages innovation, quality, and equitable access to healthcare services for all.

2. The ***institutional market***, where patients access, and pay out of their own pocket, for services and goods used while availing of treatment from hospitals.[4]

3. The ***retail market***, where though substitutes for products exist (whether generic or patented), it is the retailer (pharmacist) along with doctors who decide which drug will be sold, often based on price margins. (Jha 2017)

Of these, the first is explained in greater detail in the section that follows. The institutional and the retail markets are almost always conflated together, including in the official government statistics. The National Health Accounts Statistics, for example, reports the data as found in Table 1 (Ministry of Health and Family Welfare 2023):

Defining these markets separately, and sizing them, is thus all but impossible given the current paucity of data. There is, however, precedent from other sectors for defining markets on the basis of consumer segmentation. For example, in the case between the All India Tyre Dealers' Federation vs. Tyre Manufacturers (All India Tyre Dealers Federation vs Tyre Manufacturers.), the CCI has differentiated the market for tyres on the basis of consumer segmentation. Using the same reasoning as in this judgement, we argue that there really are three separate healthcare markets in India, contingent on which of the three groupings outlined above is applicable.

Table 1: Current Health Expenditures (2019-20) by Healthcare Financing Schemes

NHACode	Financing schemes	Rs. Crores	%
HF.1.1.1.1	Union Government (Non-Employee)	54,717	9.22
HF.1.1.1.2	Union Government (Employee)$$	14,969	2.52
HF.1.1.2.1.1	State Government (Non-Employee)	79,136	13.33
HF.1.1.2.1.2	State Government (Employee)~~	7,056	1.19
HF.1.1.2.2.1	Urban Local Bodies	8,667	1.46
HF.1.1.2.2.2	Rural Local Bodies	7,293	1.23
HF.1.2.1	Social health insurance schemes (not incl. 1.2.1.4)^^^^	23,957	4.04
HF.1.2.1.4	Government Financed Health Insurance##	13,809	2.33
HF.2.1.1.1	Employer-Based Insurance (Private Group Health Insurance)	25,881	4.36
HF.2.1.1.3	Other Primary Coverage Schemes (Private Individual Health insurance)	19,957	3.36
HF.2.1.2.1	Community-Based Insurance	39	0
HF.2.2.1	Non Profit Institutions Serving Households (NPISH)	10,231	1.72
HF.2.2.2	Resident Foreign Agencies Schemes	1,023	0.17
HF.2.3.1.2	Enterprises	18,197	3.07
HF.3.3	All Household Out-Of-Pocket Payment	3,08,727	52
Total		**5,93,659**	**100**

Notes:
$$Current expenditures on Defence Medical Services (Rs.10485 Crores), Railway Health Services (Rs.3183 Crores) and the rest is any reimbursements made by Union Government Departments through CSMA.
and the rest is any reimbursements made by Union Government Departments through CSMA.
~~Incl. expenditures on employees through Medical allowance/reimbursements by State Government Departments
^^^^Incl. Central Government Health Scheme (CGHS), Ex-servicemen Contributory Health Scheme (ECHS) and Employee State Insurance Scheme (ESIS)
##Incl. expenditures on Rashtriya Swasthya Bima Yojana and State specific health insurance schemes

2.1.1 The Government Monopsony Market

The National Health Accounts 2019-20 (p. 7) allows us to define the government monopsony market as a separate market (Ministry of Health and Family Welfare 2023). The government tells us it identifies consumers, service providers, and price, which therefore constitutes a separate market (Pindyck and Rubinfield 2013). Further, based on consumer segmentation, the government monopsony market can itself be split into the segments explained below.

The Central Government Health Scheme

The Ministry of Health and Family Welfare (MoHFW) runs the Central Government Health Scheme (CGHS). The CGHS was, at the time of its inception, envisaged as a scheme for serving those central government employees who had difficulty in getting reimbursement for OPD expenses (Annual Report, Ministry of Health and Family Welfare, 2012-13). It was earlier restricted in terms of coverage to Delhi alone. Since its launch in 1954, however, it has expanded to cover 71 cities and covers around 3.5 million beneficiaries. (Ministry of Health and Family Welfare)

While the CGHS even today refers its beneficiaries, in the first instance, to government hospitals for consultation, patients are often referred to private hospitals following said consultation (CGHS, Facilities available under CGHS 2023). Besides consultations, medicines are also issued to the 1.5 million primary cardholders (and the 4.3 million beneficiaries) against the prescription issued by CGHS (and other government) doctors. (CGHS Dashboard 2023) Those medicines that are unavailable in the dispensary stores run by the CGHS may also be procured from authorised local chemists and supplied to patients.

The eligibility for joining the CGHS runs a wide gamut today. While it is primarily focused on all central government employees, it also includes those who draw pension from the central government, Members of Parliament, freedom fighters, Delhi police personnel, and journalists accredited with the Press Information Bureau (PIB), among others. (Annual Report, Ministry of Health and Family Welfare, 2012-13)

The services offered to those who enjoy coverage are equally wide-ranging, and include the right to avail of treatment from any hospital in the country empanelled under the CGHS (or otherwise, in case of emergencies). The monthly contribution required to be a member of the CGHS (assuming eligibility) can range from Rs. 250 per month in the case of Level 1 to 5 workers to Rs. 1000 per month for Level 12 and above. (CGHS 2023)

The CGHS procures drugs, provides most medical services, and provides a list of hospitals where patients can avail of services, but the issue of coverage is rather tricky. Firstly, when it comes to hospitals, these can be private or charitable (although not all private or charitable hospitals are a part of the CGHS scheme). All public hospitals are a part of the CGHS scheme.

Secondly, the CGHS scheme procures a significant number of drugs centrally, and negotiates prices for these drugs (CGHS 2023). Procurement prices are significantly lower than retail prices. For example, a strip of Sofosbuvir retails for INR 16,182 on 1mg, a popular online dispensary in India (1mg 2023), while the same drug on the CGHS website was available for INR 959.84[5]. In addition, beneficiaries are also entitled to reimbursement of expenses incurred or medicines purchased (that are not available from CGHS dispensaries) from the retail market.

The Indian Railways provides broadly similar coverage to its 1.45 million employees (and their families), and 2.8 million retired employees and their families - approximately 6.38 million persons in total (Health Directorate, Indian Railways 2023).

> "Once a railway beneficiary comes to Railway Hospital for medical treatment, he/she is provided all types of Medical treatment as per the need of the patient. The medical treatment is either provided by available Railway hospitals or Govt Hospital or recognized private Hospital. In extreme emergency situations when there is no time for a railway beneficiary to come to Railway hospital then he/she may avail treatment in a private hospital/Govt Hospital in the locality and can claim through reimbursement claim system." (Health Directorate, Indian Railways 2023)

Coverage of a similar nature also exists for current and ex-servicemen, where the armed services own and operate their own hospitals. Current and ex-servicemen are also eligible for coverage under a scheme very similar to the CGHS (FAQ, Department of Ex-Servicemen Welfare 2023).

The Employee State Insurance Scheme

The Employee State Insurance Scheme (ESIS) in India originated with the Employee State Insurance (ESI) Act of 1948 and applies to non-seasonal factories using power and employing ten or more persons, as also to non-seasonal factories and non-power using factories and establishments employing twenty or more persons (ESIC 2023). Over time, the scheme has become much more broad-based, because the Act provides for the extensions of the provisions of the scheme to other classes of establishments - of almost all sorts, based on the prerogative of the appropriate "state or central"[6] government.

> "The Act was originally applicable to non-seasonal factories using power and employing 20 or more persons; but it is now applicable to non-seasonal power using factories employing 10 or more persons and non-power using factories employing 20 or more persons. Under Section 1(5) of the Act, the Scheme has been extended to shops, hotels, restaurants, cinemas including movie theatre, road motor transport undertakings and newspaper establishments employing 20 or more persons. The existing wage-limit for coverage under the Act, is Rs.21,000/- per month (with effect from 1.01.2017)." (ESIC, ESIC Applicability 2023)

> "The ESI has a long and somewhat convoluted history, with the Workmen's Compensation Act (1923), the Trade Dispute Act (1928), and the Employment of Children Act (1938) all playing a contributory role, whether by being subsequently adopted, or by helping to point out important omissions. The eventual form was prepared on the basis of a report prepared by B.P. Adarkar. The Act in its original form provided for "sickness, maternity, disablement, death due to employment, injury and old age." (ESIC, ESIC Applicability 2023)

The actual administration of the provisions of the ESI Act is handled by the Employees' State Insurance Corporation (ESIC), which is a statutory (and autonomous) body under the aegis of the Ministry of Labour and Employment.

The financing of the scheme is in part by the employees themselves, subject to a floor wage, and in part by the state governments. As per the ESIC dashboard, 37.2 million employees and their families are covered under the scheme. In terms of infrastructure, there are 154 hospitals across all variants of the scheme, along with 1595 dispensaries. (ESIC Dashboard 2023)

Much like the CGHS scheme, ESIC coverage entitles a patient to be referred to a private hospital, with the bills being directly reimbursed by the service provider hospital that is a part of the ESIC scheme. (Express 2023)

A relatively recent addition to the ESIC schemes is the "Atal Bimit Vyakti Kalyan Yojana", launched in the year 2018, with a planned initial run of two years. Given the Covid pandemic, the scheme had been extended for an additional year. (ESIC, Atal Beemit Vyakti Kalyan Yojana 2018)

In terms of expenditure, the following information is available in the public domain (ESIC at a Glance 2023):

Table 2: ESIC Data

Year (All data in Rs Cr.)	Expenditure on Cash Benefit Payments	Expenditure on Medical Benefit	Administrative Expenses	Revenue Income	Revenue Expenditure
2017-18	642.84	6867.73	1031.06	23480.37	9161.36
2018-19	1171.00	8721.39	1155.55	27312.64	11085.32
2019-20	1867.21	9368.30	1727.76	22161.91	13033.26
2020-21	2761.88	9530.63	1470.2	21091.12	13746.53

Coverage remains spotty at best. An investigation of insurance coverage under different health schemes in Uttar Pradesh, for example, revealed that "the government-funded insurance schemes (Employee State Insurance Scheme (ESIS), Rashtriya Swasthya Bima Yojna (RSBY) and Central Government Health Scheme (CGHS)) and others have succeeded to provide financial support to a very limited population. Only 4.8% population [sic] are covered by any health insurance scheme in UP." (Singh and Kumar 2017)

The Jan Aushadhi Scheme

The Jan Aushadhi Scheme, launched in November 2008 has the objective of "making available quality generic medicines at affordable prices to all". The scheme has since been renamed to the

"Pradhan Mantri Bhartiya Janaushadhi Pariyojana" (PMBJP)." (Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) 2023)

The scheme, while being fully funded by the Government of India, eventually hopes to recover as much as possible of its expenses through "trading margins". (Pradhan Mantri Bhartiya Janaushadhi Pariyojana 2015 2023)

Any person is eligible to run a PMBJP outlet, in so far as licensing norms are met, and there is no restriction on either the location of the outlet, or in terms of what can be sold within the premises, subject to said products being "allied medical products commonly sold in chemist shops". The scheme provides financial support of up to INR 5,00,000, to be given at 15% of monthly purchases made, subject to a ceiling of Rupees 15,000 per month. Jan Aushadhi outlets are allowed a 20% trade margin on MRP in the case of retailers, and 10% for distributors. (Pradhan Mantri Bhartiya Janaushadhi Pariyojana 2015 2023)

The number of Jan Aushadhi stores has seen a steady increase over the years, as the chart below shows, and sales have also shown a steady uptick over the years. (Annual Report, Department of Pharmaceuticals 2023) (Thawani, Mani and Upmanyu 2017)

Figure 1: No. of Jan Aushadhi Stores

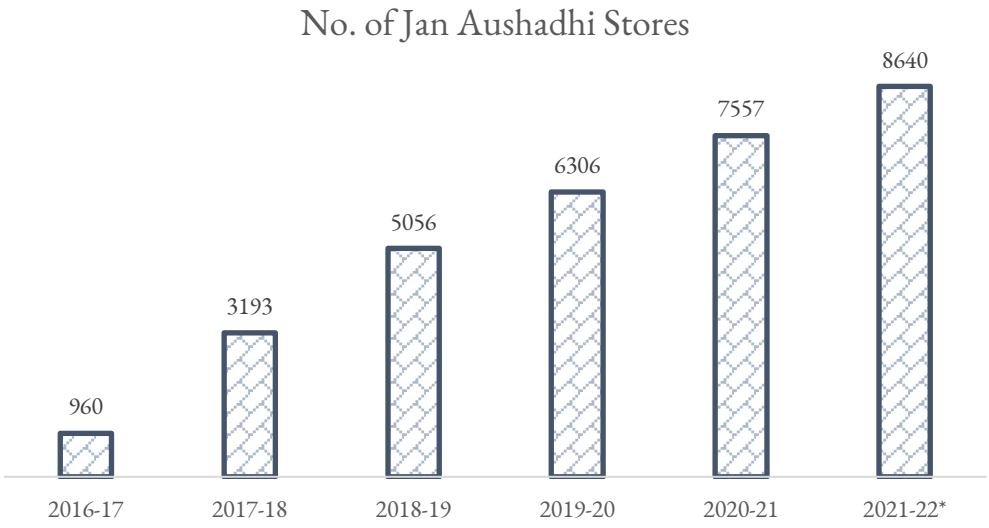
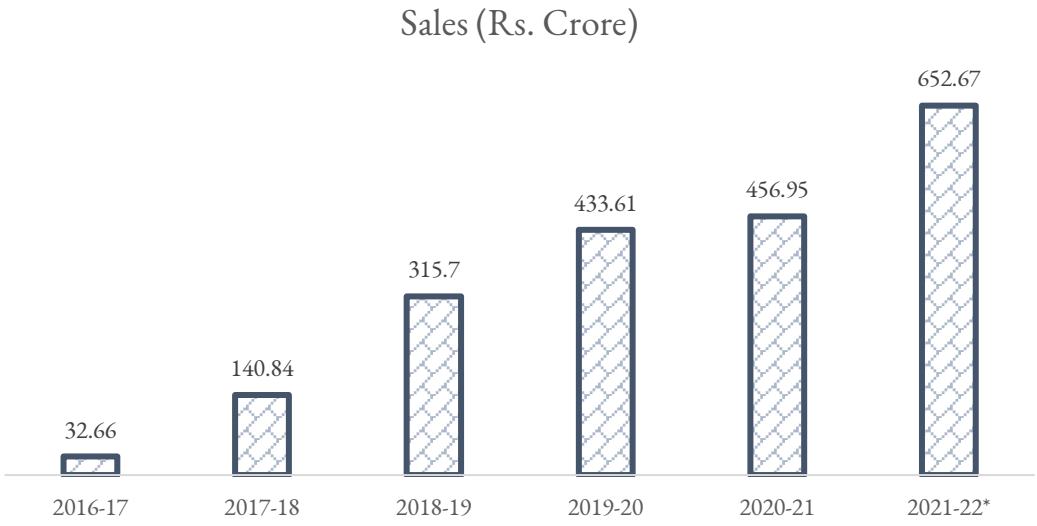


Figure 2: Sales in Rs. Crores, Jan Aushadhi Stores



The Pradhan Mantri Jan Arogya Yojana (PM-JAY)

In 2017, as a part of the National Health Policy, the Union Government of India launched the Ayushman Bharat scheme. The ultimate objective of the scheme is to provide Universal Health Coverage to all of India's citizens. Towards that end, two separate schemes have been launched:

1. Health and Wellness Centres: these are, in effect, existing sub-centres and Primary Healthcare Centres (PHCs). These cover the following services: maternal and child health services and non-communicable diseases, including free essential drugs and diagnostic services.
2. Pradhan Mantri Jan Arogya Yojana (PM-JAY): The much larger component of the Ayushman Bharat scheme, both in terms of coverage as well as ambition, is "the largest health assurance scheme in the world", and aims at providing secondary and tertiary care hospitalisation to over 107 million families, everyone in the bottom 40% of the Indian population by income.

The idea behind PM-JAY is to be an insurance scheme that is fully financed by the government, with a coverage of INR 500,000, and to provide cashless access to healthcare services for beneficiaries at the point of service delivery. This coverage is provided on the basis of a family floater set-up.[7]

As per the PM-JAY website, 28,542 hospitals (out of which 12,854 or 45% are privately owned) have been empanelled under the PM-JAY scheme, and 125 million membership cards (e-cards) have been issued. Under this scheme, 1,949 procedures have been made accessible to beneficiaries to avail cashless treatment. The costs covered include those related to treatment, medicines, supplies, diagnostic services, physicians' fees, room charges, surgeons' charges. and OT and ICU charges. (About Pradhan Mantri Jan Arogya Yojana 2023)

There are, however, implementation issues with the scheme. While some teething problems are inevitable during the launch of a scheme as large as this, research conducted on the ground points to

a misalignment of incentives, and issues that go beyond teething problems. While this is a well-recognized problem in the context of the administration capacity of the Indian state (Rajagopalan and Tabarrok 2019), the specific nature of the problems when it comes to provisioning of healthcare under PM-JAY merits a special focus in the context of our research.

