



Governing data and digital platforms in middle income countries: regulations, competition and industrial policies, with sectoral case studies from South Africa

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Abstract

This paper addresses the implications of digital platforms for middle-income countries seeking to build advanced productive capabilities. To do so it develops a new 'Digital Platform Dynamics' framework to consider platform functions and platform power in value creation and value extraction along with the potential roles for regulation, competition and industrial policies. The highly heterogeneous nature of digital platforms is considered along with the ways in which value is created and extracted, drawing from international competition cases and inquiries. The framework is developed from a review of the economics of digital platforms and the key development challenges facing countries in overcoming a 'middle-income technology trap'. To build on local productive capabilities, countries have to link into global value chains, where digital platforms are increasingly important in keeping pace with technological developments, while linking back to local production systems to ensure that dynamic efficiencies are realised. We argue that this requires an 'entrepreneurial-regulatory state' to engage with the power and potential of the global digital platforms. The issues identified are considered in the case of South Africa drawing on an established research base on the effects of digitalisation and the importance of platforms in different sectors. We find that South Africa has established competition authorities and industrial capabilities, along with local digital platforms, however, it is grappling with an integrated strategy which aligns competition, regulation and industrial policies for value creation and capture in support of local economic activity. The South Africa sectoral cases highlight the relevance of the Digital Platform Dynamics framework in governing and capturing opportunities from digital platforms in processes of digital industrial development.

Table of Contents

1. Introduction	2
2. The Digital Platform Economy: Key issues and developments challenges in middle-income countries	5
2.1 Data and Digital Platforms	5
2.2 Economics and Heterogeneity of Digital Platforms	7
2.3 International Review of Competition Policy and Regulations regarding Digital Platforms	10
2.3.1 International expert studies and policy papers	10
2.3.2 Enforcement cases and inquiries	12
2.3.3 Data, its aggregation and proposals for competition policy and regulations	15
3. Governing data and digital platforms in middle-income countries: The Digital Platform Dynamics Framework	17
3.1 The 'Middle-Income Technology Trap'	17
3.2 An industrial policy approach to digital platform economy	20
3.3 Digital Platform Dynamics Framework	22
3.4 What Governance Models for an Entrepreneurial-Regulatory State?	26
4. South Africa: A deep dive into selected sectors	28
4.1 Digital advertising and e-commerce, with examples from tourism and fast fashion	29
4.2 Industrial capabilities: Machinery & equipment	32
4.3 High value services: Healthcare	34
4.4 Comparative insights from South Africa case studies	37
5. Conclusions	38
References	40

1. Introduction

Data and digital platforms are reshaping markets and consumer dynamics, business models and industrial production. Online platforms open-up access to international markets and technologies for developing country businesses. At the same time, the global economic power of GAFAM (Google, Amazon, Facebook, Apple and Microsoft) pose challenges to countries looking to build local capabilities where data in the hands of the platforms could be a competitive asset for local companies in being critical for design and customisation of products, targeting of advertising and sales, and identifying routes to local and export markets. This has led to calls for regulation of the platforms, including data localisation, although generally without a clear articulation of the links between data and the development of local productive capabilities.

Our focus is on the implications of digital platforms for middle-income countries seeking to build advanced productive capabilities. While we will refer to middle income countries in general, we recognise that this is a wide and diverse group of economies.¹ Our objective is threefold. First, we aim at distinguishing the challenges relating to technological change and industrial development that these countries face. Second, we aim at identifying value creation opportunities offered by different types of digital platforms. Third, we aim at advancing a policy framework for middle-income countries to engage with these challenges and opportunities effectively.

In achieving these goals, the importance of understanding where and how digital platforms are value-creating and where they are value extracting has been widely stressed (O'Reilly, 2020). Less emphasis has been given to the importance of recognising differences in value creation and extraction dynamics across different types of digital platforms – i.e. *digital platform heterogeneity*. The nature of the value creation and extraction varies by the type of platform – including e-commerce, search, social networking, operating systems and software – and how they interface with new and existing businesses. Some sectors have seen the emergence of new players; in other cases, traditional sectoral players, in retailing and banking for example, have leveraged "data rents" to reposition and change their business models. Power is exercised along the "data value chain", at the point of data collection, but also at the level of data storage, aggregation, localisation (in a few data centres), and data use by businesses (and potentially governments).

Middle-income countries are often unprepared to engage with such a complex, diverse and fast-evolving scenario in an effective and targeted way. As a result, they run the risk of remaining stuck in a "middle-income technology trap" (MITT), that is, a specific structural and institutional configuration of their economies preventing innovation and domestic industrial development (Andreoni and Tregenna, 2020). Given their structural and institutional configuration, as well as a subordinate position in the digital platform economy (China being a notable exception), lessons from international experiences in competition policy and regulations present limitations when applied to middle-income countries.

¹ According to the definition of the World Bank, middle-income countries are those with a per capita gross national income of US\$1,026 to \$12,475. Challenges faced by middle-income countries are also faced by low- and high-income countries, however, we are most interested in examining the issues in a middle-income country context where governments are grappling with the implications of digital platforms for building on existing local industrial capabilities.

Across mature economies in the US, EU and UK, particular attention has been given to the problem of personal data protection and ownership and, to a certain extent, competition policy enforcement. Across middle-income countries, competition policy and regulation proposals for data localisation have also been raised, however, relatively small domestic markets result in limited data aggregation power. More critically, policy proposals have been dominated by binary decisions and trade-offs, rather than a strategic industrial policy engagement with the challenges, but also opportunities, presented by digital platforms.

We address these research and policy gaps by advancing a new framework linking regulation, competition and industrial policies and analysing explicitly how their alignment could reduce the shortcomings highlighted above, while also providing middle-income countries with a more inclusive and sustainable digital directionality. In our *Digital Platform Dynamics* (DPD) framework we identify three key dimensions – of value creation and extraction, platforms functions, and platform power – and five key relationships linking these dimensions among themselves as well as to industrial policy and competition policy. These relationships vary across the different types of digital platforms. Specifically, we distinguish between the need for regulations and competition policies for access to platforms and data on *fair terms* (in the context of digital search and advertising, for example), and competition and industrial policy supporting *digital capabilities in local rivals* to the global platforms. The implementation and enforcement of such an integrated policy mix of regulation, competition and industrial policy calls for new policy governance models for an 'entrepreneurial-regulatory state'.

The DPD framework is applied to four sectoral case studies in South Africa, a country which presents typical middle-income technology trap problems and in which digital platforms are becoming increasingly important. The selected sectors are fast fashion, tourism, mining equipment and health services. Sectoral cases are used to elucidate the high degree of heterogeneity in the relationships between value creation and platform functions, platform power and value extraction, and finally the need for appropriate industrial and competition policies. The case study analysis draws on work which we have been involved in for the Industrial Development Think Tank at the University of Johannesburg on a digital industrial policy and on regulating digital platforms.²

Following this introduction, the paper is structured in three main sections, followed by a conclusion.

Section 2 unpacks key issues of the global digital platform economy – specifically the economics and heterogeneity of digital platforms (subsections 2.1 and 2.2). Emerging business models and specific characteristics of the global digital platform economy are reviewed to highlight the intrinsic tendencies and sources of value across multi-sided and multi-layered digital platforms. In this section we also provide a review of the competition policy and enforcement approaches to digital platforms being taken internationally (subsection 2.3). The policy review points to the key ways in which platforms have been found to exercise market power to undermine rivals, and the impacts on other businesses and consumers. We highlight the emerging consensus on a combination of economic regulation and competition rules which is appropriate for digital platforms. This is an important basis for considering the further links to industrial policy in middle-income countries.

² This includes a review and synthesis of evidence and findings from expert panel meetings on data regulations conducted in South Africa in July 2019 and March 2020, as part of the activities of the Industrial Development Think Tank, CCRED, University of Johannesburg and a number of input papers which are separately referred to where relevant.

Section 3 locates our analysis in the middle-income country context, and introduces the concept of 'middle-income technology trap'. Against this background, we propose an industrial policy approach to the rising global digital platform economy. We highlight three reasons why an industrial policy approach is appropriate, and we present our new framework *Digital Platform Dynamics* framework. Sources of heterogeneity in the "value-functions-power" relationships are discussed to highlight the importance of adopting a targeted and differentiated policy response.

Section 4 examines the case of South Africa and the implications of digital platforms for value creation and extraction, the functions of platforms and the related issues of power and control. Comparative lessons are drawn for testing the *Digital Platform Dynamics* framework proposed in section 3.

Section 5 concludes by setting out recommendations for an appropriate economic regulation, competition and industrial policy regime for engaging with digital platforms to support productive capabilities in middle-income countries to overcome the MITT. This involves strategies to break into the digital economy, link up and back into digital platforms along the data value chains, and keep pace with digitalisation.