For example, in field research carried out in the state of Jharkhand, there is evidence that a faulty (and imperfect) implementation of the scheme has resulted in patients being "nudged" towards private healthcare (D'Cruze 2020). The result is that the poorest sections of society end up paying out-of-pocket for expensive treatment in private hospitals. Such cases often crop up in the media, in the case of both rural and urban populations. (Upadhyay and Sheriff 2023)

This is as much a problem of a lack of information about the scheme and its finer points as it is a case of some private sector participants in the scheme taking advantage of this fact. In addition, it is also the case that there are issues with pricing and coverage:

> "[...] rates of reimbursement in existing schemes are still too low to attract participation by elite corporate hospital chains. In most states, only one in five private hospitals are empanelled and the rest are rejected on some technical ground or the other, usually related to quality. These are informal ways of controlling expenditure and rationing care." (Sundaram 2018)

A related point about rates of reimbursement: empanelled hospitals get a specified amount for procedures they carry out on patients under the PM-JAY scheme. This rate is often lower than the rate that even State Health Agencies pay, let alone the rate charged in the private sector. These rates have been revised upwards in November 2021 (National Health Benefit Package), but remain lower than what the hospitals charge outside of the PM-JAY scheme. At the same time, premium rates for PMJAY are set to increase, although the percentage increase remains unclear. (Sharma 2023)

From the point of view of economic theory, and specifically that of efficient price discovery, these price differentials become even more problematic. Different prices for the same service, at the same point of service delivery, contingent on whether one is a PM-JAY beneficiary or otherwise, will naturally lead to the temptation to provide a different quality of service. Not only is this antithetical to a well-functioning market, but it also leads to both a different (by definition, worse) quality of service in the case of PM-JAY beneficiaries. Patients in Jharkhand have reported various instances of sub-par treatment as a consequence of being admitted under the PM-JAY scheme:

> "While some accepted this treatment as normal, others felt like second-class citizens for receiving "free" treatment. As one dejected woman put it, "*kutta jaisa vyavhaar karte hain humare saath, aur apna paisa lagao toh aadar-satkaar karte hain*" (they treat us like dogs; only when you pay for your own treatment do they treat you with respect). One patient said that after his golden card was activated,

> he was shifted from a private to a general ward, while another mentioned that his doctor was changed on the day of his golden card activation." (D'Cruze 2020)

Patients are also sometimes denied care by means of a variety of ruses:

- a referral being needed from a public hospital
- empanelled hospitals claiming that they were not in fact empanelled; or
- being told that the treatment being sought was not covered under PM-JAY (D'Cruze 2020)

The PM-JAY scheme has seen increased outlays on part of the government every year since it was launched. The number of cards issued, the number of hospitals empanelled, and number of hospitalizations have all gone up, as has been shown in this section. There is a case to be made for integrating OPD services and Jan Aushadhi services into the PM-JAY scheme, and expanding it to more citizens as well.

Our point, however, is rather more fundamental. The PM-JAY scheme, as well as its antecedents, are at the end of the day schemes that ***distort*** the market. The PM-JAY scheme distorts the market through a variety of ways.

1. It creates perverse incentives for private hospitals to provide a different class of service to citizens covered under the scheme.
    a. This can be through the route of providing different doctors, or indeed a different quality of overall service to patients being covered under the PM-JAY scheme; or
    b. It could be by asking patients to avail of certain diagnostic tests first, before being issued with coverage under the PM-JAY scheme
2. Private hospitals remain unwilling to provide services to citizens under the PM-JAY scheme, because the government's pricing isn't viable.
    a. An article in Forbes magazine highlighted recently that surgery for pancreatic cancer in the Tata Memorial hospital costs INR 150,000, while the price in a private hospital could be anywhere between INR 300,000 to INR 1,500,000. The government, under the PM-JAY scheme, prices this service at INR 25,000. (Meghani 2020)
3. On the other hand, as has been outlined above, those private sector hospitals that are empanelled as a part of the CGHS scheme are willing to provide services at comparable rates, but only to government sector employees. For the service referred to above, the comparable rate paid by the CGHS to a hospital is INR 23,000. (CGHS package rate Delhi & NCR)

Government intervention in the market - any market - is unlikely to work out perfectly. In this case, however, it would seem that government intervention is making the problem even worse, at least in

the cases of the law of one price,[8] efficient price discovery, and lack of discrimination when it comes to the end consumer.

There is one last point to be made regarding the current implementation of the PM-JAY scheme. It ignores the role of the benevolent monopsonist. One of the current stand-offs between private hospitals and the government is about the low rates that PM-JAY mandates for a variety of medical services. There is a case to be made for having the government take up the role of a benevolent monopsonist, and behave as a monopsonist would under such circumstances (Ayres and Braithwaite 1992). Because of the scale at which PM-JAY is already operating, the government certainly has the ability to drive a harder bargain - and it is clearly already (and successfully) able to bargain when it comes to CGHS coverage.

In fact, as a government monopsonist, the government could conceivably drive a hard bargain to get hospitals empanelled under the PM-JAY scheme. For a limited number of empanelled (and relatively smaller) hospitals/clinics in a geographically limited catchment area, it is possible to envisage a sufficient number of potential patients through the PM-JAY scheme on a daily/weekly/monthly basis. As a benevolent monopsonist, setting up coverage under the PM-JAY scheme could potentially be a win-win game for both the government as well as the public.

One of the recent developments in the Indian healthcare system is the attempt by the state of Rajasthan to implement a variant of a single payer model, based on the Central Government Health Scheme (CGHS) package rates. The Rajasthan Government Health Scheme (RGHS), a part of the Rajasthan Right to Health Care Act 2022, aims to provide cashless medical facilities to various categories of beneficiaries, including state government employees, pensioners, legislators, and autonomous bodies (Rajasthan Right to Healthcare Act 2022). However, the scheme has faced some challenges and controversies, such as a lack of adequate funds, infrastructure, and human resources, as well as the opposition from some private hospitals and doctors. (Dutt 2023). The RGHS case illustrates both the potential and the pitfalls of introducing a single payer system in India, where there is a wide diversity of health needs, preferences and capacities across regions and populations. It also highlights the importance of building consensus and cooperation among various stakeholders, such as the central and state governments, health providers, and the public, to ensure the success and sustainability of such a reform.

2.1.2 The Institutional Market

The institutional healthcare market in India is a market that is defined in terms of healthcare being provided in an institutional set-up, with all of its attendant benefits, but also its restrictions. A key objective of our paper is to highlight how the market for healthcare in India is not driven by competitive forces - this is as much a failure of effective regulation in India as it is a case of private players taking advantage of this fact [9]. And nowhere is this more glaringly visible than in the case of the institutional healthcare market in India.

Our definition of the institutional market is very simple, and purely functional. Any healthcare treatment recommended by an in-house physician that necessitates usage of a hospital's services, without the patient having any choice of supplier, comprises the institutional market. Note that the In-Patient Department (IPD) is, by definition, part of what we are referring to as the institutional market; certain operations performed in the Out-Patient Department (OPD) could also qualify as part of the institutional market.

In this sense, the institutional market could be thought of as being defined by geography, rather than product. The relevant definition of the geographic market as per the Competition Commission of India is as follows:

> "relevant geographic market" means: a market comprising the area in which the conditions of competition for supply of goods or provision of services or demand of goods or services are distinctly homogeneous and can be distinguished from the conditions prevailing in the neighbouring areas" (India, The Competition Act 2002)

The *Ramakant Kini v Dr. L.H. Hiranandani Hospital, Powai, Mumbai* case, brought before the Competition Commission of India, is instructive in this regard. In this case, an expecting mother was informed just before delivery that she would not be able to utilise her stem cell collection service of choice, and that she would have to utilise the services of the agency that had been chosen by the hospital.

Pt. 24 in the judgement is worth noting:

> "It is a well-known fact that an expecting mother has to repeatedly consult her gynaecologists for various problems which she faces during the 8-9 months period. No expecting mother, particularly at an advanced stage of pregnancy, would like to change the doctor or the hospital as she develops a trust in the treatment of a hospital. When at the last stage of pregnancy, the woman is told, if she wants stem cell banking of her choice, she has either to change the hospital or to engage the Cryobank with whom OP hospital had agreement, no woman admitted in a super speciality hospital, to save a few rupees will change the hospital. Mrs. Jain probably changed the hospital because she had already paid money to Life Cell for her child's stem cell banking. This, however, is not indicative of patients switching and migrating to other maternity hospitals without any cost or inconvenience. This aspect has been further accentuated by the fact that OP hospital did not inform Mrs. Jain and other patients during that time about its exclusive tie-up for stem cell banking with Cryobank. Thus, the argument of OP hospital that the patients were free to leave the hospital is a flimsy argument, not worth any weight." (Case No. 39/2012, CCI 2012)

Receiving treatment as an in-patient is therefore not the same as receiving treatment from a healthcare professional outside of the institutional set-up. There are differences in terms of:

- The inability to get a second opinion easily
- A mandate to replace pharmaceutical goods only from in-house pharmacies, rather than any other source
- Coverage of services only from approved vendors

Unfortunately, for reasons described above, getting a separate estimate of the size of this market in rupee terms is not possible.

2.1.3 The Retail Market

The retail market is an unusual one in India, in the sense that it operates along informal guidelines that are as much decided by the industry practitioners as they are by the regulators (Madhiwalla, Pai and Roy 2007). Citizens are free to purchase their medicines from either private chemists (which could either be brick and mortar pharmacies, or e-pharmacies) or through government-operated Jan Aushadhi stores, as explained above. Given perceptions of quality, and the low level of awareness regarding Jan Aushadhi stores, most citizens prefer to utilise the services of private chemists.

Such pharmacies are incentivized to stock and sell pharmaceutical products that have high margins, rather than lower-priced drugs that are equally effective. It is worth highlighting the fact that in India, there is an "unholy alliance" between "manufacturers, chemists and doctors conspire to make profits at the expense of consumers and the public's health, even as they negotiate with each other on their respective shares of these profits." (Madhiwalla, Pai and Roy 2007)

Between the institutional market and the retail market, the non-governmental expenditure on health comes out to be 72.98%, or a total of 393,632 crore rupees in 2017, the latest year for which data is available. (Ministry of Health and Family Welfare 2023)

2.2 The Overall Healthcare Market

We have tried to argue in this section that there isn't just the one single unified healthcare market in India. There are, in fact, at least three:

1. The government healthcare market (with multiple constituent parts)
2. The institutional market
3. The retail market

Each of these three markets has the ability to provide the same pharmaceutical drug or service; however, prices are different depending upon who is utilising the good or the service and where. There

is, therefore, an argument to be made about how the law of one price (Feenstra and Taylor 2017) does not prevail in India's healthcare market.

There is nascent research on this subject in India, and it does recommend that India's disparate healthcare markets be unified - but unfortunately, the suggestion is only applicable to current beneficiaries of government schemes for its own employees.[10] Our stance is that ***all*** of India's healthcare markets should be unified, not just the multiple schemes run by the government for its own employees. We argue thus because we believe that equity and efficiency concerns are best addressed through such unification. We present our arguments for (and against) such a unification in the concluding section.

Before moving on to that section, however, we examine the question of how other countries provide healthcare to their citizens, and to what extent they succeed.

2.3. A Comparative Analysis with Other Healthcare Markets

Different countries have different approaches to their healthcare systems, both in terms of regulation of, and in terms of achieving - or attempting to achieve - universal healthcare coverage. Examples abound in the case of developed nations, such as[1] the United States of America, among others (Scott, Klein and Golshan, Everybody Covered 2020), as they do in the case of developing countries (Sen 2015).

Countries such as Taiwan have attempted, and been reasonably successful with, a single-payer system (Scott 2020), while others such as Australia have attempted to develop a public-private hybrid system, wherein the private system provides more options than the public system (The Australian health system 2023). Singapore has a system that resembles the Australian one for the most part (International Health Care System Profiles: Singapore 2020) while the Netherlands have a system that resembles the Affordable Healthcare Act in the United States of America the most - although with its share of problems (Scott 2020).

Of the countries that Ezra Klein and his co-authors covered, they came away the most impressed with the United Kingdom (Scott, Klein and Golshan 2020):

> "Yet in 2016, health care spending in the US equaled more than 17% of the country's GDP, while the share of health spending in Britain was only 9.7%. Nor do health outcomes seem to be suffering. Life expectancy in Britain is higher than in the US, and on measures of "mortality amenable to health care" — which specifically track deaths that could have been prevented by medical intervention — the US performs worse than the UK.

> So here, then, is the comparison: The UK spends barely half what we do, covers everyone, rarely lets cost prove a barrier for people seeking care, and boasts health outcomes better than ours." (Klein 2020) (emphasis added)

Which, in turn, begs the question of how they go about achieving this. At the heart of the system in the United Kingdom is the National Health Service (NHS). Not only does the NHS pay for medical services, it also operates hospitals. The financing of this system is entirely through taxation revenue by the British government (Harker 2012), and the coverage is good enough for only one in ten Britons needing to use private healthcare coverage. (Klein 2020)

When it comes to procurement, the system works along the following lines: the state purchases directly from pharmaceutical companies: on the basis of tenders where there are competing products; where there is a monopoly seller, states negotiate prices with such suppliers. There may be competing products which are not identical (i.e., competing patented products) and states will therefore be able to negotiate so that one of them is purchased or procured, all at negotiated rates.

The economic rationale for the system is set (and administered) by the National Institute for Care Excellence (NICE). The broad guiding principle is to maximise the Quality Adjusted Life Years (QALY) for British citizens, by making recommendations to help those in charge of finite healthcare resources to identify the most clinically- and cost-effective treatments available that offer the best value for patients and the most efficient use of resources. (Ogden 2017)

The system balances, to the extent possible, the needs of the patients, the budgetary constraints of the patients as well as the government, and at the same time attempts to provide the best healthcare possible. In concrete terms, this often results in certain drugs not being made available to patients under the NHS, such as Relenza, an antiviral medication to treat influenza (Rawlins 2009). The centralised procurement under NICE can therefore prove to be controversial, but it is a well-documented system, with clear and transparent rules and documentation (Sasse 2020).

As can be seen with the example cited above, the system works with constraints, and from that rather limited and strict viewpoint, could be called less than perfect. But if one were to keep in mind the statistics quoted above in terms of coverage, deployment, and efficiency, it would seem to be a system that works better than those in most other countries.

Indeed, in almost all economies that are held up as exemplars of good delivery of public health services, there are obvious - indeed, glaring - differences between the way the Indian healthcare system has been designed, and the way it is done in these countries.

- Taiwan, for example, has a national health insurance system in which everybody is included, by definition, and the coverage extends to "hospital care, primary care, prescription drugs, [and] traditional Chinese medicine"
- Australia follows a somewhat similar system, and once again, there isn't differentiation in provisioning on the basis of whether or not one is a government employee; and

- The Netherlands has implemented universal healthcare (UHC), again with no special benefits being conferred upon government employees. (Scott, Klein and Golshan 2020)

There are, to be sure, examples of markets that have managed to pull off a multi-payer healthcare market with heavy regulation in terms of cost controls, the most notable example being the Netherlands (Scott 2020). Given the disparity between the two countries in terms of population, income, and (especially) the extent of rural poverty, implementation of a similar programme, especially one that mandates the purchase of medical insurance by every citizen, will be difficult to implement in India - although there has been some notable progress in recent years.

It is imperative to draw a clear distinction between the concepts of universal healthcare and universal health insurance coverage, as they often get conflated in policy discussions. Universal healthcare refers to a system wherein all individuals have access to comprehensive healthcare services, regardless of their financial status, without the risk of incurring financial hardship due to out-of-pocket expenditures. This concept encompasses the provision of healthcare services to the entire population, while ensuring equitable access, quality of care, and financial protection.

In contrast, universal health insurance coverage pertains to a financing mechanism that aims to provide financial risk protection to individuals by covering a specified range of healthcare services. This system typically involves the pooling of resources and risk-sharing among the insured population, with premiums being paid by individuals, employers, or the government. While universal health insurance coverage can be a crucial component of achieving universal healthcare, it is not synonymous with the broader goal of ensuring access to healthcare services for all. It is essential for policymakers to bear this distinction in mind when designing and implementing healthcare reforms, in order to effectively address the complex and multifaceted challenges facing India's healthcare system.

Australia

Australia’s public healthcare system is called Medicare. It provides healthcare for Australian residents for free, or in some cases and under some circumstances, at a reduced cost. If you have a Medicare card, for example, you can get free or lower-cost medical services by doctors, specialists, and other health professionals. Hospital treatment, many prescription medicines and mental health care is similarly subsidised. Medicare is funded by taxes that every Australian pays.

The Australian health system is jointly run by all levels of Australian government – federal, state, and local. The federal government is responsible for laying out and operationalizing national health policy, along with funding and regulation of health services and activities. On the other hand, the state and territory governments are responsible for managing public hospitals, community health services and some public health programs.