2. The Digital Platform Economy: Key issues and developments challenges in middle-income countries

2.1 Data and Digital Platforms

The digitalisation of the economy – its drivers and transformative impact in all social, consumption and production spheres – have gained centre stage in recent policy debates (World Bank, 2016; OECD, 2017; UNCTAD, 2017 and 2019; UNIDO, 2019). Several contributions have announced the imminence of the "Fourth Industrial Revolution" (Schwab, 2016) and the rise of the "Platform Economy" (Kenney and Zysman, 2016), both driven by widespread diffusion of cyber-physical systems, digital and highly automated production technologies, new sources of data and the internet of things, algorithms and cloud computing, big data analytics and artificial intelligence.³

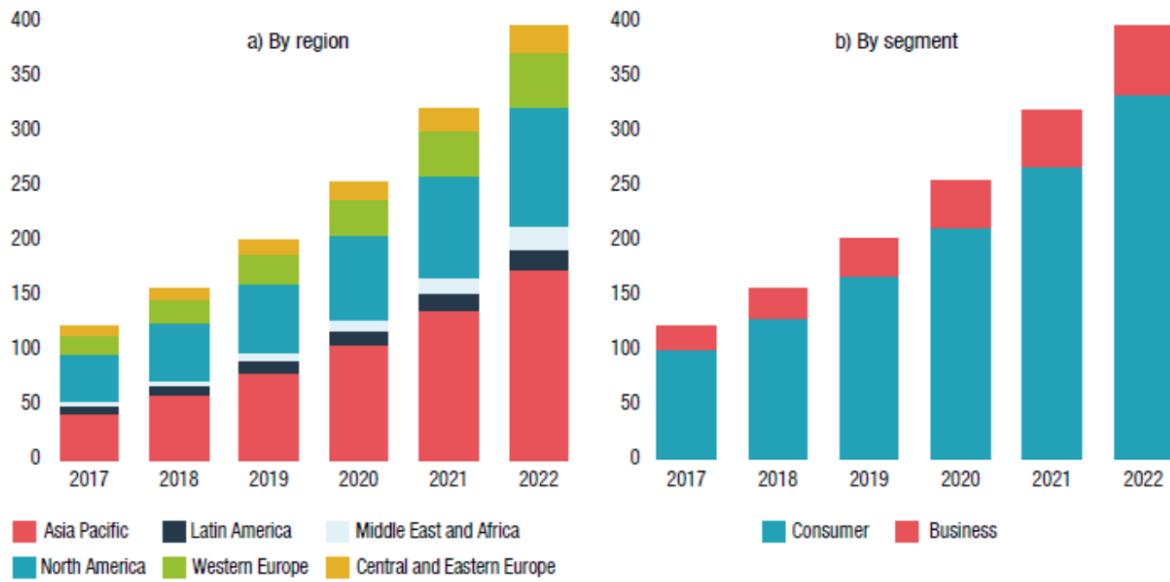
Other contributions have been more cautious and provided a more nuanced picture of digitalisation, its diffusion and impact across countries and companies. Some contributions have highlighted the evolutionary trajectory followed by these technological and organisational transformations – for example, their embedding in Information and Communication Technologies (ICTs) and Global Value Chains (GVCs) (Sturgeon, 2019; Whittaker et al., 2020; Andreoni et al., 2021). Others have emphasised differences in the distribution of basic, intermediate and advanced digital capabilities across countries and companies, hence the disproportional diffusion and impact of digitalisation (IDTT, 2018; Andreoni and Anzolin, 2019; UNIDO, 2019). In this respect, particular emphasis has been given to the ways in which, given these differences in digital capabilities, digitalisation is creating winners and losers (UNCTAD, 2019; Kenney et al. 2019).

Despite notable differences, all these contributions recognise the centrality of data and platforms as game changers reshaping processes of value creation and extraction across countries and companies. Digital platforms are multi-sided digital frameworks which emerged from combine cloud-computing power and algorithms which process data from a wide range of consumption, manufacturing and service activities. Digital platforms have become key infrastructures intermediating and shaping market transactions and ecosystem relationships (see UK Digital Competition Expert Panel (DCEP) Report, 2019; Cremer et al. 2019; Mazzucato et al., 2020). In some cases, platforms are transforming sectors by connecting producers with each other and with consumers, in new ways, while exercising different degrees of intermediation. In other cases, platforms have been used to build 'platforms of platforms', that is, platforms enabling the construction of further and diverse types of platforms. As stressed by (Kenney and Zysman, 2016:2) "[i]f the industrial revolution was organised around the factory, today's changes are organised around these digital platforms".

Data flows arising from personal, social, business and government activities within digital platforms have grown dramatically over the last two decades – from about 100 gigabytes (GB) per day in 1992, to more than 45,000 GB per second in 2017, with the Global Internet Protocol Traffic expected to reach 150,700 GB per second in 2022 (UNCTAD, 2019) (Figure 1). While middle-income countries have generally less developed physical infrastructure, such as fixed telecom lines (copper and fiberoptic) and formal branch-based banking services, they have been rapid adopters of mobile telecommunications, internet access, social media and mobile money services.

³ See Benaich and Hogarth, 2020 for an analysis of the state of Artificial Intelligence

Figure 1: Internet Protocol Traffic, 2017-2022 (Exabytes per month)



Source: UNCTAD 2019, based on Cisco 2018.

In a data-driven globalised economy where key economic relationships between participants are reshaped by digital platforms, and key industrial competitiveness parameters have been redefined by digital technologies (UNIDO, 2020), countries and companies are facing new opportunities from data collection and use along new "data value chains" and digital platforms. Opportunities arise for middle-income countries from the overall availability and lower costs of access to digital tools and computing resources for other economic sectors. Specifically, it arises from leveraging data in value creation processes to improve and transform existing economic activities, such as, more intelligent and agile manufacturing processes, opportunities for new business models, coordination and intermediation, reaching new markets, developing new products with data-enhanced features and functionalities, and coordinating along supply chains (Sturgeon, 2019; Roberts, 2020a; Andreoni et al., 2021). Digital platforms are also a potential key enabler of the 'organisational economy' (Simon, 1991), as they allow better social coordination, for example, government activities in providing public services or addressing environmental challenges (Mazzucato et al. 2020).

However, these opportunities are not equally distributed. This is because countries and companies are differently equipped in terms of digital capabilities – with the majority of middle-income countries being less capable to capture these opportunities and related digital dividends. Moreover, these opportunities come with new specific challenges and constraints. These new challenges and constraints reflect the unique way in which power relationships between and within countries and companies are redefined by the rise of different types of digital platforms. These relate specifically to the ways in which different platforms are used to extract economic value by acting as data intermediaries and infrastructures. Indeed, "we are in the midst of a reorganization of our economy in which the platform owners are seemingly developing power that may be even more formidable than was that of the factory owners in the early industrial revolution" (Kenney and Zysman, 2016:2). And, differently from the factory owners of early industrialisation, digital platforms have an intrinsic tendency to become global and fully exploit network economies.

2.2 Economics and Heterogeneity of Digital Platforms

Digital platforms have been defined in different ways, often with reference to specific concrete examples. At the core of these definitions there is the common idea of digital platforms as "multi-sided markets" (Rochet and Tirole, 2003) characterised by network effects, scale and scope economies. The way in which the economics of these platforms work depends on their different nature. For example, among the digital platforms identified by the EU Digital Single Market Strategy, network effects and economies of scale and scope work differently across search engines, social media, e-commerce platforms, app stores and price comparison websites.

Digital platforms codify a structure of rules and parameters for economic and social interactions and provide interoperable technologies (and interfaces) made of a mix of hardware, software and virtual networks. This codified and technology enabled platform structure operates as a 'stable substrate' (Kenney et al., 2019) on which multi-sided agents can interact and build-on, up to developing entire ecosystems made of focal firms, complementors and customers.⁴

Multi-sided digital platforms' power increases with the number of users and customers as they allow for the internalisation of demand externalities within or between different user groups. When a platform becomes more attractive for one user with the growing number of users on the same side of the platform we have *direct network effect* (e.g. typical for social networks and communication applications like Facebook); when the platform becomes more attractive for one user group (e.g. advertisers) given a rise in the other platform side (consumers) we have *indirect network effects*. Thanks to these 'network effects' (Katz and Shapiro, 1985; 1994), the more participants a digital platform is able to attract the higher the network economies the digital platform can benefit from. These network economies result from aggregating data from direct users and consumers, as well as in some cases their complementors.

Digital platforms can also exploit large economies of scale and scope. The former result from the fact that once initial fixed costs of building the platforms (and algorithms) have been covered, the marginal cost of adding participants is typically close to zero and often overtaken by the direct and indirect value of data aggregation. Economies of scale in the digital platform economy can result in almost infinite rents. Economies of scope on the contrary result from costs declining with increasing number of diversified goods and services offered on the platform.

To maximise these network, scale and scope economies, the platform business model relies on a number of key strategies which maximise value extraction for the digital platform:

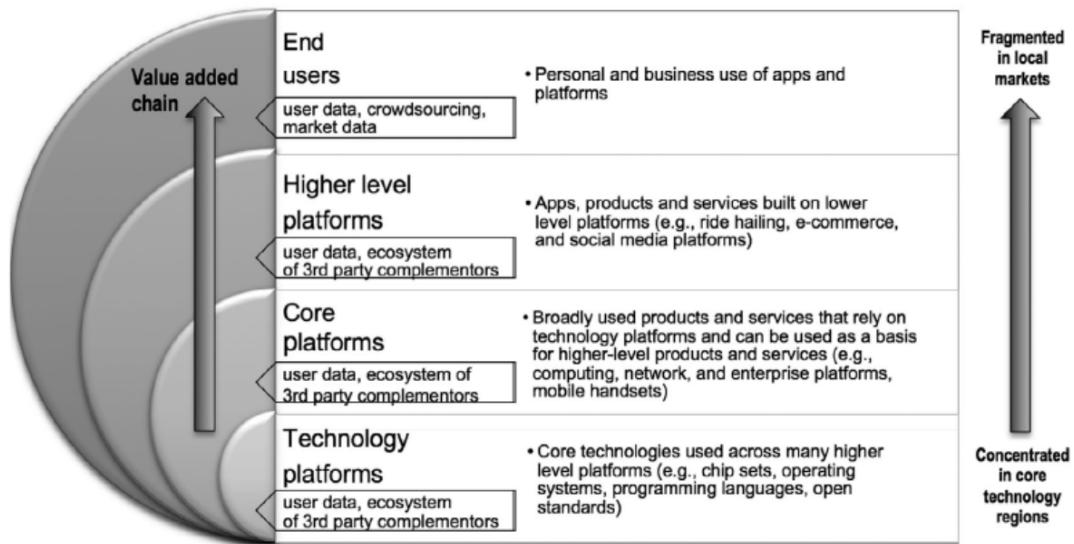
- (i) introducing "new transaction mechanisms more rapidly and at much lower cost" than traditional firms controlling a linear series of activities (Zhao et al., 2019);

⁴ According to the widely used definition by Gawer (2014:1239) platforms are "evolving organizations or meta-organizations that: (1) federate and coordinate constitutive agents who can innovate and compete; (2) create value by generating and harnessing economies of scope in supply or/and in demand side of the markets; and (3) entail a modular technological architecture composed of a core and a periphery." This definition acknowledges the fact that platforms appear in a variety of organisation forms including: within firms, across supply chains and across industry innovation ecosystems.

- (ii) fast scaling-up, especially in consumer markets where user wants and needs tend to be relatively less segmented than industrial users (Sturgeon, 2019);
- (iii) attracting users and consumers by subsidising one side of the platform along with exclusive contracting for producers – decisions on what side to subsidise can also change over the lifecycle of the digital platform (Teece, 2017);
- (iv) pursuing winner-take-all strategies, leveraging large network and scale economies;
- (v) pursuing economies of scope by aggregating data from multiple platforms as well as leveraging the data collected in a multi-sided market to enter a second multi-sided market – i.e. 'platform envelopment strategies' (Eisenmann et al. 2011; Condorelli and Padilla, 2019);
- (vi) pursuing horizontal mergers and acquisitions to capture data-driven scope economies and respond to demand-side product substitutability and complementarity (Nooren et al., 2018);
- (vii) pursuing vertical integration to control complementary assets or introducing bottleneck assets along the data value chain (e.g. by investing in physical assets like distribution networks and data centres) (Teece, 2018);
- (viii) attracting complementary providers to increase the value for users and locking-in users in the digital platform (Kenney et al., 2019); and,
- (ix) setting and developing standards, thus, controlling interoperability and possibilities for modularization in software technology and innovation (Teece, 2018) – including the development of boundary resources such as software development kits (SDK), application programming interfaces (APIs), and application contracting interfaces (ACIs) to be used by potential ecosystem complementors (Kenney et al., 2019; Sturgeon, 2019).

Digital platforms are often lumped under one banner when there are important differences between them which should be disentangled. The way in which digital platforms operate can differ significantly according to the type of digital platform and the platform *layers* under consideration. As a result, business models and strategies that in one type of platform result in constraints and challenges for new company entrants can, in other cases, offer industrial and innovation opportunities. Moreover, even within the same digital platform there can be different constraints and opportunities. As pointed out by Sturgeon (2019: 12-13) "the digital economy has developed as a set of nested modules and platforms [...] at a more foundational level technology platforms offer discrete functional elements, upon which core platforms can be developed to provide higher-level functionality [...] Above these, higher-level platforms can connect users and buyers to suppliers and vendors of goods and services across "two-sided" platforms" (Figure 2). This layered structure offers multiple entry points for potential company complementors as well as building up customised higher-level platforms reflecting data and country context specificity.

Figure 2: Platform layering as a value chain in the digital economy



Source: Sturgeon, 2019:13

Platform heterogeneity has prompted the development of different taxonomies. The following two are useful examples.

Kenney and Zysman (2016) identify the following five types of digital platforms:

- i) platforms on which massive ecosystems are built (e.g. Apple's iOS and Google's Android);
- ii) platforms offering digital tools online and supporting the creation of other platforms and market-places (e.g. Zenefits, Job Roster and Wonolo);
- iii) platform mediating work (e.g. LinkedIn, Amazon Mechanical Turk);
- iv) retail platforms (e.g. Amazon, eBay, Alibaba);
- v) service providing platforms.

Evans and Gawer (2016: 9) separate platform companies into four types:

- (i) **transaction platforms**, a technology, product or service that acts as a conduit (or intermediary) facilitating exchange or transactions between different users, buyers, or suppliers;
- (ii) **innovation platforms**, a technology, product or service that serves as a foundation on top of which other firms (loosely organized into an innovative ecosystem) develop complementary technologies, products or services;
- (iii) **integrated platform**, is both a transaction platform and an innovation platform; and,
- (iv) **investment platforms** consist of companies that have developed a platform portfolio strategy and act as a holding company, active platform investor or both.

The key issue for our purpose is to recognise that the different types of platforms have differing implications for value creation, market power and value capture and, hence, for industrial development in middle income countries.

2.3 International Review of Competition Policy and Regulations regarding Digital Platforms

There is an emerging consensus in the expert reports on the diagnoses of the economic drivers of the competition issues. These include network effects, international economies of scale and scope, the multi-sided nature of the platforms, the importance of data as a competitive asset, and the influence of consumer behavioural biases. This section reviews the approaches being taken internationally to address these key issues of digital platforms and their implications for industrial development. This includes expert studies commissioned by governments, and enforcement actions and market studies on the part of competition/antitrust authorities. The great majority of these have been in high-income jurisdictions, led by the European Union.⁵ Indeed, this is part of the rationale for our paper – to consider the implications and priorities for middle-income countries. The reports and enforcement cases also point to the differences between platforms. We do highlight examples of actions in middle-income countries, including relating to platforms which are not global in reach but are dominant in a given country.

2.3.1 International expert studies and policy papers

The range of expert studies all recognise the ways in which digital platforms can lower costs and open-up new and improved services while at the same time exhibiting economic features with fundamental implications for competition. In particular, there is an inherent tendency to tip towards concentration, and the potential for market power in one market to be extended into related markets. It is thus not surprising that the rise of global digital platforms has been accompanied by a series of major policy papers and expert studies advising governments (see Ennis and Fletcher, 2020, for a comparison of three of the most important studies).⁶ In particular, the reports all give weight to the important “gatekeeper” or “bottleneck” role that can be held by digital platforms and the centrality of data in this.

The UK's Digital Competition Expert Panel (DCEP) identifies these roles in terms of important routes to market, or gateways for other firms which implies (p41) three distinct forms of power:

- the ability to control access and charge high fees;
- the ability to manipulate rankings or prominence; and
- the ability to control reputations.

⁵ According to the Global Competition Review, 11 of the 35 competition authorities they surveyed had either opened or closed competition probes into Google, Apple, Amazon or Facebook in 2019, namely: European Commission DG Comp; USA's Federal Trade Commission and the competition authorities of France, Germany, Austria, Italy, Netherlands, Turkey, South Korea, Japan and Brazil (GCR 'Building a platform for digital enforcement', 10 August 2020.)

⁶ The studies include: *Unlocking digital competition* (Digital Competition Expert Panel ("DCEP") Report) (UK) (13 March, 2019); Cremer, de Montjoye and Schweitzer ("CMS") *Competition policy for the digital era* for DG Competition (4 April, 2019); and Scott Morton, Bouvier, Ezrachi, Jullien, Katz, Kimmelman, Melamed, Morgenstern Committee for the Study of Digital Platforms, *Market Structure and Antitrust Subcommittee*, Stigler Centre for the Study of the Economy and the State, 2019. Also: *A new Competition Framework for the Digital Economy: Report by the Commission 'Competition Law 4.0'* (released by German Ministry of Economy, 9 September 2019). Others that are slightly narrower in focus include *Digital Platforms Inquiry, Final Report* (ACCC, June, 2019), *Algorithms and Competition* (French Autorité de la Concurrence and German Bundeskartellamt, November 2019) and *Online platforms and digital advertising market study* (UK Competition and Market Authority, 2020).

Together these forms of power mean a 'bargaining power imbalance' between digital platforms and other industries which rely on them. It is strongest where there is 'single homing' (Stigler Centre, 2019). It implies that the counter-vailing power of businesses will be very important for the outcomes. In general, this means a concern that smaller local businesses (especially in middle-income countries) may suffer from less favourable terms than large multinational businesses with their bases in industrialised countries. The platforms also shape the preferences and search of consumers, to influence markets, with implications that competition authorities have been criticized for not paying proper attention to (O'Reilly, 2019; Zuboff, 2019).