Australia’s expenditure on health as a percentage of GDP has been increasing gradually over the past two decades. According to the World Bank data, Australia’s current health expenditure was 9.9% of its GDP in 2019, the last pre-pandemic year for which data is available (Bank 2023). The

government (across all levels) accounts for $142.6 billion of the total health expenditure, which comes to around seventy percent of total health expenditure. Non-government sources account for the rest (individuals spent $29.8 billion (49.7%), private health insurers $16.7 billion (27.8%) and other non-government sources $13.5 billion (22.5%).) (AIHW 2023)

The first national health plan in Australia was introduced in 1950. Since then, there have been several major restructurings of the system, due to ideological differences between the alternative governing parties (Frankel 2019). Some of the key reforms include the introduction of universal health insurance in 1975, the establishment of private health insurance incentives in 1997, and the expansion of primary health care networks in 2010.

USA

The United States of America has a complex and fragmented healthcare system, that is for the most part based on private insurance. Unlike many other countries in our analysis, the US does not have a universal health insurance scheme that covers all its citizens (Shi and Singh 2014). Instead, it relies on a mix of public and private programs that vary in terms of eligibility, benefits, and costs.

The main public programs are Medicare and Medicaid. Medicare is a federal program that provides health coverage for people aged 65 and over. Medicaid is a joint federal-state program that provides health coverage for low-income people, children, pregnant women, people with disabilities, and some elderly people. Both programs are funded by taxes, and have different rules and regulations depending on the state.

The main source of private insurance is plans sponsored by one's employer. These are plans that employers offer to their employees as part of their compensation package. Employers usually pay a portion of the premiums, and employees pay the rest through standard wage deductions. These plans vary widely in terms of provided benefits, applicable deductibles, standardised co-payments, and which networks of providers one is eligible for. Some people also buy individual plans directly from insurance companies, or through online marketplaces created by the Affordable Care Act (ACA).

The ACA is a major, if somewhat flawed, health reform law that was passed in 2010 with the aim of expanding health coverage, improving quality, and reducing costs. The ACA introduced several changes to the US healthcare system. It required most Americans to have health insurance or pay a penalty, while providing subsidies to help low and middle-income people afford insurance. It also created an online marketplace where people can compare and buy plans. Its major advantage has been regulating insurance companies to prevent discrimination based on pre-existing conditions, while there are some other advantages as well. (Gaffney and McCormick 2017)

Canada

The Canadian system of healthcare, known as Medicare, is one that is publicly funded. Unlike most single-payer healthcare systems which have nation-encompassing plans, Medicare consists of 13

healthcare insurance plans at the provincial and territorial levels. These plans must abide by the standards of public administration, comprehensiveness, universality, portability, and accessibility set in the Canada Health Act.

The federal government also participates in the funding of provincial and territorial universal health insurance programmes and provides a variety of services to specific populations like eligible First Nations and Inuit peoples, members of the Canadian Armed Forces, veterans, resettled refugees and some refugee claimants, and inmates in federal penitentiaries. Around 25% of the funding for Medicare is from the federal government through the Canada Health Transfer. According to the Canadian Institute of Health Information, in 2020, health expenditures accounted for 13.8% of the nation's GDP at $305 billion with expenditure per capita estimated to be $ 8,021 (International Health Care System Profiles: Canada 2020)

What this essentially means is that for all eligible persons, healthcare in Canada is free to a certain extent. Required medical care (which includes services like childbirth, surgery, or giving prescription drugs at a hospital) need not be paid for by the patient. However, dental services, vision care, rehabilitative care, medically superfluous plastic surgery and the administration of prescription drugs outside a hospital environment do not come under Medicare and hence, are expenses paid by the patients themselves.

Given the existence of 13 regional insurance plans, there exist regional differences in payment coverage, with some regions having public programmes targeted at groups like dependents, that may cover services usually not covered by Medicare. This being said, a majority of Canadians fall back on alternate insurance plans supplied by private firms to cover any out-of-pocket medical expenses. (Veillard, et al. 2015)

United Kingdom

Established in 1948, UK'S National Health Service (NHS), aims to provide free and universal healthcare to all British citizens. Until its inception, the British healthcare system worked on insurance-based schemes, as healthcare was unaffordable for most people.

The NHS changed that – being completely funded by taxpayers' money, the rich contributed more to its funding than the poor. It was initially planned as a three-tier structure: hospitals; GPs (general practitioners), dentists, opticians, and pharmacists; local authority health services. These three tiers were set up and meant to interact based on the needs of each patient. However, major structural reforms were set into motion with the Health and Social Care Act of 2012, which divided the NHS into a series of organisations at both local and national levels.

As of 2021, health expenditure in the UK stands at about 11.9% of the country's GDP. Records estimate that government expenditure was in the region of £ 229 billion, about 83% of the national healthcare expenditure at £ 276.6 billion. The onset of the pandemic greatly affected the nation's budget with regard to the NHS, as spending turned out to be around 9% more than what was initially planned for the year 2021-22. The budget, however, is now showing signs of convergence to pre-

pandemic levels. Spending on staff (excluding GPs and primary care staff) constituted 45.2% of the total NHS spending in the year 2019-20. (Key Facts and Figures about the NHS 2023)

What is remarkable about the NHS is that services such as A&E (Accident & Emergency) not including emergency care after being admitted, offered at NHS hospitals are free for all, even overseas visitors. The latest reform with respect to the NHS is the introduction of Integrated Care Systems (ICSs) which are partnerships of organisations that come together to provide joint healthcare services for local populations. The passage of the Health and Care Act of 2022 saw the establishment of 42 such ICSs on a statutory basis across the UK on July 1, 2022.

2.4 The Law of One Price

A corollary to the definition of an efficient market is that the price that has been discovered should be applicable to all consumers. This is the widely accepted law of one price.[11] (Mankiw 2019)

While the law itself is easy to understand, and it is instructive to reflect upon it in a theoretical sense, there isn't much empirical evidence to support the law. For instance Froot and Rogoff, (2019) run an analysis on a dataset that spans 700 years on two-way trade flows between the Dutch and the British agricultural markets, and establish that these markets never have been, and are not even today close to being fully integrated. That is to say, they do not find evidence that the law of one price holds. Or as they put it 'the volatility and persistence of deviations in the law of one price have remained quite stable'.

The law of one price is a concept that emerges from international trade. But the law of one price has applications outside of international trade too. Financial theory has models that are built upon the core assumption of the law of one price, while the law has been used to measure the level of European financial integration. As Thaler and Lamont (2002) argue, 'Economic theory teaches us to expect the Law to hold exactly in competitive markets with no transaction costs and no barriers to trade, but in practice, details about market institutions are important in determining whether violations of the Law can occur.'

Our contention is that the law of one price does not prevail in the case of India's domestic healthcare markets because of two factors. First, there are significant barriers to trade - the inability to trade across these markets, because of binding legal constraints, that end up harming consumer welfare. And second, the market institutions have been set up in a way that arbitrage is not just rendered impossible, but rather that the aim of the institution is to violate the law of one price. That is, we have ended up creating different markets with different prices for the same (and essential) good. This is, to put it mildly, an undesirable outcome. A lengthy, but ultimately illuminating example from Thaler and Lamont (2002) exemplifies the undesirability of such an outcome:

> "Consider the case of aspirin. Suppose, for the sake of argument, that Bayer aspirin and store brand aspirin are identical products, but that Bayer costs twice

> as much because some consumers believe (falsely, in this example) that Bayer is better. Would we expect markets to eradicate this price difference? Since the Bayer brand name is trademarked, it is not (legally) possible to go into the business of buying the store brand aspirin and repackaging it in Bayer bottles. This inability to transform the store brand into Bayer prevents one method arbitrageurs might use to drive the two prices to equality. Another possibility for arbitrageurs would be to try to sell the more expensive Bayer aspirin short today, betting that the price discrepancy will narrow once the buyers of Bayer "come to their senses." Short selling works like this: an arbitrageur would borrow some bottles from a cooperative owner, sell the bottles today and promise the owner to replace the borrowed bottles with equivalent Bayer bottles in the future. Notice that two problems impede this strategy. First, there is no practical way to sell a consumer product short, and second, there is no way to predict when consumers will see the error in their ways. These problems create limits to the forces of arbitrage, and in most consumer goods markets, the Law may be violated quite dramatically."

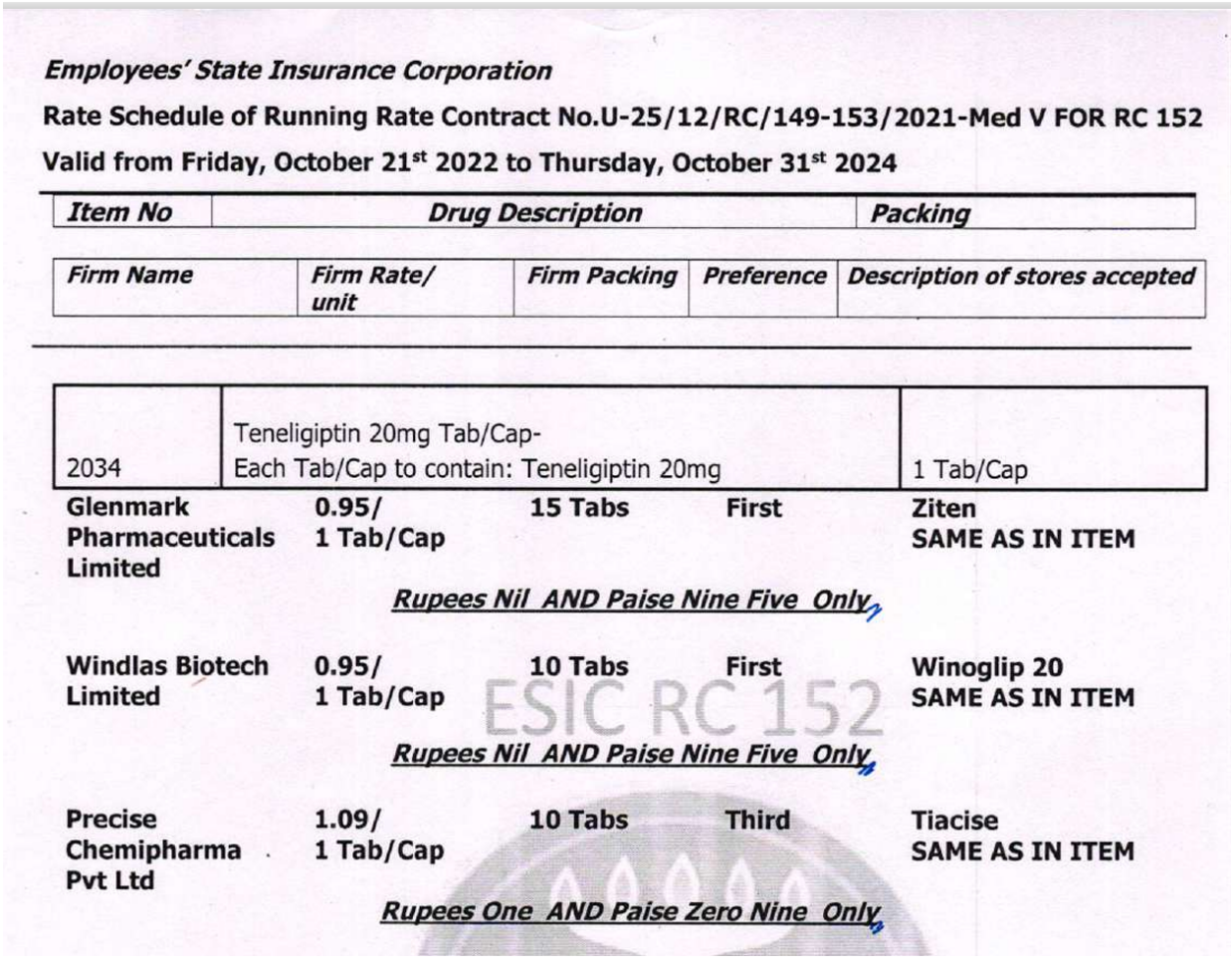
In the context of the Indian healthcare market, the fragmentation of the sector has led to the existence of varying prices for the same drug, both within the same market and across different markets. A single individual may find that the cost of a particular medication differs significantly between retail stores and government markets.

For instance, and as has been discussed above in the case of Sofosbuvir, the price for the same product may vary between a retail pharmacy, a government hospital, and a private hospital, despite the fact that the drug has the same therapeutic effect in all cases. This price discrepancy can have a substantial impact on consumers, particularly those in lower-income groups, who may struggle to afford essential medications due to the lack of price standardisation across the fragmented healthcare markets. By unifying India's healthcare markets and centralising procurement processes, policymakers can work towards achieving more consistent and equitable pricing structures for essential medications, ensuring greater accessibility for all citizens.

Table 3: Comparison of Drug Prices Across Jan Aushadhi, ESIC and the Private Retail Market[12]

Drug Name + Composition	JAN AUSHADHI	ESIC	Private retail market
Vildagliptin 50mg	INR 2.33	Not Available	INR 2.9 (Link)
Saxagliptin 2.5mg	INR 9.3	3.23	INR 35.9 (Link)
Linagliptin 2.5mg	INR 3.9	Not Available	INR 8.9 (Link)
Teneligliptin 20mg	INR 2	INR .95	INR 2.5 (Link)

Figure 3: Rate Schedule for Teneligliptin 20 mg[13]



Employees' State Insurance Corporation

Rate Schedule of Running Rate Contract No.U-25/12/RC/149-153/2021-Med V FOR RC 152

Valid from Friday, October 21st 2022 to Thursday, October 31st 2024

Item No	*Drug Description*	*Packing*

Firm Name	*Firm Rate/ unit*	*Firm Packing*	*Preference*	*Description of stores accepted*
2034	Teneligiptin 20mg Tab/Cap- Each Tab/Cap to contain: Teneligiptin 20mg			1 Tab/Cap
Glenmark Pharmaceuticals Limited	0.95/ 1 Tab/Cap	15 Tabs	First	Ziten SAME AS IN ITEM
	Rupees Nil AND Paise Nine Five Only			
Windlas Biotech Limited	0.95/ 1 Tab/Cap	10 Tabs	First	Winoglip 20 SAME AS IN ITEM
	Rupees Nil AND Paise Nine Five Only			
Precise Chemipharma Pvt Ltd	1.09/ 1 Tab/Cap	10 Tabs	Third	Tiacise SAME AS IN ITEM
	Rupees One AND Paise Zero Nine Only			

ESIC RC 152

Table 2 shows a comparison of the prices at which pharmaceutical products with the same chemical composition[14] are sold across different markets in India. Note that two of the products (Vildagliptin 50mg and Linagliptin 2.5 mg) are not available in ESIC dispensaries. The lack of availability of the same product across different arms of government-run healthcare programmes is, in and of itself, a problem with the current form of centralized procurement. More importantly, the price discrepancies are the more pressing problem. We see no good reason for the same drug, i.e., teneligliptin, to be available at three different prices in the ESIC (See Figure 3: Rate Schedule for Teneligliptin 20 mg) and at larger price differences across markets. Saxagliptin, to take the most extreme example from within the table, is priced roughly three times higher in Jan Aushadhi stores when compared to ESIC, and a further four times higher in private retail markets when compared to Jan Aushadhi stores.

Most of the empirical evidence, whether domestic or rooted in international markets, goes on to show that the law of one price isn't upheld. What's interesting is trying to figure out why. This is equally true, and perhaps even more so, in the context of India's healthcare markets.

The question to ask isn't whether the law of one price prevails in India's healthcare markets. There are in fact two questions that need answering. The first is whether it should hold, and we maintain that the answer to this question is a self-evident 'yes'. The second question is why it doesn't hold, and how it could be made to hold. This paper is an attempt at answering this question.

2.5 The Failure of Price Discovery in Indian Healthcare

There is another argument to be made about the law of one price failing to hold in Indian markets, before we embark upon an exploration of potential solutions to the problem. In the previous section, we have argued that the law of one price does not hold in Indian markets, and the earlier sections help us understand the ways in which it does not hold. But another question remains to be addressed - what, exactly, are the downsides when this law does not hold? That is to say, what shortcomings become manifest in this sector as a consequence of the absence of the law of one price?

Broadly speaking, there are five ways in which negative consequences can arise as a consequence of the failure of efficient price discovery in India. The failure of efficient price discovery itself is a symptom of the absence of the law of one price. But this obvious implication apart, India's healthcare markets also suffer the following negative outcomes:

1. An increase in healthcare costs, for some: By definition, the fact that the same product or service is available at different prices for different consumers means some will end up overpaying. But the question isn't just about whether some people will pay more - instead, the more pertinent question to ask is who is likely to pay more. As discussed above, it usually is the case that the people who can least afford to end up paying more in the long run. The second order effects are perhaps even more pernicious, for the total costs of eventual treatment end up being even higher. (Ruthven, Murdoch and Rutherford 2009)
2. Further, the problem of information asymmetry and the principal-agent problem combine to drive unintended and welfare-reducing outcomes in the healthcare sector. Simply put, because the seller of a medical good or service is almost always likely to know more than the buyer, there is an asymmetry of information. Secondly, the motivations of the seller might be different from those of the buyer. The buyer is looking to get the highest quality for the lowest price, while the seller is looking to fetch the highest margin. Combining both of these features, it is easy to see how less than ideal outcomes can occur during consultations with a trained medical professional, or even in the context of purchasing medicines from a hospital pharmacy or the local pharmacy. As we have discussed above, the same medicine is available from different pharmacies at different prices!