While sharing important common characteristics, the platforms differ in their nature and in their importance for different kinds of businesses, as reflected in the distinctions outlined above (Nooren et al, 2018; Sturgeon 2019). The main platforms are also continuously developing their offerings. As of mid-2020, the core areas of the main global digital platforms can be identified as follows:

- Amazon – e-commerce; marketplace; cloud computing
- Google (YouTube) – search, advertising, apps, maps; cloud computing
- Facebook (WhatsApp, Instagram) – social media, advertising
- Microsoft – operating systems, software
- Apple – eco-system of devices and apps

The nature of the platforms' market power has led to proposals for a far-reaching rethink of market rules and regulations, including on non-discrimination and leveraging. This has important implications for middle-income countries given the extreme power imbalances, as producers in most middle-income countries (arguably aside from China) are likely to be discriminated against by self-preferencing and ranking influenced by payments. The platforms' gatekeeper power has led the UK's DCEP to propose designating them as having 'Strategic Market Status', reinforced by the CMA's Digital Advertising Market Study. In Germany the reform proposals are for the Bundeskartellamt (the German competition authority) to be able to declare companies as having 'outstanding relevance across markets' (Budzinski et al, 2020). The Stigler Centre (2019) recommends a new Digital Authority for the USA on similar grounds.

The proposed regimes in effect represent a change in competition and economic regulation that recognizes the centrality of digital platforms and the need for economic regulation and competition enforcement under a broader competition policy. This is a framework which can set market-shaping rules, and which will be able to impose duties on the platforms, including of interoperability and data portability (of a regulatory nature, as discussed below). The proposals further include reversing the onus in certain situations meaning that the platforms are placed under special obligations to justify their conduct given their dominant positions. Institutional coordination, such as between competition authorities and data protection bodies, is an important part of the proposed regimes (Coutinho and Kira, 2020).⁷

⁷ See also Banga and Jeet Singh (2019).

2.3.2 Enforcement cases and inquiries

Europe has led competition enforcement of digital platforms and the development of remedies. The findings in competition cases set out different important theories of harm to competition on the part of platforms and the impact on local businesses. The magnitude of the impact will depend on the characteristics of different economies and their businesses which can be taken into account in middle-income countries. We consider the European Commission cases together with the few other jurisdictions where findings have been made or studies have been concluded.

Advertising, ad-tech

The importance of advertising for reaching consumers, especially where branding and consumer awareness is crucial, coupled with the shift to online sales has raised major concerns about the dominance of Google and Facebook in search and display advertising, respectively. For example, the CMA's Digital Advertising Market Study (2020) found Google has over 90% of search advertising, which accounts for £7.3bn of the £14bn spend on digital advertising in 2019. Facebook has over half of the £5.5bn display advertising market.

Digital advertising has grown rapidly over recent years. In the UK it is now more important than all other forms of advertising and accounts for close to two-thirds of advertising revenue in 2019 (CMA, 2020: Figure 2.8, p58). The total digital advertising spend in 2019 in the UK was equivalent to £500 per household. The importance of online platforms has been turbo-charged by the effects of the Covid-19 pandemic. The value of digital advertising is reflected in Google's revenue per search having doubled from 2011 to 2019, and Facebook's average revenue per user has increased from less than £5 in 2011 to over £50 in 2019 (CMA, 2020). The positioning in web searches depend on Google's decision-making on how to rank. This was the subject of the EU's Google Shopping case which is considered along with e-commerce, in the second bundle of issues.

Digital advertising is the subject of the Australia ACCC's Ad Tech Inquiry (see also Geradin and Katsifis, June 2020). Google's conduct in advertising was also the specific target of the EU's Adsense case in 2019 for which it was fined €1.49bn for extending power over advertising space on third party websites.⁸ The French Autorite de la Concurrence is concerned about the power of Google relative to publishers and the imposition of unfair conditions on publishers and unfair low or zero reward for publishers for their content.⁹

The advertising spend on Google and Facebook naturally reflects the value to advertisers from the ability to reach people online and target their ads to those most likely to value the products and services being offered. However, the ad spend also reflects the power of the two companies to set prices which in turn is linked to their position in the markets and their platform market power (see also Scott Morton and Dinielli, 2020; Geradin and Katsifis, 2020). In the case of Google this combines the consumer facing eco-system including search, browsing, specialized search, navigation and streaming (including YouTube) and its positioning as default on devices including almost all mobile

⁸ https://ec.europa.eu/competition/presscorner/detail/en/IP_19_1770

⁹ <https://www.autoritedelaconcurrence.fr/en/press-release/related-rights-autorite-has-granted-requests-urgent-interim-measures-presented-press>

devices places it in an unassailable position in the view of the CMA (CMA, 2020: Figure 2.4). For UK search advertising data, Google's market power means it appears to have the ability to charge prices higher than competitive levels and around 30-40% higher on a cost-per-click basis than Bing (Thornton et al, 2020). In addition, ads on less common queries tended to be more expensive than the average (which would disadvantage middle-income country businesses if competing against more-searched-for multinational businesses on, for example, tourist services). Google has also extended its businesses to control the way ads are placed and sold through the adtech stack.¹⁰ Facebook combines with WhatsApp and Instagram on social media (CMA, 2020: Figure 2.5).

The cost (including management time) required to ensure the best value from digital advertising, given opacity and complexity of the system on the part of Google and Facebook, has been identified by small advertisers as a disadvantage.¹¹ This is due in part to understanding key words to ensure appearing in searches and the changes in algorithms which require trial and error to adapt to. The fixed cost aspect to this means larger companies are relatively better off.

The implications for industrialising country producers are substantial. On the positive side, a key feature of middle-income countries (but also least developed ones) is the significance of mobile phones in people accessing information as well as, in many countries, financial services and payments. This means there are substantial relative benefits from digital advertising in lowering advertising costs, extending reach and enabling better targeting.

On the other hand, the ability to take advantage of this reach depends on the prices and ability to engage with potential offered. There is a 'digital ad divide' where more sophisticated businesses (including multinationals) are able to quickly adopt and extend their reach through cheaper and more targeted advertising. Smaller companies face challenges in understanding how best to optimize the offering and higher average fixed costs. This implies that digitally savvy companies in niches will be able to expand and use the services effectively if they are able to access data, while others may struggle to compete. There is also a benefit to independent companies such as online publishers from 3rd party cookies which allow the publishers to target their advertising without relying on Google. When Google did a trial disabling 3rd party cookies average UK publisher revenue ad revenue declined by 70% (Thornton et al., 2020).¹²

The challenges of incremental growth on the part of small businesses to become medium-sized firms has long been identified as the 'missing middle' in middle-income countries. To the list of challenges of technology adoption, including skills and training, access to finance (in all of which there are intrinsic market failures associated with information economics), can be added the economies of scale in advertising (Church and Ware, 2000), costs of meeting the requirements of supermarket chains (das Nair and Landani, 2020) and of complying with heightened standards (Ponte, 2019).

¹⁰ The ad tech stack is the supply chain of intermediary services involved in the automatic buying, selling and serving of display advertisements, operating between advertisers and publishers (CMA, 2020). However, the CMA study did not find Google exerting its market power in charging higher fees than its competitors for intermediary services (see also Thornton et al., 2020).

¹¹ See CMA (2020), Annexure on Digital Advertising Services Qualitative Research Report, Jigsaw Research. Value for money was identified by respondents as having fallen in recent years.

¹² According to Thornton et al (2020) Google announced in early 2020 that Chrome browsers will stop support for 3rd party cookies in the future.

The differential requirements to benefit from digitalization can work against smaller businesses in middle-income countries and likely increases the capabilities gulf which has to be bridged. It implies targeted strategies on digital capabilities are even more important in middle-income countries.

E-commerce and self-preferencing

The importance of digital platforms as market-places and resellers has raised concerns about preferencing some suppliers, including self-preferencing their own linked businesses. As SMEs are brought into international e-commerce operations and are covered in Google searches they gain access to international markets and improved logistics. The data generated from their business operations is aggregated by the platforms. The platform harvests the data and can better evolve the next generation of services displacing the smaller firm from the market. This is at the centre of the European Commission's investigation¹³ into Amazon's dual role as a platform providing a market-place for independent sellers and, at the same time, selling its own products on its website. The standard agreements between Amazon and market-place sellers appear to allow Amazon's retailer business to analyse and use the data on third party producers meaning Amazon can favour its own suppliers in various ways.

The EU's Google shopping case (2017) related to partners being given preference in search results, restricting consumer choices and raising prices paid by consumers.¹⁴

Addressing preferencing of own or partners' products over genuine customer rankings is an area where there have been cases in other countries including with regard to local platforms. For example, the South Korean Fair Trade Commission (KFTC) found the local e-commerce and price comparison platform, Naver, contravened competition law in self-preferencing.¹⁵ There are very few decisions in developing countries. India found against Google with regard to it preferencing searches for flights.¹⁶ Brazil has undertaken four investigations relating to Google including a Google shopping case and found in each that there had *not* been an abuse of a dominant position under Brazilian law (Coutinho and Kira, 2020). India has also placed rules on foreign owned e-commerce platforms with regard to their vertical integration with suppliers affecting, in particular, Amazon and Walmart's Flipkart business.¹⁷ This was specifically in response to the interests of the influential local small business constituency. This is a potentially important area for middle-income countries if preferencing by online platforms of their own

¹³ Launched in July 2019, following from an investigation by the Bundeskartellamt.

¹⁴ [https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516198535804&uri=CELEX:52018XC012\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516198535804&uri=CELEX:52018XC012(01))

¹⁵ See Global Competition Review, 7 October 2020 and Korea Times 9 October 2020. Naver has more than 70% share of the market for price comparison series for online shopping in a case similar to the EU's Google Shopping matter (https://www.koreatimes.co.kr/www/tech/2020/10/133_297338.html)

¹⁶ <https://timesofindia.indiatimes.com/companies/google-fined-rs-136-crore-for-anti-trust-conduct/articleshow/62842966.cms>; <http://www.cci.gov.in/sites/default/files/07%20%26%20%2030%20of%202012.pdf>

¹⁷ This was under foreign direct investment rules which means that Amazon and Flipkart can only operate marketplace models in India: <https://uk.reuters.com/article/us-india-e-commerce-explainer/explainer-what-are-indias-new-foreign-direct-investment-rules-for-e-commerce-idUSKCN1PP1Y2>. There have been complaints about preferencing by both businesses. In November 2018 the Competition Commission of India (CCI) found companies had not contravened competition law as there was no single dominant player in 'online marketplace platforms' <https://fr.reuters.com/article/us-flipkart-amazon-antitrust-idUSKCN1NC17P>. The CCI has continued to study the e-commerce market.

partners means steering consumers away from locally produced goods and services.¹⁸ However, it is challenging to demonstrate a substantial effect if the online channel is small relative to brick-and-mortar. Flights is one area where this may be the case as reflected in the India decision. We return to this below with the example of tourism in South Africa.

Interface with apps, software

In addition to the EU case against Google relating to Android restrictions on mobile devices, there is a number of other matters which have been raised related to restrictive terms. These are possible complaints or active investigations, as yet unresolved and simply noted here as examples. They are relevant as they point to the challenges businesses in middle-income countries may face in building a user-base through applications, where the digital platforms are a key route to reach consumers.

- Spotify is reported to have made a complaint against Apple relating to terms for accessing on mobile phones.¹⁹
- Epic Games resisted for almost 2 years the terms required by Google and Apple (the 30% fee charged) for its Fortnite game being accessible via the Playstore and the Apple app store on mobile devices, and attempted to by-pass the app stores before giving way in April 2020. An antitrust complaint was subsequently lodged by Epic Games.²⁰
- Slack is reported to have complained about Microsoft bundling of its Teams software in a matter apparently similar to the earlier Microsoft cases relating to Netscape and Media Player.²¹
- The EU is probing the terms attached to personal assistants such as Amazon's Alexa and Google's Siri.²²

2.3.3 Data, its aggregation and proposals for competition policy and regulations

The expert reports all recognize the important of the aggregation, analysis and control of data for the competitive environment. As the DCEP report states (p.23), "the scale and breadth of data that large digital companies have been able to amass, usually generated as a by-product of an activity, is unprecedented. Moreover, the centrality of this data to their business models is unique". Data can in turn create a strong barrier to entry and incumbency advantage, helping to confer and maintain market power.

¹⁸ This is similar to the concerns in the Walmart-Massmart merger in South Africa where conditions were imposed to support local suppliers under the public interest test (which applies in mergers in South Africa, but is not a test in abuse of dominance cases) (Roberts 2017; 2020b).

¹⁹ <https://www.ft.com/content/73e0d448-4577-11e9-a965-23d669740bfb>

²⁰ This is a private antitrust case, filed in the USA. <https://www.lexzion.eu/en/coreblogpost/epic-v-apple-1/>

²¹ <https://www.ft.com/content/03798bf5-cdec-438f-879f-f9db8a5b8a07>

²² https://ec.europa.eu/commission/presscorner/detail/en/speech_20_1367

There are two main ways in which the reports suggest opening-up access to relevant data to address competition concerns.

First, requirements of **data mobility/portability** can give consumers control over their own data. In the DCEP report the term "data mobility" ("data interoperability" in the CMS report) is used to cover the right of consumers to request that data be moved or shared directly between a business and a third party on an ongoing basis. This is important for enabling effective multi-homing to support rival platforms. By contrast, "data portability" refers to consumers being able to themselves request access to and move data from one business to another. This risks being complex and time-consuming and therefore little used by consumers. It is important that open API standards are required in order to make data mobility work effectively. However, data mobility will only work if consumers take it up in large numbers and it is unlikely to be sufficient to address all competition concerns.

Second, **data openness/sharing** may be required, referring to mandating direct data access without consumers involvement. This will need to overcome privacy concerns and thus will be easier for non-personal data or where datasets can be interrogated anonymously.

While addressing competition issues, the steps to achieve this likely require a combination of government legislation and proactive regulation. The case for this will depend on the market context and nature of the data. It is possible that steps can be required as a remedy to an antitrust case, as proposed in the CMS report. This follows the Bundeskartellamt case against Facebook on data aggregation as an abuse in itself.

In middle-income countries, there may be important local sources of data on people's consumption, lifestyle and financial positions. For example, in Kenya Safaricom's mobile money platform has provided a database which has been leveraged into finance and related services such as ride-hailing. There have been several competition cases into its conduct (see Kariuki and Roberts, 2016; Mazer and Rowan, 2016). In South Africa medical scheme administrator and health insurer, Discovery, has built a substantial platform extending into a range of other services, as we assess below.

3. Governing data and digital platforms in middle-income countries: The Digital Platform Dynamics Framework

The opportunities, constraints and challenges that middle-income countries and their companies face are nested in the specific technological, organisational and value 'appropriability' regimes defined by digital platforms (Teece, 2018).²³ In section 2 we pointed out how digital platforms operate both as 'enablers' of certain activity and 'constraints' or 'bottlenecks' to others, with significant implications for value creation and extraction dynamics. For example, algorithms and software can enable self-executing data processes increasing productivity, but also part of self-enforcing constraining mechanisms and bottlenecks resulting in data rents. Digital platforms can also play a 'constitutive' role to the extent that they define and give transactions specific directionality, and determine power relationships among the ecosystem of players operating through the digital platform. In some cases this form of control can be highly targeted, thanks to the use of tailored incentives and nudging tools. The result is that in many cases digital platforms create multi-sided binding rights and obligations far more pervasive than government rules do (Lauslahti et al. 2018).

3.1 The 'Middle-Income Technology Trap'

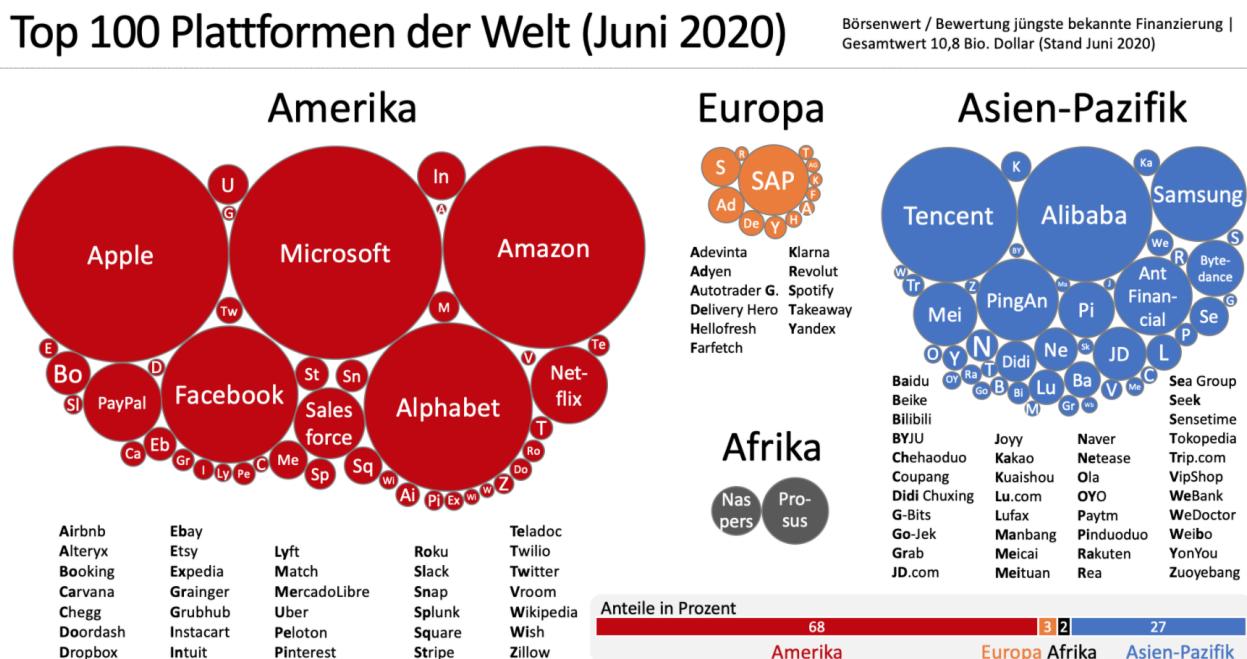
Over the last decade, the striking evidence that only 14 of the 101 economies classified as 'middle-income' in 1960 had become 'high-income' by 2008 (World Bank, 2013), has led to a growing literature looking at the factors responsible for the so called 'middle-income trap'. That is, the fact that countries reaching a middle-income status remain stuck, unable to increase their income further (Wade, 2016; Lin, 2017; Lee and Ramanayake, 2018; Kang and Paus, 2019; Bresser-Pereira et al., 2020). A number of specific industrialisation challenges faced by middle-income countries have been identified, including: challenges in sustaining sufficiently high rates of labour productivity growth over a long period of time; difficulty in gaining space in the global market given double competitive pressure from low-wage and large-scale exporters on the one hand, and advanced technological and innovation capabilities of advanced economies on the other; and premature de-industrialisation.