   Inequitable access to healthcare: Particularly in the case of medical services, differential costs of treatment can also result in inequitable access to healthcare. Feizal's case, as cited in (Ruthven,

Murdoch and Rutherford 2009), is a useful illustration of this problem[2] - people may choose to avoid going for treatment altogether if they are under the impression that the cost of treatment is likely to be prohibitively high. Simply put, differential prices, information asymmetry, and the principal agent problem (discussed in the point above) can result in people being driven out of India's formal healthcare system - a textbook definition, if ever there was one, of inequitable access to healthcare.

3. Differential quality of care: Different prices also implies that service providers are incentivized to provide different levels of quality, as has been discussed above in the context of the PMJAY scheme and its implementation in Jharkhand. There exists research to show that this is already happening in different parts of the country (D'Souza 2023). If a patient were to clear the hurdles of information asymmetry, the principal-agent problem and the problem of inequitable access to healthcare - they may land on significantly worse quality of care once they are a part of India's formal public healthcare system. Might this result in people eventually paying out of pocket in the informal healthcare system or private healthcare sector in India? Recent data seems to suggest this might be the case, with a 20% decline in the proportion of those seeking outpatient care in India, and a 25% decline in the proportion of those seeking hospitalisation services from the 2014 survey (Nagarajan 2022).
4. Misallocation of resources: When prices fail to reflect the true cost, the true quality and the true return on investment, the allocative efficiency of the market tends to be less than desirable (Maria, Silva and Thanassoulis 2014). As a consequence, not only is the market not efficient in the present instance, but it is also likely to be less than efficient in the future, and the cycle can end up being vicious. India's healthcare system suffers not just from too little investment, as has often been pointed out (Oommen 2015), but also from the misallocation of said investment. Indeed, the misallocation of investment in India's healthcare system can be observed through several concrete examples: for instance, the imbalance between the allocation of resources to tertiary care facilities, such as specialised hospitals and medical colleges, and primary healthcare centres, which are the first point of contact for patients. A significant portion of public and private investment has been channelled towards the establishment and expansion of tertiary care facilities, often in urban centres (PRS 2023). As a result, these facilities receive a disproportionate share of healthcare funding, while primary healthcare centres, especially in rural areas, remain underfunded and understaffed. This disparity exacerbates health inequities and limits access to essential services for a large portion of the population.

   Another manifestation of misallocation can be seen in the distribution of healthcare professionals across different regions in India. There is a considerable concentration of medical

[2] Feizal, from Uttar Pradesh, India, supported his family on a $36 monthly income. Despite saving for their daughter's wedding, a thighbone fracture led Feizal to initially choose cheaper traditional medical care. His condition worsened, costing nearly $250 in modern medical expenses—two-thirds of their annual income. This, combined with lost wages during his recovery, strained their finances. The family used savings, interest-free loans, and shop credit to cope. The situation underscored the potential value of insurance for timely, quality care.

professionals in urban centres, while rural areas suffer from a scarcity of qualified healthcare providers. This uneven distribution of human resources not only hampers the delivery of healthcare services in underserved regions but also contributes to inefficiencies in the system, as the workforce is not optimally utilised to cater to the healthcare needs of the entire population.

5. Rent-seeking: Finally, inefficiency in terms of the lack of one price can also incentivize producers, who are able to charge a higher price to push for a maintenance of the status-quo. That is, sellers who are able to realise a higher profit margin for the same good or service will quite naturally want to preserve the system rather than seek to ameliorate it. Lobbying and rent-seeking are outcomes that are easy to predict as a consequence, and there is already evidence to this effect (News 2023).

3. Our Proposal: A Unification of India's Healthcare Markets

3.1 Our Proposal

The unification of India's healthcare markets presents a compelling opportunity to address inefficiencies arising from disparate markets for medical goods and services. By leveraging the government's monopsony power, it will be possible to negotiate better terms with suppliers, resulting in more cost-effective and accessible healthcare for the nation. This proposed solution, akin to the widely recommended school voucher program in the field of education (Muralidharan and Sundararaman 2015), holds the potential to revolutionise India's healthcare system and optimise resource allocation across the sector.

Under our proposed system, the government will guarantee free healthcare for all at the point of service delivery, covering both public and private providers. To estimate the cost of this proposal, we need to consider several factors, including the cost of procuring medical goods and services, the cost of subsidising private providers, and potential cost savings from a unified healthcare market. Furthermore, the government will guarantee demand for procedures and services at all hospitals, which may lead to more efficient utilisation of resources and a potential reduction in the cost per patient.

To overcome the limitation of state capacity and effectively implement our proposal for a unified healthcare market, we can draw inspiration from the successful school voucher system in the education sector. Like the voucher system, which empowered parents to choose the educational institution for their children using government-funded vouchers, our proposal aims to empower patients to access healthcare services from their preferred providers without any out-of-pocket expenses. This will create a competitive environment among healthcare providers, incentivizing the provision of quality services as patients can easily switch between providers.

Furthermore, to ensure cost efficiency and streamlined operations, the government will act as a monopsony buyer, procuring medical goods and services for all empanelled hospitals. This centralised approach will enable economies of scale, reduce costs, and guarantee steady demand for healthcare

providers. By taking on the responsibility of procuring medical supplies, the government can negotiate better prices and allocation of resources within the healthcare system. We recognise that the healthcare requirements will vary across the country and even across states but we argue that there can be central procurement nevertheless. The local hospital or health authority will purchase based on the price notified by the central procurement agency.

In summary, our proposal will foster competition and quality improvement among healthcare providers, while the government's role as a monopsony buyer will lead to reduced costs and more efficient allocation of resources, ultimately benefiting patients and the healthcare system as a whole.

The implementation of a unified healthcare market will serve to eliminate redundancies, streamline processes, and encourage economies of scale, ultimately leading to improved patient outcomes and reduced costs. Furthermore, such a system will foster greater transparency and standardisation of healthcare provision, enabling patients to make well-informed choices regarding their healthcare needs. In this manner, the unification of healthcare markets not only addresses inefficiencies but also empowers citizens by granting them increased access to high-quality, affordable healthcare services (Lagomarsino, et al. 2012).

3.2 The Advantages and Potential Limitations

Some of the advantages of a unified healthcare market include the facilitation of data-driven decision-making, improved coordination among healthcare providers, and enhanced monitoring of healthcare quality (Lagomarsino, et al. 2012). The availability of comprehensive data will help policymakers identify gaps in healthcare provision and develop targeted interventions to bridge those gaps (Wyber, et al. 2015). Additionally, the system will enable better allocation of resources, ensuring that underserved regions and communities receive the necessary support. It might also help in plugging the gaps in the system that are currently being filled by informal health providers (IHPs) (Luthra 2023).

However, it is important to acknowledge the potential limitations of this proposal, particularly with regard to state capacity. The successful implementation of a unified healthcare market will require significant investments in infrastructure, technology, and human resources. Moreover, the government will need to overcome potential bureaucratic hurdles and resistance from entrenched stakeholders. While these challenges are considerable, they are not insurmountable (Bali and Ramesh 2021). With a concerted effort from policymakers, healthcare providers, and the broader society, India can work towards overcoming these obstacles and realise the potential benefits of a unified healthcare market.

In the following subsections of this concluding section, we elaborate on the specific strategies and mechanisms that can be employed to successfully implement a unified healthcare market in India. We explore the necessary steps for overcoming the aforementioned limitations, as well as the potential roles of various stakeholders in this transformative process. By providing a comprehensive roadmap

for the transition towards a unified healthcare system, we aim to demonstrate that the benefits of such a proposal can be realised and contribute to the overall improvement of India's healthcare infrastructure.

3.3 An Improvement Over The Status Quo

The current inefficiencies in India's healthcare system can be attributed to several factors, one of which is the existence of separate markets. This fragmentation has led to procurement processes that are diffuse and decentralised, with different schemes run by the union and state governments, often lacking coordination and standardisation. The absence of a unified procurement strategy results in duplicated efforts, suboptimal allocation of resources, and in some cases, corruption, and inefficiency. Consequently, the costs of medical goods and services are higher than necessary, placing a financial burden on both the government and the citizens who rely on these services (Balarajan, Selvaraj and Subramanian 2011).

Another issue arising from the disparate markets is the differential levels of quality and accessibility experienced by various segments of the population. Factors such as socioeconomic status, employment type, and geographical location have a significant impact on the healthcare services available to an individual. Government employees, urban residents, and those belonging to the upper-income class often enjoy better access to quality healthcare than their counterparts in rural areas and lower-income groups. This unequal distribution of healthcare services is not only unjust, but also exacerbates existing health disparities and undermines the goal of universal healthcare coverage. (Balarajan, Selvaraj and Subramanian 2011)

In evaluating our proposed solution of a unified healthcare market, it is important to recognize that while there will be shortcomings and deficiencies. The correct benchmark for comparison should be the existing status quo rather than an idealised but unrealized state of affairs. The proposed model, despite its limitations, presents a significant improvement over the current fragmented system in terms of efficiency, cost-effectiveness, and equity. By addressing the issues of decentralised procurement and unequal access to quality healthcare, a unified market can contribute to a more robust, resilient, and inclusive healthcare system in India.

3.4 An Initial Estimation of the Costs

India's total health expenditure (THE) was estimated to be INR 6,55,822 crores in the fiscal year 2019-120. THE includes current and capital expenditures incurred by both government and private sources. Current Health Expenditure (CHE) is INR 5,93,659 crores (90.52%) of THE. Capital expenditures make up the remainder (9.48%). (Ministry of Health and Family Welfare 2023)

With the government handling all procurement related to healthcare, it is likely that cost savings will be realised through its monopsony power, which can be used to negotiate better prices with

suppliers. Additionally, by streamlining procurement processes, the government can eliminate duplication of efforts and further reduce costs. There is already evidence that bolsters such an argument, especially in an international context (Sanders 2023). Tamil Nadu's experiences in this regard are also instructive (Parthasarathi and Sinha 2016).

Furthermore, the government will guarantee demand for procedures and services at all hospitals, which can lead to more efficient utilisation of resources and a potential reduction in the cost per patient. If we can assume that the government will act as a benevolent monopsonist, (Ayres and Braithwaite 1992), the government will be able to negotiate better prices for surgical procedures and related services, leading to further savings.

Finally, the long-awaited rationalisation of the pricing of pharmaceutical goods will also lead to further reductions in THE. Detailed analysis and scenario building of the reduction in THE is certainly needed, but is beyond the scope of this paper.[3]

3.5 One Step at a Time

Taking into account the complexity and scale of the proposed overhaul, we do not recommend an immediate implementation at the national level. Instead, following the example set by Du Runsheng's gradual rollout of agricultural reforms in China, we advocate for a phased implementation, beginning with a small number of districts or provinces (Rungsheng 2010). This approach allows for evaluation of the system's effectiveness, and identification of potential challenges, in a more controlled and manageable setting. Lessons learned from the initial rollout can be used to inform adjustments and improvements before scaling up the model to a wider geographical area.

This incremental approach aligns with the basic precepts of public policy, which emphasise the importance of evidence-based decision-making, adaptability, and continuous learning. By implementing the proposed healthcare reforms in a gradual manner, policymakers can better assess the feasibility and impact of the changes, ultimately leading to a more efficient and effective healthcare system that caters to the diverse needs of India's population.

There is evidence that such a phased implementation approach can work in the case of health: the United Kingdom's National Health Service (NHS) rollout of Personal Health Budgets (PHBs) (Jones, et al. 2013). PHBs are a financing mechanism that allows eligible individuals to have greater control over their healthcare by allocating a certain budget for their health and well-being needs. The goal of PHBs is to improve patient choice, autonomy, and the overall quality of care.

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[3] Here is one hypothetical scenario: We assume savings of 5% (as a percentage of THE) because of centralised procurement. We further assume savings of 5% by means of the government being able to negotiate better prices with healthcare service providers. We further assume a 5% reduction because of a rationalisation of prices for pharmaceutical goods. These savings (15% of THE) suggest that our proposed system could potentially cost a little less than current healthcare spending (CHE, not THE) in India, while providing more equitable and accessible healthcare services to the entire population.

The NHS initiated the PHB pilot program in 2009, with a small number of sites across England. Over the course of three years, these pilot sites generated valuable insights into the benefits and challenges of PHBs, enabling the NHS to refine the model based on empirical evidence. Following the success of the pilot program, the NHS expanded PHBs across England, with increasing numbers of eligible patients benefiting from this innovative approach to healthcare financing.

This example illustrates the advantages of implementing healthcare reforms in a gradual, evidence-based manner, allowing for continuous learning and adaptation before scaling up to a national level. Indeed, the key takeaway from the UK's Personal Health Budgets (PHBs) example is not the specific policy itself, but rather the nature of rollout – a staggered and slow implementation that allowed for continuous learning, adaptation, and improvement. This gradual approach, which began with pilot sites and expanded nationally only after careful evaluation, demonstrates the value of evidence-based decision-making in the realm of public policy and healthcare reform. By adopting a similar approach for the proposed unification of India's healthcare markets, policymakers can maximise the potential for success and minimise the risks associated with large-scale systemic change.

4. Potential Limitations

In this concluding section of our paper, we defend the idea of unifying India's healthcare markets as a means to address the existing inefficiencies and disparities that currently mar the system. We examine the challenges posed by state capacity, and consider successful examples of healthcare reforms implemented at the state level, such as in Delhi and Tamil Nadu. Moreover, we draw parallels with the school voucher system in the education sector, highlighting its potential applicability to the healthcare domain. By presenting a phased and evidence-based approach to implementation, we demonstrate that a unified healthcare market can be both feasible and effective in promoting a more equitable and efficient healthcare system in India.

As has been mentioned earlier, continued iterations will be needed. Countries that have run Universal Healthcare (UHC) programmes for over two decades are still iterating and making these programs better (Mahajan, Tirakotai and Patcharapim 2023). The correct benchmark isn’t one of perfection, however, but rather the question of whether our proposal is better than the status quo.

One potential limitation of our proposal lies in the challenges posed by state capacity, or the ability of the government to effectively implement and manage the proposed reforms. Although this has been discussed earlier, it is a point that bears repetition. India's vast and diverse population, coupled with varying levels of state capacity across different regions, raises concerns about the feasibility of implementing a unified healthcare market on a national scale. To address this limitation, it is important to draw on successful examples of healthcare reform at the state level, which can provide valuable lessons and insights for the broader implementation of our proposal.

A notable example can be found in the efforts made by the Delhi state government to improve health outcomes. Over the past few years, the government has prioritised healthcare by allocating a

significant portion of its budget to the sector, with the aim of enhancing both the quality and accessibility of healthcare services for its residents. This investment has led to the establishment of *mohalla* clinics, or neighbourhood health centres, which provide essential primary healthcare services free of charge to the local population. The success of the Delhi model can be attributed to the government's focus on strengthening primary health care, as well as its commitment to ensuring equitable access to services for all citizens (Lahariya 2020).

Another instance of successful healthcare reform at the state level can be found in Tamil Nadu, where the state government has implemented a range of innovative measures to improve the accessibility and affordability of healthcare services. These initiatives include the Tamil Nadu Medical Services Corporation (TNMSC), which centralises the procurement and distribution of drugs and medical equipment, resulting in more efficient and cost-effective processes (Parthasarathi and Sinha 2016). Additionally, the state has pioneered the use of telemedicine to bridge the gap between urban and rural healthcare, enabling patients in remote areas to access specialised care and consultations.

While our proposal seeks to address the inefficiencies and disparities in India's healthcare system, it is important to acknowledge that implementing such a reform will be a complex and challenging process. Drawing from the lessons learned in the successful examples of Delhi and Tamil Nadu, as well as the school voucher system in education, we can begin to outline a broad strategy for the implementation of a unified healthcare market in India. This strategy must focus on enhancing state capacity and building robust systems for procurement, distribution, and service delivery.

In conclusion, the unification of India's healthcare markets presents a promising opportunity to address the longstanding inefficiencies and inequities that plague the country's healthcare system. By drawing on successful examples of healthcare reform at the state level, as well as lessons from the education sector's school voucher system, we outline a broad strategy for implementing a unified healthcare market that is both feasible and effective.

While the challenges posed by state capacity and the complexities of reform cannot be underestimated, a phased, evidence-based approach to implementation, coupled with a strong commitment to improving healthcare access and quality for all citizens, can pave the way for a more equitable and efficient healthcare system in India.