In a recent contribution Andreoni and Tregenna (2020) advance a 'Middle-Income Technology Trap' (MITT) framework to articulate the challenges faced by middle-income countries in 'linking up' into GVCs while 'linking back' to the local production system, and 'keeping pace' with technological change and innovation. The rise of the digital platform economy and the centrality of data in value creation processes are reshaping these challenges, while opening some potential opportunities if appropriate policies are introduced and aligned strategically. These challenges are driven by market concentration, endogenous power asymmetries and limited funding along the technology innovation chain.

²³ In his seminal contribution, Teece (1986:287) defines an appropriability regime as "the environmental factors, excluding firm and market structure, that govern an innovator's ability to capture the profits generated by an innovation".

First, a key feature of the digital platform economy is its high degree of concentration. The United States and China account for 90% of the market capitalisation value of the world's 70 largest digital platforms (Europe's share is 4% and Africa and Latin America's together is only 1%). Seven 'super platforms' – Microsoft, Apple, Amazon, Google, Facebook, Tencent and Alibaba – account for two thirds of the total market value. Google has some 90 per cent of the market for Internet searches. Facebook accounts for two thirds of the global social media market, and Amazon boasts an almost 40 per cent share of the world's online retail activity. Alibaba has been estimated to have close to 60% of the Chinese e-commerce market. Concentration operates along the "data value chains": China and the United States account for more than 75% of the world market for public cloud computing. 50% of global spending on IoT and the majority of investments in Data Centres are controlled by the same group of platform companies and located predominantly in the US (40%), or other advanced economies (25%) with significant implications for data ownership. Africa and Latin America together account for less than 5 percent of the world's colocation data centres (UNCTAD, 2019). South Africa has the one major digital platform identified in Africa, Naspers and the associated company Prosus (Figure 3).

Figure 3: Dominant digital platforms and their geographical distribution (2020)



Second, the challenge middle-income countries face in linking up into GVCs while linking back to the local production system is determined by the presence of endogenous power asymmetries along the value chains as well as the extent of digital capabilities among companies in the domestic economy. Data and digital platforms change competitiveness parameters across industries, both from a technological and an organisational point of view. Similar to the "putting-out" production model which was dominant before the first industrial revolution,²⁴ while operating as 'intermediary'

²⁴ The putting-out model entailed merchants acting as employers by putting out materials to a disperse network of individual producers which in turn would produce either directly or through a chain of subcontracting.

among producers, and between producers and consumers, the platform operator can exercise control and arbitrage power over the networked-producers, while also shaping consumer markets. Seven of the world's top eight companies by market capitalization adopt a platform-based business model.

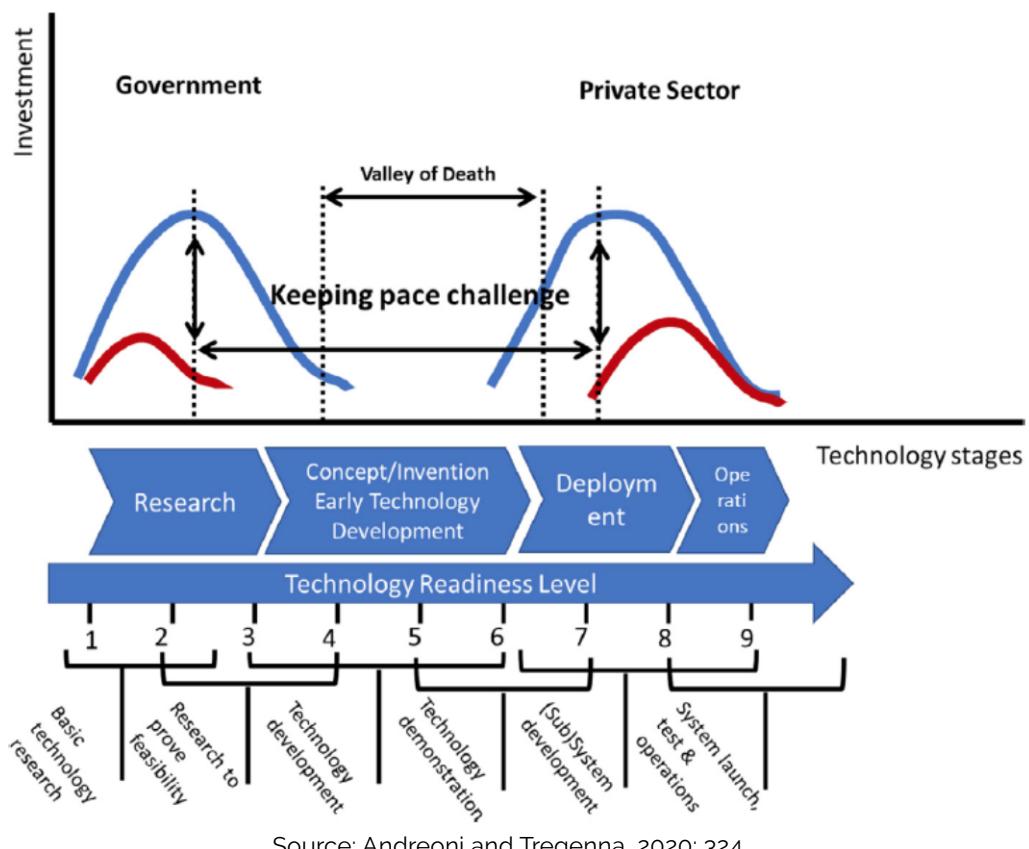
Endogenous power asymmetries often result in value extraction practices which reduce growth chances of companies at lower tiers of the value chains. These companies are often located in middle-income countries. Some power asymmetries in more traditional sectoral value chains also stem from new partnerships between mature multinational enterprises (MNEs) – e.g. Walmart – and super platform corporations – e.g. Google.

At the same time, in some cases digital platforms can disrupt existing concentration in middle-income country sectors and provide domestic economies with new opportunities for reaching export markets. This is however conditional on the fact that the potential entrants are capable of capturing the opportunities offered by lower computing costs, new routes to markets etc. The majority of the companies in middle-income countries tend to lack basic and intermediate digital capabilities and broader access to high-quality digital infrastructures. As a result of this, across middle-income countries the digital capability gap remains wide and widespread (Andreoni, 2020). Dynamic capabilities and other complementary assets underpin not only value creation but also value capture by platform leaders (Teece, 2018; Helfat and Raubitschek, 2018).

Third, keeping pace with technological change and innovation is made particularly challenging by the specific economics of digital platforms (see section 2.2), the fact that MNEs control this technology space and that the investment threshold is very high. Advanced economies have also remained the main host of inward cross-border M&A investments in digital assets over the period 2013-2017, with the only exception being China and India among top 15 countries (Gestrin and Staudt, 2018). Among industrially advanced economies, the technology readiness level (TRL) metric has been especially used to draw attention to what has been called a 'valley of death' represented by potential investment gaps in technology development stages TRL 4-5-6 (Figure 4). Indeed, in advanced economies, governments tend to invest heavily in research –at least comparatively –and firms are typically keen to invest in technologies that have proven to be deployable and ready to market.

Middle-income countries tend to start from a structurally disadvantaged position in this respect (Figure 4). Not only is this valley larger in middle-income countries - that is, several stages of technology development are underfunded (horizontal arrow) - but moreover those stages in which the government or the private sector invests tend to be funded at lower levels (vertical arrows). The combination of these two dimensions make keeping pace with technological change and innovation particularly challenging for middle-income countries.

Figure 4: Keeping pace with technological change and innovation challenge



Source: Andreoni and Tregenna, 2020: 324.

The vast majority of middle-income countries do not have large domestically-owned MNEs capable to invest substantial resources at early stages of technology development (TRLs 1-4), and scaling-up and commercialisation (TRLs 6-9). Similarly, these countries lack public resources to compete with the two leading countries – US and China – in basic and intermediate research for development of key enabling technologies of the digital platform economy. While some opportunities for domestic firms exist, especially in tailoring solutions for local users, these innovation and business developments mainly involve lower layers of the digital platforms (e.g. solutions running on lower level platforms or mini-apps that run on super-apps) (Sturgeon, 2019).

3.2 An industrial policy approach to digital platform economy

Middle-income countries run the risk of remaining stuck in a structural and institutional configuration – i.e. MITT – which is not conducive to their structural transformation, increasing domestic value addition and high-tech economic sectors development. From the MITT perspective, although competition policy and regulatory approaches adopted in advanced economies matter (see section 2.3 above), they might not be sufficient in achieving middle-income countries' developmental goals, specifically pursuing digital industrialisation and technological upgrading. Approaching the existing policy puzzle posed by the rising digital platform economy from an industrial policy perspective can be more appropriate, both as a complement to the existing policy responses, and as a way of refocusing the policy discussion, hence rethinking the role of the state in the context of digital platforms. There are three main reasons for that.

First, industrial policy reframes the complex policy issues governments are grappling with around the problems of *value creation* as well as value capture and distribution in the domestic economy. The government needs to find ways to strategically engage with digital platforms in view of increasing domestic value addition and addressing the challenges of linking up and back along the data value chains, and keeping pace with digitalisation. The government also needs to make sure that the value that is created domestically across multi-sided platforms is also captured and distributed domestically among all relevant players, and according to their contribution.²⁵ In this respect, industrial policy concerns for counterbalancing the *power* of digital platforms, in extracting value away from the actors and place where the value is generated, intersects with competition policy's main concerns.

Second, an industrial policy perspective points to the importance of seizing entry points in multi-sided and multi-layered digital platforms, leveraging the enabling *functions* they provide while at the same time investing in those *digital capabilities* and *infrastructures* which are critical for domestic companies to create and capture value in the evolving global digital platform economy. Indeed, while countries can benefit from a 'static digital dividend' – that is, benefitting from access to the services and functions provided by global digital platforms – the 'dynamic digital dividend' is the one which can deliver long lasting transformative economic results and increasing value returns. But this long-term dividend calls for commitment of financial resources, their strategic control and policy directionality. Thus, it requires industrial policy.

Third, industrial policy is about strategic targeting, mission-orientation and differentiated interventions (Amsden, 1989; Wade, 1990; Chang, 2014; Mazzucato, 2013; Andreoni and Chang, 2019 and Chang and Andreoni, 2020). Specifically, in the digital platform economy context, this means designing policies taking full account of the heterogeneity of digital platforms (their functions and power control mechanisms), hence their different impact on value dynamics across different economic activities and sectors. The adoption of such a strategic industrial policy approach is also a way to move beyond false trade-offs and binary choices. For example, governments in middle income countries can simultaneously adopt apparently contradictory measures in an effective and strategic way. They can leverage data aggregation functions of global digital platforms in certain sectors (e.g. fast fashion), in view of opening new routes to markets for their companies; while simultaneously enforcing strong data ownership and localisation regulations in other sectors (e.g. health) in view of supporting the emergence of domestic platform/innovation ecosystems providing tailored solutions to context-specific needs. Finally, in other sectors (e.g. advanced machinery) governments can exploit the multi-layered nature of industrial platforms to give domestic companies opportunities to innovate in software design domestically, while keeping digital platforms interfaces and standards open.

The adoption of an industrial policy approach to challenges and opportunities offered by global digital platform economy is not a substitute to regulatory or competition policy frameworks. Indeed, as the history of successful industrial policy demonstrates, countries which were successful in escaping the middle-income technology trap like South Korea were exactly those

²⁵ In many cases the existence of different and overlapping contributions, for example as users of platforms and producers of data make this value distribution problem very challenging.

that relied on a complex policy mix aligning industrial and competition policies (Amsden, 1989; Amsden and Singh, 1994; Stiglitz, 1996; Chang, 2010; Roberts, 2013; Andreoni, 2016; Andreoni and Chang, 2019).²⁶

However, the terms of this *industrial policy–competition policy alignment* need to reflect the specific features and intrinsic tendencies of the digital platform economy. As discussed above (see section 2.2), the existence of network effects and related incentives, alongside scale and scope economies, make necessary to rethink the standard competition policy frameworks adopted in mature industrial economies. In some cases, for example, when dynamic efficiency (i.e. the highest long term productivity growth rate) considerations are paramount, competition policy might need to be subsumed within an industrial policy framework, more than operating in a purely legalistic and conventional way (see Amsden and Singh 1994 on the idea of “optimal degree of competition” vis à vis perfect competition policy benchmarks). If the target is dynamic efficiency – thus, an industrial policy target – the degree of competition a government might want to accept might be different from the one allowed within standard competition authority’s rulebooks²⁷ (Sidak and Teece, 2009; Roberts, 2013). Squaring the right balance between competition and cooperation in many areas of a data-based networked economy is challenged by the fact that in some cases less competition (or even no competition) is necessary to concentrate resources and generate network effects.²⁸ Digital standards or interfaces are one of those areas where coordination, more than competition can bear dynamic efficiency. An assessment of both the static and dynamic impact of competition policy decisions and its relations to industrial policy is thus key for a middle-income economy to move away from a MITT.

3.3 Digital Platform Dynamics Framework

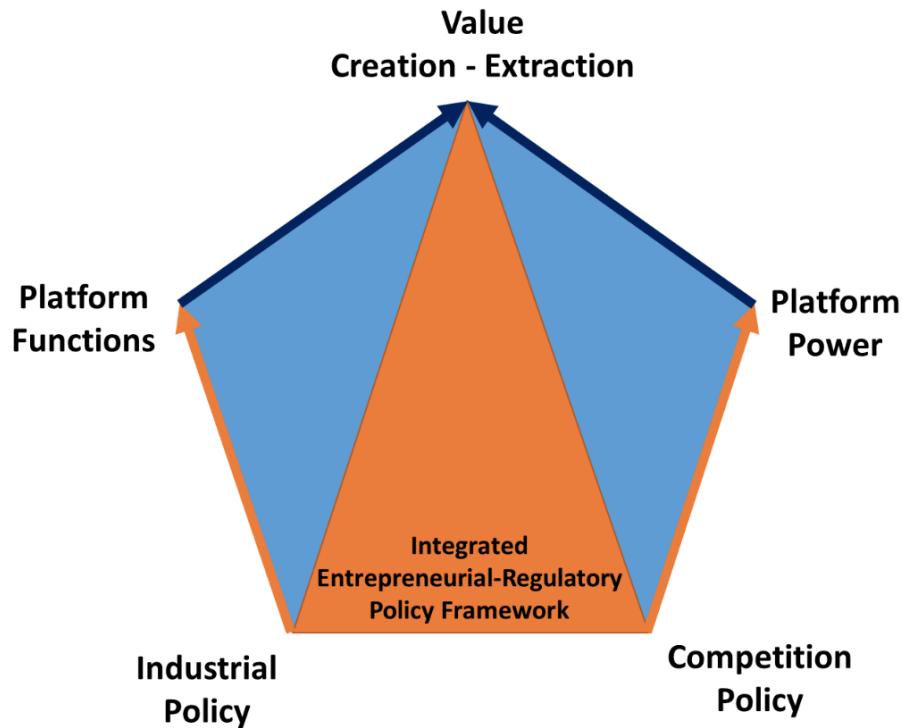
The industrial policy approach we propose to adopt in the analysis of digital platform economies is structured around the triangle “value–functions–power” of digital platforms, and two further dimensions, industrial and competition policy (including their integrated use in policy making and economic regulations). These five dimensions are presented in Figure 5. Each side of the framework represents a key relationship in the digital platform economy and links pairs of value, functions and power dimensions as well as industrial and competition policies. While all these dimensions are interrelated, arrows point to direct mechanisms linking pairs of dimensions. Data are the main mediators of these relationships, as data is the main source of value creation, the main target of power control and value extraction, and the main ingredient of platform functions. Platforms would not exist without data, and data would not be valuable without platforms.

²⁶ Notably Chang (2010:100) points out how: “In East Asia, free trade, export promotion (which is, of course, not free trade), and infant industry protection were organically integrated, both in cross-section terms (so there always will be some industries subject to each category of policy, sometimes more than one at the same time) and over time (so, the same industry may be subject to more than one of the three over time).”

²⁷ As pointed out by Telser (1987): “It is hard for many economists to accept the proposition that competition might be excessive because they received theory regards competition as always good, the more there is the better.” This is what John Weeks defined as the “quantitative theory of competition.” For seminal contribution on this matter see Schumpeter, 1942 and Richardson, 1961 and 1965.

²⁸ In a recent debate in *Research Policy*, Teece (2018) raised concerns about the increasing appropriability challenges companies face in the context of the enabling technologies underlying digitalisation. Nelson (2018) raises the opposite concerns, that is, the fact that public investments in these enabling technologies are rewarded and not captured by private interests. This debate poses important questions at the core of our digital dynamics framework.

Figure 5: Digital Platform Dynamics Framework



Source: Authors

First, the relationship between digital platform functions and value points to the multiple ways in which platforms enable value creation processes – thus, *platform functions-value creation*. Second, the relationship between digital platform power and value points to the mechanisms whereby created value is extracted by those controlling the platform – thus, *platform power-value capture*. Third, the relationship between industrial policy and digital platform functions points to the strategic targeting and differentiated interventions that governments can put in place to create and capture value in the digital platform economy, including investments in digital capabilities and infrastructures. Fourth, the relationships between competition policy and platform power reflect ways in which governments can affect platform power to reach the optimal degree of competition, without losing sight of its underlying development objective of creating and capturing value. Finally, the relationship between industrial and competition policy is one pointing to the core of the dynamics, as it reflects the need for a strategic alignment between the two and the adoption of an *integrated entrepreneurial-regulatory policy framework*. Without assuring that value is created, there is no value to be captured domestically. On the other hand, without assuring that the value created domestically is captured and distributed among those who contributed to its creation, there is no long-term development prospect.

The DPD framework allows us to identify critical relationships in the global digital platform economy. However, the ways in which these relationships unfold and develop across different multi-sided and multi-layered digital platforms and related economic sectors and activities is highly *heterogeneous*. There are three main reasons for that.