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Notes

[1] As is explained later in this paper, a strip of sofosbuvir retails for INR 16,182 on 1mg, a popular online dispensary in India, while the same drug on the CGHS website is available for INR 959.84. Also see Table 3 for prices differences between ESIC and Jan Aushadhi

[2] For our purposes, market power can be understood as the ability to price products above marginal costs.

[3] 35.22% of Current Health expenditure was by either the central or state governments.

[4] Patients in this market might claim reimbursement via their own private healthcare insurance schemes later; however, they are not eligible for coverage under any scheme in what we call the government monopsony market.

[5] The CGHS website no longer divulges information about prices of specific drugs. However, the archived version of the website shows the price before the page was updated. See: https://web.archive.org/web/20200930042635/https://www.cghs.nic.in/ls_online.jsp

[6] This is so because social security and social insurance are included in the Concurrent List under the Constitution

[7] A family floater set-up is a health insurance policy that covers multiple members of a family under a single premium and sum insured. Instead of buying individual policies for each family member, one can opt for a family floater plan. The "floater" in the name indicates that the coverage "floats" among the family members included in the policy.

[8] The Law of One Price posits that, absent factors such as transportation costs, trade barriers, and taxes, identical goods or services will have the same price when expressed in a common currency, regardless of where they are sold.

[9] The report "A Critical Assessment of the Existing Health Insurance Models in India" is no longer available on the NITI Aayog website. A PDF is available here:

https://web.archive.org/web/20190124030035/http://planningcommission.nic.in/reports/sereport/ser/ser_heal1305.pdf

[10] The report "A Critical Assessment of the Existing Health Insurance Models in India" is no longer available on the NITI Aayog website. A PDF is available here: https://web.archive.org/web/20190124030035/http://planningcommission.nic.in/reports/sereport/ser/ser_heal1305.pdf

[11] This law asserts that a good must sell for the same price in all locations. Otherwise, there would be opportunities for profit left unexploited.' *in* N Gregory Mankiw, *Principles of Economics* (9th ed, South-Western Cengage Learning 2019) 653.

[12] 1mg prices have been used for the private retail market. The cheapest drug has been used for purposes of comparison, regardless of the manufacturer. Relevant links are given in each cell.
Jan Aushadhi Link: http://janaushadhi.gov.in/productlist.aspx
ESIC Link: https://www.esic.gov.in/attachments/circularfile/f1fc925ea394b79043c9fb333afd817f.pdf

[13] Source: https://www.esic.gov.in/attachments/circularfile/f1fc925ea394b79043c9fb333afd817f.pdf

[14] Gliptins, also known as dipeptidyl peptidase-4 (DPP-4) inhibitors, are a class of medications used in the treatment of type 2 diabetes. These drugs work by inhibiting the enzyme DPP-4, which is responsible for breaking down incretin hormones like GLP-1 (glucagon-like peptide-1). By inhibiting DPP-4, gliptins increase the levels of GLP-1, leading to increased insulin secretion, reduced glucagon secretion, slowed gastric emptying, and an overall improvement in blood sugar control.

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IPPR

Defining Strategic and Critical Vulnerabilities in Asymmetrical Trade Interdependence

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Abstract

As the world becomes more economically integrated, a complex web of asymmetric interdependences has emerged, allowing some states to wield disproportionate economic power. Consequently, recourse to economic coercion as a tool for compellence, deterrence, or co-optation has become much more frequent in current times. Debates around dependence-induced strategic and critical vulnerabilities have thus gained traction with an end objective to reduce or mitigate them. But a lack of conceptual framework underpinning the ideas of dependence, vulnerabilities, and strategic and critical vulnerabilities plagues the present decision-making apparatus, which runs the risk of treating subjects under each of these categories as synonymous. To prevent a one-size-fits-all approach emanating from the lack of conceptual differentiation, this paper presents a framework, in the form of a series of tests, to understand whether trade in a certain commodity between countries can be classified as a critical vulnerability.

Keywords: Dependence, Asymmetric-Interdependence, Strategic Vulnerability, Critical Vulnerability, Decoupling, De-risking, Trade, India-China

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1. Introduction

In a world characterised by anarchy, states pursue goals based on their respective national interests. However, their relative capabilities (power) to meet those ends differ, thereby giving rise to a hierarchical structure to this anarchic global order. Military capabilities are a conventional tool of coercion, employed by states to pursue national interests in this global order. However, as the world has become deeply integrated, deploying the military option has become more challenging, owing to the increased cost associated with it.

Instead, in the world of complex but asymmetric interdependence, some states have acquired a dominating position owing to their differential capabilities in the international economic order. The differential capabilities of states to influence the dynamics of international trade have encouraged dominant trading countries to weaponise their advantages vis-à-vis dependent countries. The intensification of great power rivalry has further led to the deployment of coercive economic tools and the exploitation of economic dependencies to gain favourable political outcomes.

The anxiety and paranoia with respect to weaknesses arising from asymmetrical interdependence have been such that the term 'dependency' has become synonymous with 'vulnerability'. The conflation of the two terms runs the risk of viewing all forms of economic dependence as undesirable, with vulnerability seen as a definite (rather than potential) outcome thereof.

This leaves policymakers susceptible to approaching the issues of asymmetrical interdependence with a one-size-fits-all mindset. There exists a gap in our understanding of when interdependence becomes dependence, and when dependence gives way to vulnerability. Therefore, the need arises for a framework to distinguish and define the two terms conceptually.

This paper attempts to address this gap, defining strategic vulnerabilities arising out of asymmetrical interdependence or dependence in the context of international trade. The first section of the paper reviews some of the existing definitions of vulnerabilities detailed in supply chain management (SCM) literature. The second section proposes a framework to define strategic vulnerabilities, that can be uniformly applied by countries, to differentiate them from non-strategic vulnerabilities. It also provides a framework to distil a subset of strategic vulnerabilities - critical vulnerabilities. The paper concludes with a brief advisory note for readers and a discussion of the scope of future outputs.

2. Risk and Vulnerabilities through Supply Chain Management Literature

Before proposing a framework for our specific need, it would be pertinent to delve into some of the pre-existing definitions and frameworks underpinning risks and vulnerabilities, as viewed in supply chain management (SCM) literature.

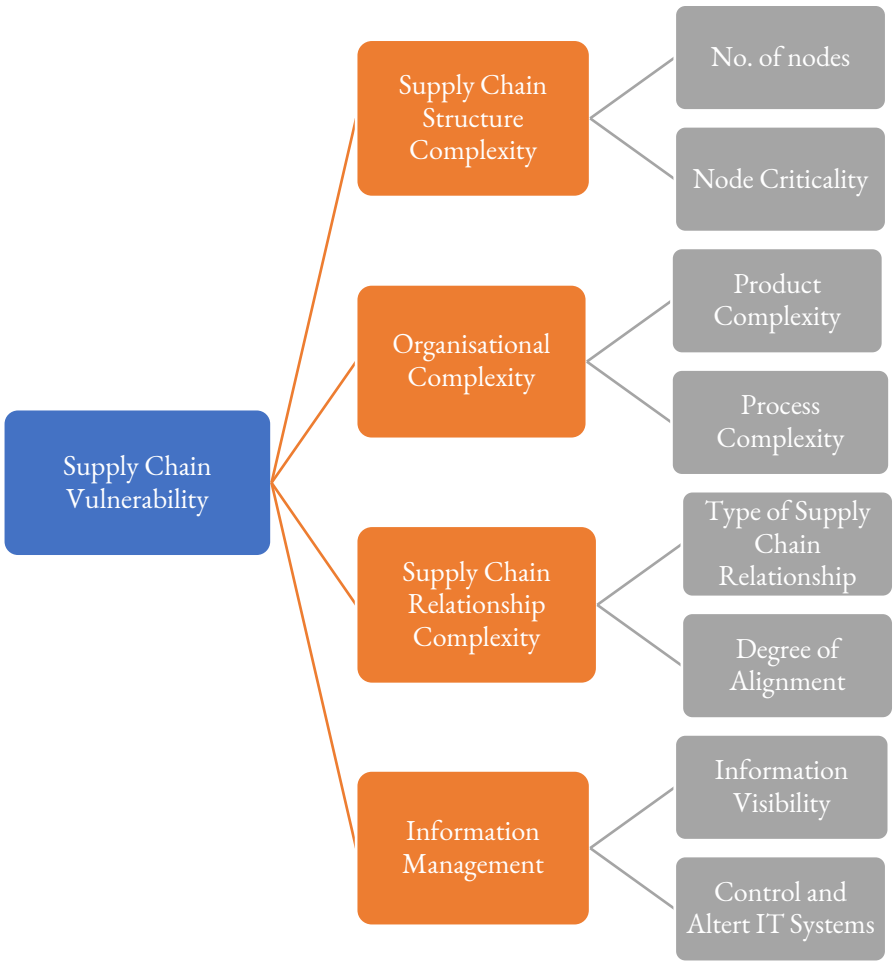
A preliminary review indicates that most of the existing SCM literature identifies factors such as natural disasters, operational difficulties, terrorist activities, volatility in demand and supply,

centralised distribution systems, outsourcing, and even globalisation as sources of supply chain vulnerability.

Sharma et al. (2021), in their paper titled *Supply Chain Vulnerability Assessment for Manufacturing Industry,* have carried out an extensive review of the SCM literature as well as interviews with experts in the manufacturing industry to identify 26 supply chain vulnerability (SCV) factors (Sharma, Srivastava and Kumar, 2023). The authors have simplified and streamlined these factors into four broad categories. This serves as a single-point source to understand how the idea of vulnerabilities and risks is viewed in the SCM literature.

At the outset, the paper differentiates supply chain risks from supply chain vulnerability. It defines vulnerability as "*design and process factors that may increase the exposure to different kinds of internal and external risks in the supply chain*" (Sharma, Srivastava and Kumar, 2023). In this sense, "vulnerability is used to measure the sensitivity of a supply chain to these disturbances". In other words, "risk is the *outcome* (always negative in case of supply chain disruptions) and vulnerability is a *driving force* that leads to risk in the supply chain." Lastly, "SCV is a precondition to supply chain risks" (Sharma, Srivastava and Kumar, 2023). [Emphasis added.]

Diagram 1: Illustrates the supply chain vulnerability driver model



As can be seen, the authors have outlined two metrics each to measure the four vulnerability drivers (Sharma, Srivastava and Kumar, 2023). The drivers and their respective metrics are further explained in detail below.

1. Supply Chain Structure Vulnerability drivers

   a) **Number of nodes:** It refers to the "number of alternative suppliers for a particular component." This metric suggests that chain complexity increases with an increase in the number of nodes, while also enhancing the resilience of the supply chain, and vice-versa.

   b) **Node Criticality:** It refers to the "number of linkages emerging out and merging in from a particular node. For a particular node, if the number of linkages coming in is more than the number of linkages going out, the node becomes vulnerable." It is so because any disruption in the demand from the customer will lead to substantial losses.

2. Organisational Complexity Vulnerability Drivers

   a) **Product complexity**: It refers to "the number of parts and components needed to produce a product." The underlying idea here is that supply chain vulnerability increases with the complexity of the product design.

   b) **Process complexity**: It takes into account both manufacturing and business process complexity. Factors like the number of bought-out components, product life cycle, variety of products, manufacturing lead time, and production process types increase manufacturing process complexity; long process lead time and high decision-making points increase business process complexity. The higher the complexity, the higher the vulnerability.

3. Supply Chain Relationship Vulnerability Drivers

   a) **Type of supply chain relationship**: This factor takes into account the existence of "active relationships and integration across different levels of the supply chain" to assess vulnerabilities. The lack of stronger and collaborative relationships among the supply chain stakeholders leads to increased vulnerability.

   b) **Performance measure alignment**: The metric seeks to measure the degree to which the performance (effectiveness) of an individual unit in a supply chain is aligned to other units within the supply chain. The underlying principle here is that a supply chain is as strong or vulnerable as the weakest link in the supply chain.

4. Information Management Vulnerability Driver

   a) **Information visibility:** This metric recognises that transparency and the free flow of information enhance the supply chain's resilience. Thus, a lack of access to key information (information asymmetry) increases the chances of its weaponisation by

actors that are privy to such information, leading to increased vulnerability in a supply chain.

b) **Detection and Control Mechanism:** It emphasises that the ability to detect and control supply chain vulnerabilities reduces the vulnerabilities and risks in a supply chain, and vice versa. Thus, the lack of statistical quality control techniques and inspection, forecasting tools, Enterprise Resource Planning (ERP), Material Requirements Planning (MRP), etc. contribute to increased supply chain vulnerability.

Another helpful framework to assess vulnerabilities in international trade is offered by Reiter and Stehrer (2021), which examines the following five components:

1. **Outdegree Centrality**: Seeks to detect the presence of a central player, i.e., a country that exports to many countries and has a high market share in the importing countries.
2. **Tendency to Cluster**: Takes into account the tendency among trading countries (exporting and importing) to form trade clusters. Formation of clusters is a severe vulnerability, as any disruption within the cluster could have devastating effects on individual countries within the cluster.
3. **International Substitutability**: Looks for substitutability of the trading product
4. **Hirschmman-Herfindahl Index**: Captures the situation when an importer country is dependent on just a few exporting countries, meaning that the market concentration among the exporting countries is high.
5. **Non-tariff measures**: Seeks to identify products most frequently subject to non-tariff barriers.

2.1 Limitations of the existing frameworks

While the reviewed literature provides comprehensive frameworks to assess vulnerabilities in a supply chain and international trading, it does not fully satisfy the objective set out in this paper, i.e., identifying strategic vulnerabilities arising out of asymmetrical interdependence between two trading countries. Furthermore, the above-discussed frameworks suffer from six key limitations as they fail to take into account the following:

Geopolitical motivations: The discussed frameworks do not take into account geopolitical motivations, i.e., the willingness of an actor to weaponise trade or economic dominance for political ends.

Country-wide perspective: The above-discussed frameworks view risks and vulnerabilities primarily from the perspective of firms. They fail to distinguish between business interests and national interests. In other words, they do not take into account that what might constitute a vulnerability for a few firms might not be a vulnerability for the country as a whole. For instance, a vulnerability for a firm that sources close to 50% of its supplies from a single source country may not

be a vulnerability for a country if that source accounts for less than 6% of the country's total imports of that particular product. Factors that might make a firm vulnerable might not lead to strategic vulnerabilities for a country.

Utility/Value of the product traded: The discussed frameworks do not make a distinction between vulnerabilities based on the utility/value of the product. For instance, what might constitute a vulnerability for a business engaged in the import of toys might not be a vulnerability of strategic significance for a country. Likewise, a disruption in the import of luxury furniture may not be a vulnerability for a country.

Consequence of disruption: The discussed frameworks also do not take into account the scale of impact that a disruption in the trade of a commodity/service would unleash while identifying vulnerabilities. Not all vulnerabilities might have an impact on a significant scale to render a country strategically vulnerable.

Latent Capability to Replace Supplies: While the above frameworks account for alternatives or substitutability, they do not take into account the potential or latent capabilities to fill in the demand-supply gap, even in cases where alternatives are unavailable. Consider, for example, the manufacturing of masks in India: When the pandemic hit, India did not produce enough masks for its population and was initially dependent on imports from China, but when supplies from China were disrupted, India quickly evolved into one of the largest mask-producing countries and even began exporting these to other countries. Here, while the alternative did not exist at the moment of the crisis, capabilities existed to quickly ramp up production and meet the burgeoning demand.

Dependency is not vulnerability: Lastly, existing frameworks view concentration as an outright vulnerability, which corresponds to the prevailing idea that dependence necessarily implies vulnerability. However, concentration and dependence as a consequence need not necessarily imply vulnerability when it comes to states.

Overall, the existing frameworks essentially approach supply chain vulnerabilities from an enterprise perspective, and do not deal with the issue of strategic vulnerabilities for states. While they do provide valuable insights, a state's framework for risks and vulnerabilities needs to be different from that of businesses. This is what we attempt to do in the following section.

3. A Framework to Assess Dependence, Vulnerability, Strategic Vulnerability and Critical Vulnerability

To begin with, it is worthwhile to briefly define the concept of dependence. In the context of international trade, dependency could be described as a situation wherein a country depends on a foreign entity to meet a substantial share of its supply needs. A dependency could arise out of broadly three factors: geography, economy, and technology.

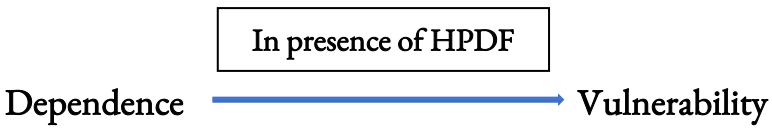
Geography/Resource Endowment: A case in point would be India's dependence on crude oil imports for its energy needs. Only a select few countries have petroleum reserves large enough to export them to the outside world and meet global demand.

Comparative Advantage: Dependency could also arise because of pure economics, i.e., when an entity has acquired a comparative advantage over other players. For instance, China's capabilities with respect to low-end manufacturing over the past few decades, or its current advantages with regard to assembling electronic equipment.

Technological Capabilities: Technology serves as the third source of dependency. It might be the case that only certain entities possess the technical competence to produce a sophisticated commodity, that competitors cannot match. Such capabilities take decades of capital investment, manpower training, industrial innovation and experience. The evolution of ASML and TSMC in the chip value chain or Airbus and Boeing in commercial airplane manufacturing are examples.

Besides, it is important to recognise that dependency could also be reciprocal or mutual. An exporting entity can be as dependent as an importing entity if the latter is a huge market for the former.

But dependence by itself should not be seen as a vulnerability. A case of dependence is of mutual interest to the two trading parties. However, if a case of dependence is accompanied by high-probability disruptive factors that make the relationship unreliable, it can be termed as a vulnerability. For instance, a case of dependence becomes a vulnerability if it is susceptible to frequent tariff or non-tariff barriers, supply shocks and disruptions, natural calamities, information asymmetry, and other factors that make dependence untenable. Thus, so long as a dependency is founded on relatively strong supply chain management basics, it need not be viewed as a vulnerability, because reducing dependency otherwise could lead to increased economic cost and reduced productivity. Thus, dependency-induced vulnerability can be imagined as:



Similarly, for a case of dependency to be termed as a strategic vulnerability, it needs to be tested against multiple parameters. To address this question, this paper proposes the following framework in the form of a four-stage test to determine whether a dependency amounts to strategic vulnerability.

3.1 The Strategic Vulnerability Test

In this four-stage test, for any dependency to be termed as a strategic vulnerability, it must pass the first two tests (adversary and alternative) and at least one of the last two tests (incidence or cascading).

1. The Adversary Test

So long the strategic interest of a trading partner does not (or is not likely to) outweigh the mutual economic interest in an interdependence, dependence cannot be termed as a strategic vulnerability.

To account for this factor, the adversary test becomes imminent as strategic interests are most likely to triumph over mutual economic interest when the dependency is vis-a-vis an adversary. An adversary would harbour a geopolitical motive to weaponise trade or resort to economic coercion to extract favourable outcomes.

The existence of an adversary relationship can vary with time. It is up to governments to categorise each other as adversaries / non-adversaries. Also, while applying the adversary test, governments have to be mindful of accounting for 'extended adversaries' - trading partners that are most susceptible to one's adversary's pressure.

2. The Test of Alternatives

While examining a dependency vis-a-vis an adversary against the test of alternatives, if any of the three case scenarios emerge, it could amount to a strategic vulnerability.

Case 1: Dependency vis-a-vis an adversary is a result of an absence of alternatives (either source or product)

Case 2: Alternatives are available, but the scale is so large that it cannot be entirely met by others in the short run.

Case 3: Alternatives are available, but the 'switching cost' is too high

In each of the above cases, the disruption is likely to be so severe that supply cannot be revived even with increased expenditure. This sort of disruption will certainly bring about a halt in production activity or sales. Example: China's imposition of sanctions on solar panels and lithium batteries can hurt India's ambitions in the renewable energy or electric vehicle sectors.

The last two tests can be mutually exclusive depending on whether the product in question is an end product/finished good/service or intermediate good/service. In specific cases, both tests may apply. Thus, any case of dependency after having passed the first two tests, must clear at least one of the following two tests.

3. The Test of Incidence

This test seeks to measure the impact of disruption on the general population. Any dependency vis-a-vis an adversary that *clears* the 'alternative test' can yet not be classified as a strategic vulnerability unless its impact on the wider population is taken into account. Two parameters need to be satisfied in this regard:

1. Assessing the section of the population affected: If the consumption pattern of a significantly large population is impacted, a dependency vis-a-vis an adversary that has failed the alternative test is a potential strategic vulnerability. For instance, a 40% dependency on 'Made in China' electronics that cater to the needs of almost the entire consumer class is a strategic vulnerability for India. On the contrary, if the consumption pattern of only a minuscule percentage of the

population is impacted, a dependency on an adversary even to the tune of 100%, despite being an irritant, cannot be classified as a strategic vulnerability. For instance, an 80% dependency on a luxury item, catering to less than one percent of the consumer class.

2. Assessing the product's utility for the population: This parameter would take into account the utility of the product and the impact of any disruption on the lives of the people and the functioning of public utilities. Thus, by this standard, any form of dependency on an adversary relating to the import of products such as soft toys, idols, and decoratives cannot be classified as a potential strategic vulnerability. On the other hand, dependency on an adversary vis-a-vis drugs (vaccines), oilseeds, laptops, and smartphones would amount to a strategic vulnerability.

For instance, India's dependence on Chinese imports for electronics and medical equipment and devices satisfies both parameters and thus, amounts to potential strategic vulnerability given it clears the first two tests as well.

4. The Test of Cascading Effect

This test seeks to assess the cascading effect of the weaponisation of a dependency by an adversary on other domestic sectors, within the supply chain or beyond. This is not a compulsory test, but an additional one to determine the severity and degree of a strategic vulnerability. A plausible example could be India's dependency on China for Active Pharmaceutical Ingredients (APIs). The fact that India sources more than 60% of its API supplies from China means that any disruption or weaponisation in this segment would severely restrict India's capability on two fronts. One, it would severely curtail India's generic medicine manufacturing, and two, it would dent its status as the pharmacy of the world, thereby also jeopardising the medical tourism industry.

3.2 The Critical Vulnerability Test

Having devised a framework to distinguish strategic vulnerabilities from the concept of risk, vulnerabilities, and dependence in general, it is also important to underline that not all strategic vulnerabilities are similar. Some strategic vulnerabilities may be of a more severe or critical nature than others. Depending upon the severity of the challenge they pose, a different approach might be needed to deal with them.

For this reason, this paper further seeks to delineate critical vulnerabilities from the pool of strategic vulnerabilities. In this sense, critical vulnerabilities are a subset of strategic vulnerabilities.

Two additional tests could be applied to a strategic vulnerability to determine whether it qualifies as a critical vulnerability. These tests would supplement and follow the four-stage test mentioned above.

1. National Security Threat

Case of strategic vulnerabilities that pose a direct threat to national security and can offer adversaries disproportionate leverage. For example, dependence on the adversary's investments or technology in electricity grids, communications, and satellites, banking & finance, digital infrastructure, and all Command, Control, Communications, Computers (C4) Intelligence, Surveillance and Reconnaissance (ISR) related sectors can be termed critical vulnerabilities, as these sectors are then highly susceptible to cyber-attacks. Any exploitation of such vulnerabilities even through a short-term disruption can significantly undermine national security and thereby influence decisions that affect the national interest.

Here it is necessary to point out that India's dependence on Russia for spares and serviceability of the Russian-origin inventory of weapons amounts to a critical vulnerability owing to the deepening China-Russia relationship. The case of India's dependency meets the adversary test given the growing strategic alignment between China and Russia. The case also fails the alternative test because India currently operates a large inventory of Russian-origin weapon systems, which makes it dependent upon Moscow for spares and serviceability requirements. In light of the absence of any alternatives, this case of dependency on Russia for spares becomes a critical vulnerability, as it could have implications for national security during a conflict with China.

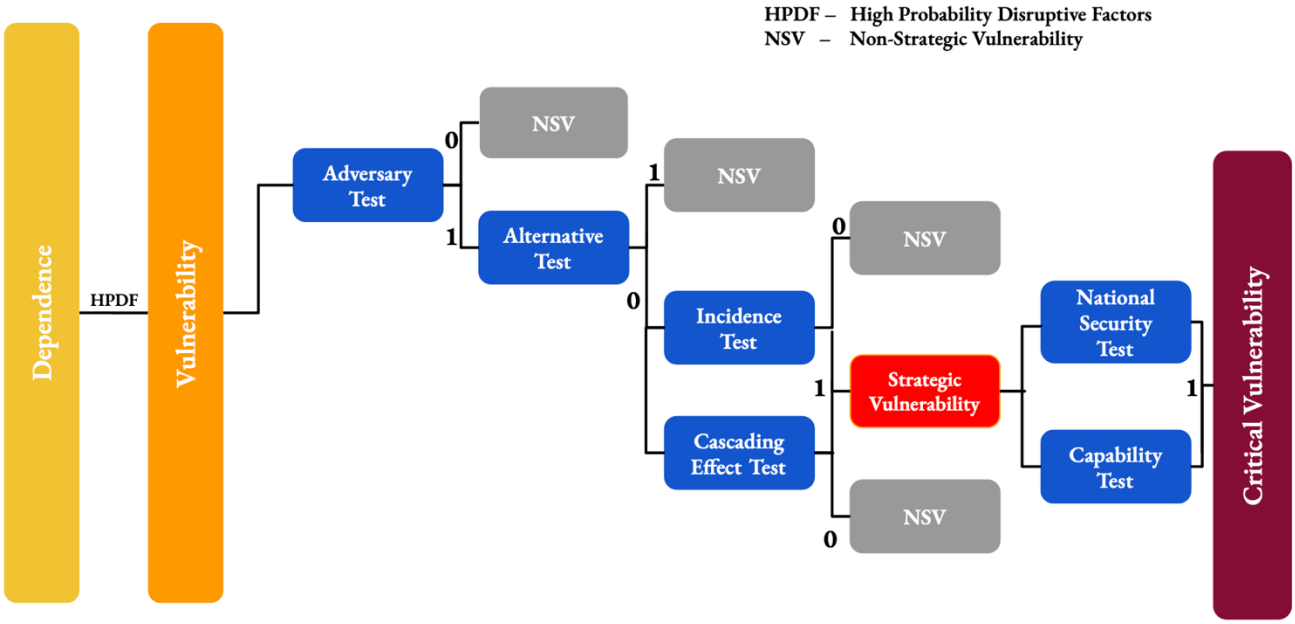
2. Capability Gap

Vulnerability vis-a-vis an adversary relating to a product of sophisticated and specialised technology that cannot be replicated in the short to medium term (rather would take decadal efforts). Examples: advanced chips, precision weaponry, space technology, missiles, ships, & aircraft. On the other hand, if the adversary's specialisation can be replicated and expanded in a relatively shorter period ~6 months to 2-3 years, it is a strategic and not a critical vulnerability. Example: assembly of electrical equipment; production of medical equipment, etc.

3.3 Framework through Flowchart

The following framework presents a four-stage test to determine strategic vulnerabilities arising out of trade dependency or asymmetric interdependence in trade.

'0' and '1' denote the result after putting the case of dependence through various tests. If a case passes the test, the number '1' is assigned and if fails the test, the number '0' is assigned.



4. Conclusion

The ideas discussed in this framework are not exhaustive, but serve the purpose of incorporating the most significant factors that determine whether a case of dependence constitutes vulnerability, and of what kind. The caveat this framework may encounter is that it does not apply to any and all cases of global trade interdependence; more specifically, it applies best to bilateral cases.

This paper forms the first of a series of outputs on dependency-induced vulnerability in the context of international trade, and shall serve as the backdrop for future outputs in this series. The framework discussed in this paper will henceforth be applied to various case studies globally, with the central study of interest being the India-China trade relationship.

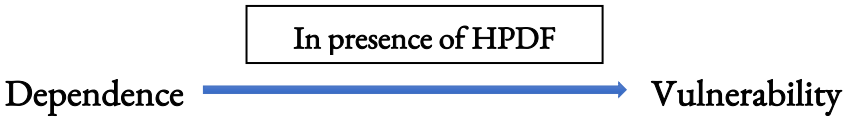
Glossary

Several terms or concepts discussed in this paper tend to be defined and understood very differently in popular discourse or specific contexts. For the purposes of conceptual clarity during this analysis, we adopt the following definitions:

Risk: Risk in a supply chain is defined as "the likelihood of an adverse and unexpected event that can occur, and either directly or indirectly result in a supply chain disruption" (Garvey, Carnovale and Yeniyurt, 2015).

Dependence: Dependence refers to a situation where Party A is reliant on Party B to carry out business operations - broadly sales and purchases. In this context, dependency can be buyer-based (downstream) or seller-based (upstream). The degree or severity of dependence can create conditions of vulnerability.

Vulnerability: Vulnerability (arising out of trade dependence) is a case of dependence tied to other disruptive factors that can render the dependence relationship untenable, fickle, or unreliable. In other words, it is a case of dependence that is susceptible to distress due to the presence of high probability disruptive factors (HPDF). Thus, dependency-induced vulnerability can be visualised as



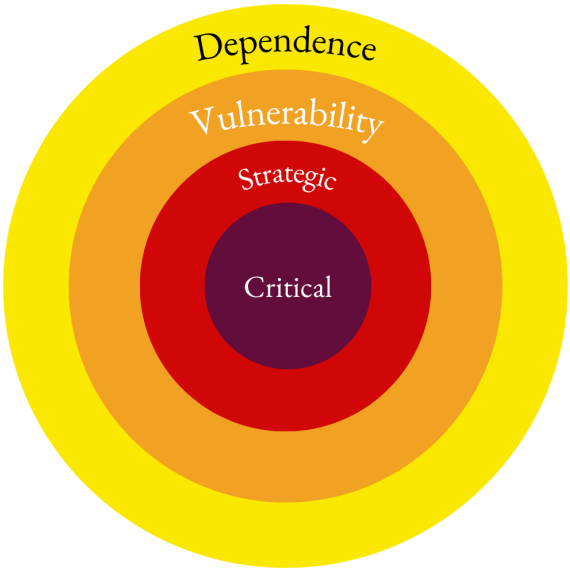
A case of dependence that is susceptible to frequent tariff or non-tariff barriers, supply shocks and disruptions, natural calamities, information asymmetry, and other factors that make dependence untenable. Dependence in isolation shall not be viewed as a vulnerability.

Strategic Vulnerability: This paper defines strategic vulnerability as a subset of vulnerability that can be primarily attributed to strategic motivations (economic coercion) by an adversarial state and can likely have geostrategic/geoeconomic implications on the state exposed to the vulnerability. Any vulnerability that is not strategic can be defined as a **non-strategic vulnerability (NSV).**

> **Strategic**: In the context of international relations, it is an approach to maximise national interests, i.e., pursue power and security, through tools of compellence, deterrence, and co-optation. A strategic approach could be applied to varying fields - domestic politics, international politics, business, or any other field characterised by competition among rivals.
>
> **Geostrategic**: Geostrategic is the strategic approach specific to the field of international relations. In this sense, the terms strategic and geo-strategic are often used interchangeably. It is the interplay of geography (loosely translated to nations or states) and strategy. Geopolitics and Geoeconomics are two constituents of geostrategic approach.

Geopolitics: Geopolitics is the use of political tools to further geostrategic/national power or interests. Geopolitical interests are connected with the direct or indirect control of territories (which contain resources) (Kurecic, 2015).

Geoeconomic: Geoeconomics can be defined as "the geostrategic use of economic power (Wigell, 2016). Alternatively, geoeconomics is using economic strength to pursue geostrategic interests. Geoeconomic interests are connected with resource management (exploitation and exports) and the inclusion of resources into national economies (Kurecic, 2015).



Critical Vulnerability: It is a strategic vulnerability of a severe nature that meets either of the two conditions: if the vulnerability can have a profound impact on a country's national security, or if such a vulnerability is a consequence of an enormous capability gap vis-a-vis an adversary that cannot be matched in the foreseeable future and would instead take decadal effort.

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Covid-19 and the Goalkeeper of the Indian Economy

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Abstract

The decision and the conviction to keep the capital markets functioning amidst the uncertainty of COVID-19 lockdown, proved to be a game changer for the Indian economy. The robust systems put in place over decades and reinforced with measures to strengthen systemic integrity during COVID, revived the inherent trust in the Indian markets, especially at the retail level. The buoyant numbers of new trading and demat accounts opened, new investors in Mutual Funds etc. are a reflection of this trust. At a structural level, apart from decreasing dependence on FPI investments, the retail segment has witnessed a secular shift from savings to investment. Additionally, within investments, there is a shift from fixed income to equities. This deepening of the investor base has moved the Indian capital market to a higher orbit igniting a structural shift in the economy.

Keywords: Indian Capital market resilience, Retail shift to equities from debt, declining impact of FPI investment, deepening of investor base, structural shift in the economy

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* The author works in the financial sector. The views and opinion expressed are personal.

1. Introduction

In a football match, the goal scorers hog the lime light and receive all the adulation. In contrast, the goalkeeper, who would have contributed equally, if not more to the victory by saving goals, does not elicit as much attention. This contrast was starkly brought out in the semi-finals of the World Cup 2022 in which Argentina defeated the Dutch 4-3 in penalty shootout. Lionel Messi celebrated this victory with his goalkeeper, who had miraculously saved two goals in the shootout, even as the rest of Argentina's team was huddled in jubilation with their final goal scorer.

We attempt to unearth similar such goalkeeper of the Indian economy during the COVID-19.

Similar to football, managing a country's economy is always a team effort, albeit more gigantic in scope and complexity. The executive and its various agencies, monetary authority, sectoral regulators, etc. each have their well-defined roles to play. In a watershed event, like the COVID-19, the complexity of managing the economy only gets compounded.

A plethora of measures were taken by each of the entities to address the unprecedented challenge of COVID. The outcome of these measures, along with externalities, is reflected in the present state of the economy. Simplistically, the outcome varies across segments and sectors of the economy ranging from fully recovered (financial sector), partly recovered (manufacturing), yet to get off the ground (employment) etc. During the possibly receding waves of Corona, this may be a good time to reflect and unearth the goalkeeper in this team game of managing the economy.

2. The facts

The deepening of the securities market in the COVID interregnum, is too glaring a phenomenon to be missed out (Table – 1). The average of the new trading, demat accounts, MF folios opened, average monthly inflow to MF Systematic Investment Plan (**SIP**) and the inflow to equity schemes of MFs, during the last three years (post COVID) are 381%, 418%, 50%, 29% and 14% higher, than their preceding three years (pre-COVID) period, respectively.

Table - 1: Select Data of Capital Market

(Number / Rs. in crore)

	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23*
New Trading Accounts	1.25	1.30	1.59	4.21	9.89	5.86
New Demat Accounts	0.41	0.40	0.50	1.43	3.46	1.86
New Unique Investors in MFs	N.A.	1.93	0.15	0.20	1.09	0.30
New Folios of MFs	1.59	1.11	0.73	0.81	3.16	1.16
Average monthly inflow to MF through SIP	5,599	7,724	8,340	8,007	10,381	12,684
Net Inflows to Equity Oriented MF schemes (NFO + Purchases - Repurchases / Redemptions)	2,71,797	1,09,701	87,301	2,14,743	2,46,730	74,541
Equity Mobilized by Listed Corporates (IPO (Excl. OFS) + FPO + Rights + SME/IGP + QIP + Pref. Allot.)	1,66,315	2,27,181	2,88,496	2,08,483	1,60,939	91,935

Data Source: Websites of BSE, NSE, SEBI and AMFI

*March – 2023: data is till December 2022.

The open question is whether the above outcome was just a happenstance or a result of thoughtfully crafted policy measures? We explore the same.

In March 2020, when the lockdown was announced in India, COVID was still an 'unknown threat'. There were rumours swirling around, fanned by the social media, that roads would no longer be usable as they would be piled-up with human corpses. There was palpable panic all-round. On March 13 and 23, 2020 the SENSEX crashed by 10 % and 13 % respectively, triggering the circuit breaker, leading to the freezing of the market for 45 minutes. Even as leveraged 'investors' (margin traders / loan against shares, traders) were being roasted in this mayhem, short sellers and speculators were having a field day, fishing in troubled waters.

The simplest and safest decision would have been to just shut down the markets temporarily and wait. But this was not done. Instead, status quo was maintained. Not even the market timing was reduced, as was the case with the Forex markets[1]. Neither was short selling banned nor was any hurdle placed on the FPIs, who were exiting the market in droves, withdrawing Rs 1.18 trillion in March 2020 alone.

Instead, the margins were increased, enhancing the systemic integrity. It bears pointing out that the cited circuit breaker stoppage was not a knee-jerk reaction to the prevalent panic, but a mere compliance to the extant regulatory norms, which are already known to all the participants. This non-shifting of the goal post during the unprecedented times was an unambiguous signal that, come 'hell-or-high water', the (capital market) show must go on!

Unlike stress tests, which are theoretical exercises through simulations, the systems of the MIIs withstood real life extreme turbulence; SENSEX fell by about 39% from its peak of 42,274 on 20.01.2020 to 25,881 on 23.03.2020 and then rose by 63% to the cited peak on 09.11.2020, all without any failure in settlement.

Having thus reinforced the immutability of market functioning through surveillance measures, it was backed by a slew of measures on ease of doing business, onboarding, digitisation of the process etc. Specifically, norms for raising funds, rights issue, preferential allotment etc. were simplified. The concept of trading of rights entitlement was ushered in, opening a new avenue for investors. Pricing norms for stressed companies were relaxed. Growth companies were allowed to come out with IPOs, albeit without dilution of interest of retail investors.

A slew of relaxations and exemptions on various compliance norms for listed companies including for fund mobilisation, mutual funds, registered intermediaries were made, spanning across timelines, filing requirements etc.

Increasing the digitisation of the process, specifically the eKYC norms, was a game changer in as much as it enabled opening of a humongous number of trading and demat accounts online, even during the lockdown.

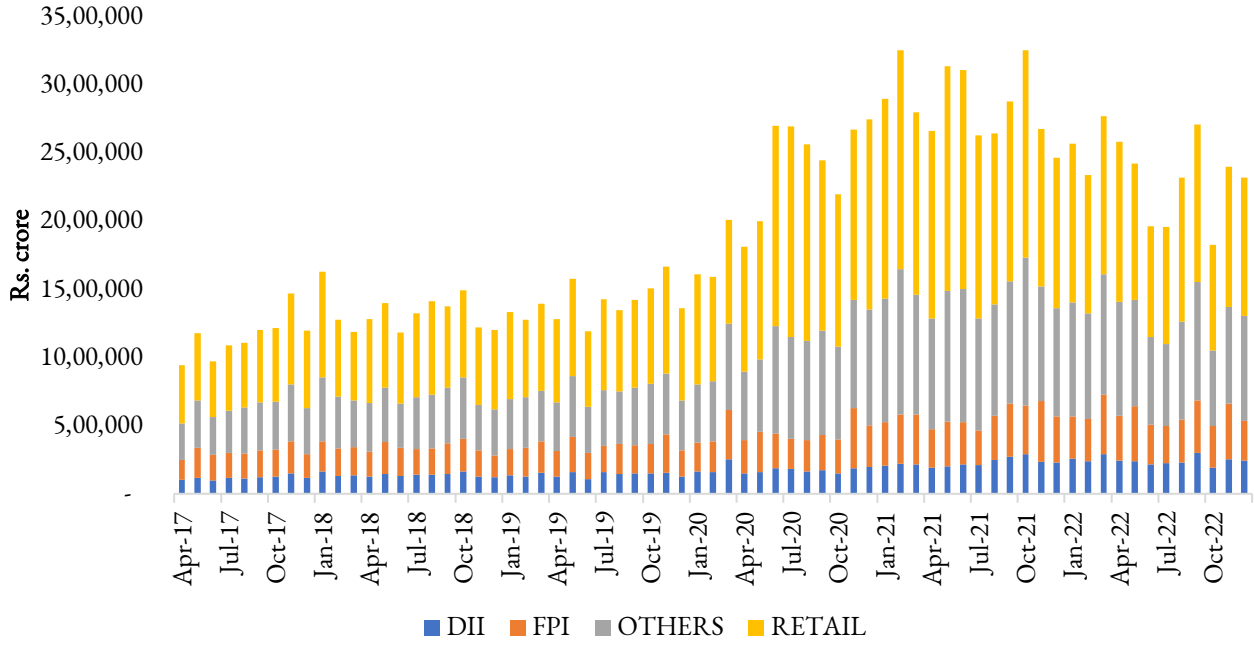
In parallel, RBI also came up with a slew of measures to mitigate the disruption caused by COVID. In addition to injecting durable liquidity of up to three years to banks and NBFCs & MFIs through LTRO and TLTRO in February and April 2020, respectively, the RBI also came up with the Special Liquidity Facility for Mutual Funds (**SLF-MF**) on April 27, 2020, to address the liquidity pressure on debt funds. Banks were eligible to avail this funding window to buy or conduct repo of debt instruments from / with MFs. This had a salutary impact as the redemption pressure abated; so much so that this facility was never required to be used at all.

However, much before the SLF-MF, the illiquidity problem cum redemption pressure brewing in certain debt schemes of an AMC since September 2019 got aggravated in the COVID panic. The Supreme Court verdict in the matter of Telecom Companies in January 2020, which, *inter-alia*, rendered the value debt paper of Vodafone zero, added to the woes of the debt market. Cumulatively, the aforesaid events led to the winding up of six debt schemes by that AMC on April 23, 2020. However, from February 2021[2] onwards, the investors of these six debt schemes started getting their money back as the value of the underlying instruments got restored. Nevertheless, it was the signalling impact of RBI's SLF-MF scheme, which stemmed the tide of redemption pressure on debt schemes.

The cumulative impact of the measures taken reinforced the trust in the markets and also ushered in the transition to the 'new normal' during COVID.

The trend in decoupling of the Indian capital market from FPI investments accelerated during COVID and thereafter became entrenched. Chart – 1 captures confidence of the retail investors as reflected in their dominance in the cash segment of NSE as a percentage of traded volume. In contrast, the falling share of FPIs in traded volume, practically mirrors that of the retail share, in the obverse.

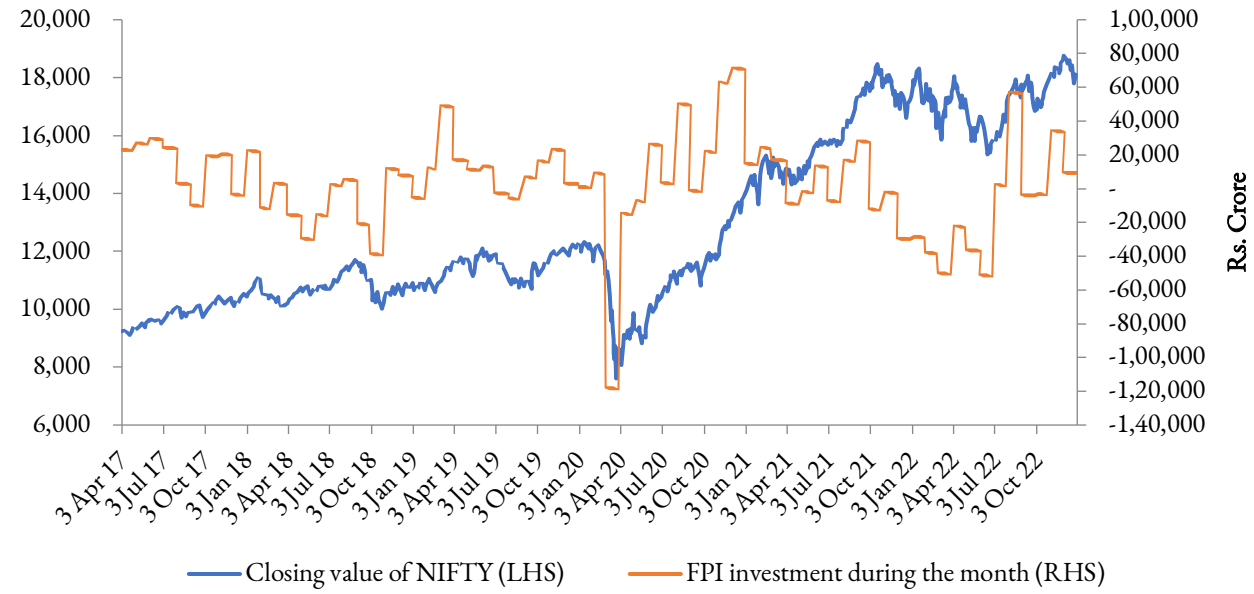
Chart – 1: Segment wise monthly traded volume in NSE, April 2017 to December 2022 (in Rs. crore)



Data source: NSE

Perhaps, based on this confidence exhibited by the retail investors and the steady participation by the DIIs, the FPIs returned from June 2020 onwards, followed thereafter by a mixed pattern, as captured in the Chart – 2.

Chart 2: NIFTY 50 (close) Vs. FPI investment, April 2017 to December 2022 (Rs. in crore)



Data Source: Websites of SEBI and NSE

This data implies that FPI outflows no longer have material impact on the Indian capital market. And yet, the line separating confidence from exuberance is indeed a very thin one, necessitating further deep dive.

3. Analysis

The growth of the capital market post COVID is attributed by some observers to the availability of cheap money and excessive liquidity. However, this attribution ignores the fact that capital market regulatory framework and MII systems are robust. Of course, low interest rates did help, but it also has had negative externalities.

RBI has been successfully borrowing gargantuan amounts for the Government year after year (Rs. 12 trillion in 2021-22 alone) at artificially low rates (financial repression), thereby keeping fiscal deficit and the public debt, low. However, the social impact of negative interest rates has been severe. In the movie 'The Mummy Returns', the soul of long since dead Egyptian priest gets resurrected and goes on to wreak havoc. Figuratively, the reversion to the taxpayer funded Old Pension Scheme (**OPS**) by some State Governments is equivalent to the return of the Mummy in public finance. Given the vociferous populist clamor, more financial weak States could resort to OPS[3]. The resultant impact on the combined fiscal and debt position of Union and State Governments, can only be negative.

In complete contrast, capital markets measures have had positive externalities. First, the average amount of equity mobilised by listed companies, (excluding the Offer for Sale component[4]), in each of the three-year pre and post COVID period has been a sizable Rs. 2.27 trn. and Rs. 1.54 trn., respectively (see Table - 1). Not surprisingly, the debt-to-equity ratio for listed companies dropped to the lowest in six years to 0.59 in 2020-21[5]. As much as high corporate leverage eventually leads to high NPAs in the banking sector[6], the record 10-year low net NPAs of 1.3% in September 2022[7] can be attributed to their deleveraging through equity mobilisation.

Second, the banking system did play its complementary role in ensuring smooth operation of payment and settlement systems even during the peak COVID. However, long before Core Banking Solutions was made mandatory for all bank branches (remember, outstation cheques took up to a week to clear?) it was the audacious transition by the stock exchange settlement to T+5, T+3 & T+2 in December 2001, May 2002 and April 2003, respectively, that hastened and catalysed the complete automation of the banking industry. This externality of capital markets has not received the recognition that it deserves and is worthy of a separate study[8].

The pertinent question now is whether the impressive increase in numbers pertaining to capital markets (in Table - 1) actually help in achieving its *raison d'etre*, namely, channelising savings into investments? And is this phenomenon a durable one? We examine the evidence.

First, equity mobilisation by listed companies and its externality of low NPA is dealt with already and hence not repeated here. Additionally, in terms of 'evidence of absence', it may be stated the lack of ADR / GDR issues by Indian corporates since 2018[9], is but a reflection on the availability of capital

as well as its ease of mobilisation in the domestic market. Further, 'reverse filliping'[10] by Indian start-ups, corroborates the aforesaid.

Second, the savings rate. The macro picture of savings and its components presents a complex scenario. The savings rate in the economy (i.e. of Govt. + Private + Households) has shown a secular declining trend and is a matter of grave concern (see Table – 2). However, the silver lining in this dark cloud is that the absolute contribution of households to savings increased from about 60% to 78.5% in this period. A golden sheen to this silver lining is that the net savings in financial assets[11] of the households (at 52.47%) exceeded their savings in physical assets for the first time ever in 2020-21. In other words, more resources are available in the economy from the households for furthering investments and thereby future growth.

Table – 2: Data on Savings

	2017-18	2018-19	2019-20	2020-21	2021-22
Savings as % of G.D.P.	32.07	31.75	29.87	28.24	N.A.
Gross Savings of Households in financial assets, as % of GDP (A)	12.03	11.98	11.95	15.70	10.82
Net Savings of Households in financial assets, as % of GDP (B)	7.64	7.90	8.03	11.63	8.31
Savings of Households in physical assets, as % to GDP (C)	11.65	12.45	11.54	10.54	N.A.
Net Savings of Households, as % of GDP (B + C)	19.29	20.34	19.57	22.17	N.A.
New Small Savings Scheme Accounts^ (in crore)	N.A.	4.66	4.12	4.11	2.33

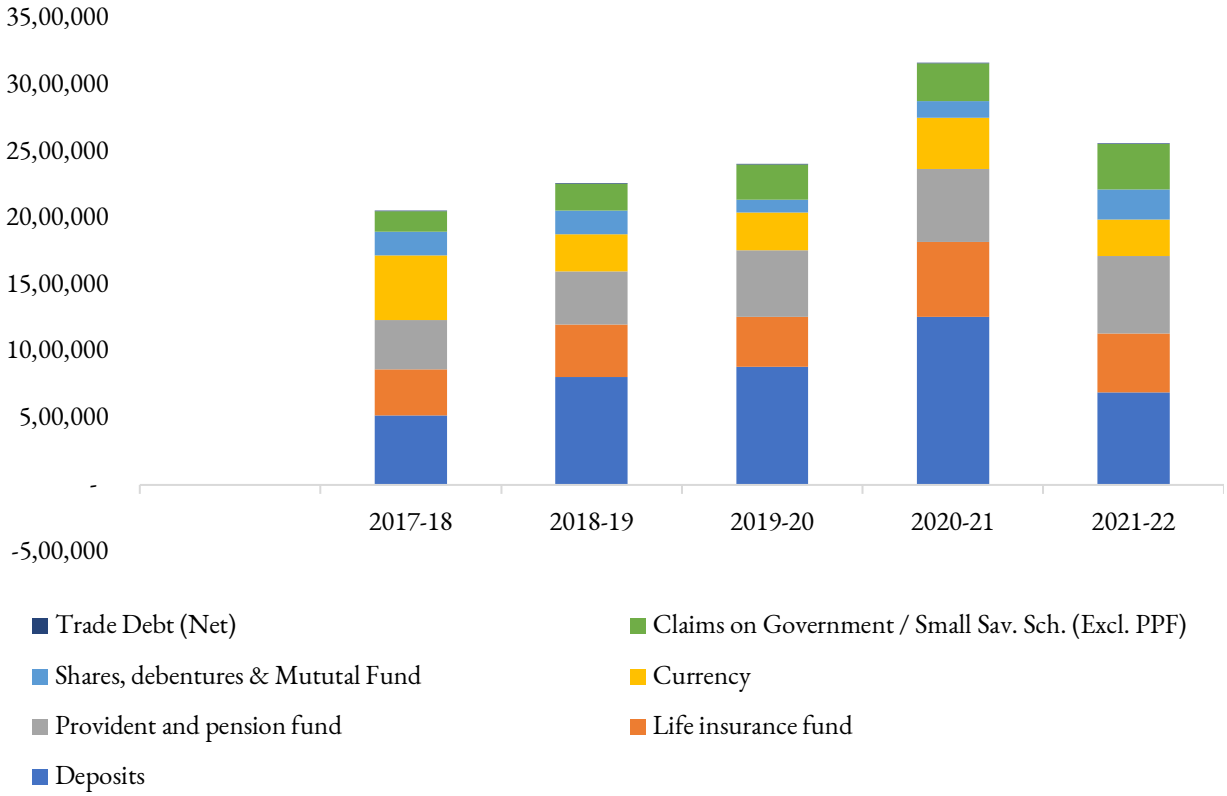
Source: RBI website & Lok Sabha Website

^ Till November 2021

The individual components of the household savings show an interesting behavioural pattern in the pre and post COVID period[12]. The constraints on spending during the lockdown, the increased need for precautionary savings and financial protection products led to a huge surge in the savings of households[13] in currency, deposits, and insurance policies in 2020-21 (see Chart - 3). Accordingly, the savings of households ballooned from (its medium-term average of) about 12 % of GDP in 2019-20 to 15.7% in 2020-21. Subsequently, as normalcy returned, spending also revived, leading to a huge reversal of holding in these three components in 2021-22, with deposits registering the largest fall. In absolute terms, savings of household fell from Rs. 31.62 trn. in 2020-21 (15.7% of GDP) to Rs. 25.6 trn. in 2021-22 (10.8% of GDP). However, bucking this trend, the investment by household (equity, debenture & MF units) showed an increase in absolute value from Rs. 1.25 trn. to Rs. 2.28 trn. in this period!

Intriguingly, the savings of households in small savings schemes also showed absolute increase during this period (see Chart – 3), although the number of new accounts opened shows a declining trend (Table – 2) coterminous with the increase in new accounts / folios in capital markets.

Chart – 3: Components of savings of Households



Data source: RBI website

Third, investment in Mutual Funds[14]. The shift in retail preference from savings to investment is evidenced in the MF industry, where individual investors held Rs. 23.56 trn. (about 58 %) of its Assets Under Management (AUM) (Rs. 40.76 trn.) in December 2022. Within investment, the shift from fixed income to equity is tangible as the AUM of equity-oriented schemes of MFs (Rs. 13.65 trn.) exceeded that of debt-oriented ones (Rs. 12.98 trn.) for the first time ever in March 2022[15]. And in July 2022, the AUM under equity exceeded 50% of the industry's AUM. Further, the retail preference for equity is overwhelming as 80% of their investments in MFs are in equity-oriented schemes and in turn, 89% of equity-oriented schemes are held by individual investors in December 2022. The increase in retail participation from Tier-3 and 4 cities, as mentioned in SEBI Annual Report, 2021-22, the steady and rising investments through SIP, irrespective of market gyrations, et al, are all subsumed in the above numbers.

The aforesaid indicates that there is a secular shift from savings to investment and within investment, there is a shift from fixed income to equities. These exuberant numbers would inevitably undergo mean reversion but would settle at a higher level. In other words, in terms of deepening, the Indian capital market has moved to a higher orbit and that is a structural shift in the economy.

While past performance is certainly not a guarantee for the future, the resilience exhibited by the capital market regulatory systems in overcoming the cascading challenges of the recent past, namely,

increasing interest rate cycle, liquidity tightening, unpredictable FPI movements, geopolitical uncertainties etc., indicates that the system is agile enough to respond to emerging situations.

4. Conclusion

As much as adversity is the true test of character, the COVID-19 provided a platform for the capital market regulatory systems to showcase its inherent robustness, resilience, and agility, built brick by brick over decades. Can we then give a big round of applause for the goalkeeper of the Indian economy?

Notes

[1] As a corollary to which the market timing of the currency segment of F&O was reduced and possibly that of Commodities F&O too.
[2] After the verdict of the Supreme Court in this matter.
[3] The link between the sustained period of negative real interest rate and the return to OPS is indirect - States with poorest financials have reverted to OPS to 1) save their monthly contribution to NPS & 2) use the corpus returned from NPS, to fill in their primary, revenue and fiscal deficit. As the incumbent will not be around when the unsustainable pension liabilities eventually become due for payment, the return to OPS is a cynical manipulation of legitimate public clamour for positive returns, into a populist measure.
[4] The concern raised by observers that large a component (about 70%) of IPOs is OFS, may not be entirely valid as OFS frees up capital to fund new investment by the PE Funds.
[5] India Inc's FY21 debt-equity ratio at 6 yrs low on massive deleveraging move, Business Standard, 11.01.2022
[6] FRDI Bill: Indian banking require a non-doctrinaire approach and not bail-in like western world, by the author, Money Life, 05.02.2018
[7] Financial Stability Report, RBI, December 2022
[8] Another externality deserving accolade is as follows. Way back in 2010, when the evil potential of media (including social media) in manipulating the public (like in the US elections) was not even fully recognized, SEBI metamorphosed itself from investor to citizen's protector, by causing media, i.e. entities outside its regulatory ambit, to disclose in their news reports, advertorials etc., any 'Private Treaty' (shares allotment in lieu of coverage) with listed or to-be listed companies. SEBI Press Release dated 27.10.2010.
[9] TaMo one of many as India Inc turns averse to ADRs and GDRs, Business Standard, 25.01.2023.
[10] Shifting of domicile back to India by Start-ups, Economic Survey, 2022-23.
[11] net of financial liabilities
[12] Vidya Mahambare, 'Our household savings are moving towards normalcy', Mint, 05.10.2022.
[13] Savings of households is calculated as the change in the opening and closing balances of stock of financial assets at the end of each financial year.
[14] Data source: AMFI website
[15] MF equity AUM surpasses debt, Business Standard, 18.05.2022

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War, Peace and Cooperation in the Last Wilderness

Review article based on "The Future of Geography: How Power and Politics in Space Will Change Our World" by Tim Marshall.

Aditya Ramanathan*

1. Introduction

In 2001, Everett C. Dolman, an academic with the US Air Force's School of Advanced Airpower Studies published Astropolitik: Classical Geopolitics in the Space Age. Featuring a photograph of Apollo 11 astronaut Buzz Aldrin on the Moon's surface next to an American flag, it was the rare sort of academic book that invited you to judge it by its cover. The very title, Astropolitik, evoked realpolitik, a word typically associated with the amoral practice of power politics on Earth. The 'Classical Geopolitics' of the subtitle indicated that Dolman's text would not succumb to the 'critical geopolitics' increasingly popular among his peers. Together these words imparted a darker meaning to the image of the Apollo 11 mission gracing the book's front cover. The motionless American flag now seemed to symbolise not scientific achievement but power and a claim to possession.

Delving into Dolman's work more than two decades later, it is hard not to be struck by its breathtaking ambition and careful concision. In less than 200 pages of text, Dolman laid out the case for astropolitics (a more neutral term for the geopolitics of space), he surveyed outer space for perils and prizes, provided an assessment of contemporary space governance, and closed with a series of recommendations.

Despite its age, much of *Astropolitik* remains relevant. One of Dolman's lasting contributions was his sounding the alarm on the increasingly out-of-date Outer Space Treaty (OST) of 1967, which still forms the bedrock of international space law. A more substantial contribution was the way Dolman brought geopolitical thinking to bear on the outer space environment. As Dolman put it:

> "What appears at first a featureless void is in fact a rich vista of gravitational mountains and valleys, oceans and rivers of resources and energy alternately dispersed and concentrated, broadly strewn danger zones of deadly radiation, and precisely placed peculiarities of astrodynamics." (2001, p.53)

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Dolman recognised that these physical peculiarities had political meaning. The Earth's shape and its rotation help determine ideal locations for space ports. Some orbits like the Low Earth Orbit (LEO) and the geosynchronous orbit are more useful than others. Transfer orbits have choke points akin to the straits and canals at sea. Lagrange points are potentially valuable locations because spacecraft can be parked there; and the Moon and other celestial bodies offered riches to those able to take them.

Astropolitics has only become more relevant since Dolman's book. The revolutions in information and sensors have made satellites smaller, cheaper, and more effective. Private companies now dominate the satellite industry and boast commercial, military, and government clients.

The growing demand for satellite services has encouraged private launch companies to push down the costs of putting them into orbit, creating a virtuous cycle. As of this writing, some private players are making plans for their own space stations and are participating in the ambitious American Artemis programme to return to the Moon permanently.

Contemporary military operations are also tightly integrated with the use of space. Satellites provide vital intelligence and targeting information. But as Bleddyn Bowen (2020, p.193-225) points out, on a more profound level, greater use of satellites allows a military to disperse yet fight effectively, while forcing dispersion on an adversary on disadvantageous terms.

Furthermore, orbital infrastructure has become heavily dual-use. When Dolman first published his book in 2001, the American GPS satellite navigation system was primarily military in nature and barely used by civilians. In 2023, GPS and its rivals like China's BeiDou are indispensable to hundreds of millions in their daily lives. On the flipside, Ukraine has made extensive use of commercial satellite imagery (Borowitz, 2022) as well as the American Starlink satellite internet constellation in its war with Russia. (Jayanti, 2023)

2. Marshall's Arguments

Dolman's book helped spur the small but growing field of astropolitics. Yet while scholars have produced serious-minded tomes on the subject, popular perceptions tend to be marked by indifference. Tim Marshall's book is well-placed to bring astropolitics to the attention of policymakers, journalists, and general readers.

It is not surprising that Marshall wrote this book. A veteran foreign affairs journalist and author, he has penned popular works dedicated to geopolitics. In *Prisoners of Geography* (2015) he sought to explain how terrain and ecology shaped the behaviour of some states. He repeated this effort in *The Power of Geography* (2021), which included a final chapter on space.

The Future of Geography expands that last chapter into an accessible and informative book-length treatment. It is divided into three sections. The first section summarises the origins of the space age in the Cold War and introduces astropolitics. The second profiles the space programmes of the three

states Marshall believes are the most capable players: the United States, China, and Russia. The third section looks at what the future might hold for human politics in space.

Two key themes emerge from the book. One is the need to upgrade Cold War-era space governance frameworks to meet our 21st century needs. The other is the potential for states to wage warfare in space.

Unlike some of Dolman's detractors, Marshall seeks not to bury him but to praise him. Channelling Dolman, he looks at what it takes to be a space power. For one, a state's space ports are ideally located near the Earth's equator to take advantage of higher rotational speeds. The ports should also ideally have coastlines to their east to allow boosters to fall back to Earth safely. If a state does not possess such locations it needs to gain access to them as the European Union (EU) does with French Guiana and Russia does with the Baikonur Cosmodrome in Kazakhstan (which is neither close to the equator nor next to a coastline but is the best Russia can currently get). More importantly, states need capital, the right human resources, and broad support for investments in space.

Escaping the Earth's atmosphere, Marshall identifies the Low Earth Orbit (LEO) as "an attractive piece of real estate" (p. 63) because it's useful for a diverse array of satellites including those for imaging and satellite internet. Indeed, LEO can be legitimately identified as a choke point as private companies have plans to launch tens of thousands of additional satellites into these orbits, which range in altitudes between 160 to 2,000 kilometres above sea level.

This leads to the twin problems of orbital crowding and orbital debris. Marshall mentions the 2009 collision between a defunct Russian satellite and an American Iridium satellite that created 2,000 pieces of debris (p. 93). Incidents like these could become more likely in the future. The only way out, according to Marshall, is for the "Big Three" space powers — the US, China, and Russia — to agree on new rules for spacecraft disposal, space traffic management, and data sharing (p. 101).

Marshall briefly touches on other issues like the limited slots available in geosynchronous orbit (at an altitude of about 36,000 km). He also describes the potential utility of the five Lagrange points, since they are spots in which objects can remain more or less in a fixed position in relation to Earth. Lagrange point L2 was put to use in 2022 by the James Webb Space Telescope, which will observe deep space for the next 20 years.

Lunar governance remains vexing. The US-led Artemis programme has plans for a Moon base and space station. It is scheduled to return humans to the lunar surface in 2026. China and Russia have similar plans of their own. The US has portrayed the associated Artemis Accords as a series of innocuous rules to which all states should be willing to adhere. While this is mostly true, Marshall flags the three Artemis provisions that have sparked the most concern: protection of heritage sites (such as those of the Apollo landings), deconfliction (which would allow the declaration of 'safety zones') and extraction of resources.

The first two principles mentioned above could allow for the de facto creation of private property and even national territory on the Moon. Existing provisions under the OST prohibit states from making claims on celestial bodies in whole or part but Artemis may have found a way to do just that

informally. Combined with the provision allowing resource extraction, the Artemis Accords can seem like a finders-keepers model of lunar law.

These challenges are likely to grow more acute because the Moon's resources are not evenly distributed. Lunar water ice, which is crucial for sustaining life and for providing hydrogen and oxygen for rocket fuel, is concentrated in the polar regions. On the other hand, the Moon's equatorial region is likely to have the best deposits of helium-3, which could prove valuable if nuclear fusion power generation ever becomes a reality back on Earth. To manage potential competition, members of the Artemis Accords (including India, which became the 27th signatory in June 2023) will have to insist on multilateral legally binding measures.

Finally, there's the matter of space warfare. Increasing military and economic reliance on space also makes satellites attractive targets. Between 1985 and 2007, states observed an informal moratorium on destructive testing with anti-satellite weapons. In 2007, China fired a direct ascent anti-satellite (DA-ASAT) missile against one of its defunct satellites orbiting at an altitude of 863 kilometres. The immediate result was at least 35,0000 pieces of debris. The more lasting consequence was that the US, India, and Russia conducted destructive DA-ASAT tests of their own.

Marshall discusses electronic warfare, directed energy weapons, and cyberattack capabilities. However, he spills more ink over the emerging threat from debris removal satellites, since these can quite as easily be repurposed to maul adversary satellites or knock them out of orbit. Since such dual purpose technologies cannot be easily proscribed, Marshall advocates a comprehensive global agreement on space situational awareness to make it easier to detect hostile behaviour in orbit.

3. Our Astropolitical Future

The Future of Geography offers little new to experts in the field but it is not targeted at that miniscule audience. Instead, Marshall strives to produce something rare: an accessible primer on astropolitics that is put together with jargon-free pose and sprinkled with wit. *The Future of Geography* is not the product of years of archival research and does not need to be. For sources, Marshall uses other books, papers, web sites, and news reports. More significantly, he speaks to practitioners and academics, and quotes some of them, including Dolman.

Writing this sort of book forces authors to make difficult decisions about what to leave out. Unfortunately, Marshall's choices often result in superficial treatment of important subjects. For instance, on space governance, Marshall has little to say about space laws other than the OST. There is also little or nothing on how the International Telecommunication Union (ITU) helps administer the grant of radio frequencies, or the various proposals for debris mitigation.

On space warfare, Marshall mentions the 2022 US declaration of a unilateral moratorium on destructive tests. However, his book does not cover the vote in the UN First Committee in November that year. In that vote, a total of 154 states were in favour of a resolution calling on states to ban destructive DA-ASAT tests. Eight, including Russia and China, voted against the resolution. India

and Pakistan were among the ten that abstained. (Foye and Hernández, 2022) Readers of Marshall's book will find few insights into why some states have hesitated nor will they learn of rival proposals for arms control in space.

Finally, Marshall's proposals are vague. While new space laws are needed, they are unlikely in the present international climate. The first generation of space laws were concluded during the Cold War detente. These treaties came at the same time as a series of major arms control agreements and were bookended by the 1959 Antarctic Treaty and the 1982 UN Convention on the Law of the Sea (UNCLOS), both of which were concerned with governance of regions beyond recognised national territories. For new space laws to come into being, we will require dramatic changes in great power relations, though the adoption of the High Seas Treaty in 2023 is cause for cautious optimism.

Notwithstanding a few shortcomings, *The Future of Geography* is the best introduction to a complex subject. It is also a sign of how much more urgent the study of astropolitics has become since Dolman's pioneering work. Those who delve into Marshall's latest offering will have little doubt that humans will take their paranoias and pettiness into the vast expanses beyond our planet.

"The Future of Geography: How Power and Politics in Space Will Change Our World" by Tim Marshall, Elliott & Thompson, 2023, Pages 285. ₹1646 (Hardcover); ₹755 (Kindle)

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