The first source of heterogeneity is related to the 'platform functions-value creation' side of the Dynamics Framework. Different digital platforms provide different enabling functions which are more or less relevant for value creation processes in different economic sectors and activities. Different platforms can perform different functions – e.g. from provision of services to consumers, to brand-building and routes to market, consumer data harvesting, data aggregation, and renting cloud services. These functions have become major sources of value in key sectors, such as fast fashion, retailing, and tourism. In other sectors, such as advanced manufacturing and high-tech services, the key value functions provided by digital platforms are related to: harvesting industrial data for improving operation efficiency and providing digital solutions to business clients (as well as consumer data for complex product design); providing access to software and data analytics services; offering cloud and data centres services; and, transforming traditional goods into rentable services (so called 'servicification' of manufacturing).

The second source of heterogeneity is related to the 'platform power-value capture' side of the Dynamics Framework. The way in which platform power is exercised and value is captured is different across these economic sectors and activities. For example, pricing in e-commerce, and discriminatory treatment in advertising from search and display adverts are key mechanisms to capture value from a specific set of functions offered to specific economic sectors and activities (fast fashion, tourism, etc.). There are also cases of differential pricing and terms (for example, access to consumer data) for those with countervailing power and bargaining capabilities (multinationals) compared with local businesses. In other cases, such as advanced manufacturing and services (machinery, health, etc.), platform power is exercised through the introduction of bottlenecks assets in software and digital interfaces. Moreover, by controlling foundational layers of digital platforms – technology and core layers (Figure 2 above) as well as shaping computational algorithms, it is possible to extract value along the data value chain and all complementors operating within the ecosystem generated by the platform itself (e.g. creators of apps).

The third source of heterogeneity is related to the fact that global digital platforms are built around evolving business models which combine and recombine functions in search of new value capture opportunities. For example, digital platforms can provide social media or e-commerce services while at the same time performing a data aggregation function for different markets. As discussed in section 2 above, the rising digital platform economy has seen the emergence of a plurality of business models which have resulted in increasingly multi-sided and multi-layered platforms, as well as platforms of platforms. As a result, data aggregation and portability, platform envelopment, and movement across markets, are constantly introducing new ways of combining functions, data and power control mechanisms and increasing heterogeneity in the digital platform economy.

Disentangling these three main sources of heterogeneity in the digital platform economy is a critical step for strategic policy making, along the lines we are advocating within the DPD framework. Indeed, industrial policy can operate selectively alongside and in alignment with competition policy to address specific functions and power control mechanisms which ultimately affect value creation and extraction. As discussed above, in some cases competition policy can be subsumed within an industrial policy framework to favour dynamic efficiency arguments, as well as addressing the challenges posed by the MITT.

As a way of operationalising the framework and highlighting areas for targeted and differentiated policy interventions, we focus our attention on ten different industrial and competition policies which could support middle-income countries governments in dealing with the constraints and challenges but also opportunities posed by the digital platform economy.

- a) Building digital capabilities to link up and back across the data value chain, by targeting the digital capability gap in basic, intermediate and advanced capabilities (for a detailed discussion, see Andreoni and Anzolin, 2019; UNIDO, 2019).
- b) Building digital infrastructure and data centres to attract foreign investments and as a data localisation policy, especially in those countries which have the potential to become a major regional or even continental hub (e.g. South Africa for the African continent, see Bell and Mondliwa, 2020).
- c) Addressing self-preferencing, preferential treatment in search and e-commerce for partners and most favoured nation clauses which could undermine local businesses competing with international businesses with stronger counter-vailing power in negotiating with platforms.
- d) Data localisation policy differentiating different types of data according to the scope for data aggregation and network effects on the one hand, and data customisation and domestic use for digital business development.
- e) Using digital platforms to open new routes to markets for export through lower cost options for international advertising and brand development (especially for SMEs).
- f) Using digital platforms to open-up markets with strong domestic incumbents (e.g. in retailing), to break rent capture along sectoral value chains (such as where there are cartels), and to provide alternative routes to markets for smaller and more innovative local businesses.
- g) Using digital platforms to offer domestic industrial businesses access to software and data analytics, cloud services, and develop customised innovations (Andreoni et al., 2021).
- h) Supporting domestic businesses targeting value creation and capture opportunities at higher level platforms / end user levels customisation in the industrial sector (industrial data, B-to-B), combined with strict competition regime on interoperability, open standards and modular interfaces (see more on this in Sturgeon, 2019).
- i) Supporting domestic businesses targeting value creation and capture opportunities at higher level platforms / end user levels customisation in high-tech service industries (e.g. health), combined with strict data ownership and localisation.
- j) Local licencing to ensure access to data and level playing field in competition of international platforms and local businesses.

Each of these measures address different challenges posed by the MITT and points to the high level of complementarity between industrial and competition policy. Breaking into the global digital platform economy cannot be achieved simply by regulating or limiting platform power through competition policy. Digital capabilities and infrastructures must be built domestically to exploit static and dynamic efficiency of the digital platform economy (industrial policy). Similarly, without combined industrial and competition policy, domestic businesses would find difficult to link up into the data value chain and back into the local economy. Competition policy can address endogenous power asymmetries along data value chains, while through industrial policy it would be possible to carve spaces and entry-points in these chains for domestic value creation and capture. Finally, keeping pace with technological change and innovation requires building dynamic capabilities and innovation ecosystems as well as creating appropriability regimes which do not penalise innovators.

The set of policy instruments and alignment issues discussed above poses a related governance issue, namely the type of governance models that middle-income countries can effectively deploy as entrepreneurial-regulatory states.

3.4 What Governance Models for an Entrepreneurial-Regulatory State?

Recognising the dynamic nature of value creation and extraction, as digital platforms enable new business models, means rethinking the role of the state and regulation. An 'entrepreneurial-regulatory' state is required to support local capabilities in a world of digital platform competition. Regulatory powers are necessary to set and enforce rules which take into account the entrenched dominant positions of the platforms, the intrinsic network effects, and importance of data as a competitive asset which can be leveraged across adjacent markets. This involves rule-making rather than simply rule-enforcing, taking into account the market-shaping implications of platforms and how they are governed.

This is the aim of the 'Strategic Market Status' designation proposed in the UK, alternatively the 'Outstanding Relevance across Markets' put forward in Germany. It is about ensuring effective rivalry and contestation to balance the market power of the platforms. Antitrust enforcement is too slow (Chopra and Khan, 2020) and based on static conceptions of competition emphasising allocative efficiency (Blaug, 2001).

The role of the state regarding competition needs to align industrial, trade and competition policies, as in East Asian rapid industrialisation.²⁹ Protection of the local market was combined with requirements to compete in export markets, forcing firms to improve their products (Stiglitz, 1996, Chang, 2011). Optimal competition means a balance between ensuring effective rivalry while at the same time allowing for the achievement of dynamics economies of scale and scope (Amsden and Singh, 1994; Singh, 2016). The balance will depend on the stage of industrial development, the world configuration of industries, the context of the economy in question and the role of the state (Chakravarty and Singh, 1988). As such, it will differ from country to country.

²⁹ As illustrated by South Korea, it is consistent with having strong autonomous competition authorities.

There is a diversity of approaches to competition law and policy that have grappled with these issues (Budzinski, 2008). For example, the Korea Fair Trade Commission's objectives have long incorporated the balancing of competition and industrial development (Fox, 2003; KFTC, 2011). The importance of the large *chaebol* industrial groups was recognised along with the need to maintain effective competitive rivalry between them and in international markets in order to continue to spur effort, creativity and innovation (Amsden and Singh, 1994; Fox, 2003). In this approach, ensuring effective competitive discipline is part of industrial policy. In Japan, there has been a similar recognition of competition as a dynamic process (Amsden and Singh, 1994). In Germany, the Ordoliberal approach to competition law has been concerned with the dangers of concentration of economic power for its possible impacts on freedom. In the UK, market inquiries allow the competition authority to address markets which are not working well and set out improved rules for market functioning, as in the creation of the Groceries Code Adjudicator which monitors the main supermarket chains (Fletcher, 2020).

With reference to digital platforms, which have such a central role in shaping markets, these challenges imply collapsing the boundaries between ex ante economic regulation and ex post competition enforcement, as the rules need to evolve with analysis of evolving market power and the level of discipline required. It is evident that digital platforms have brought substantial benefits while at the same time having a tendency to tip to monopoly. Importantly, the regime needs to prevent harms such as in the cases of preferencing set out above, allow fair access to platforms for those providing complementary services (layering, as in Figure 2), and to ensure multi-homing by users is possible (Walker, 2020). Rules are required for data access, taking into account incentives for data gathering and analysis, and regulate the access arrangements to make them work in practice. The regulation of data is integral to assessment of the wider arrangements on the part of dominant platforms, balancing the potential negative effects of restrictive terms on competition against the efficiency rationales for the arrangements. Healthy, open and competitive markets therefore require an entrepreneurial-regulatory state.

4. South Africa: A deep dive into selected sectors

The different ways in which data and digital platforms can deepen or bridge the middle-income technology trap require locating the changes in industry dynamics and specific country contexts. We apply the framework in section 3 to the case of South Africa as an example of a middle-income economy struggling with the challenges, while exhibiting advances in key areas.

Through the industry reviews in South Africa we highlight the triangular interaction of:

- the links to value creation and control in production ecosystems;
- the differing functions of platforms; and
- the importance of data and links to the power of platforms.

We draw on a research base in important industries in South Africa including e-commerce, tourism, apparel, machinery & equipment and health sectors. This enables us to use the framework to assess the effects on rapidly changing business models as a result of digital platforms and the implications for an industrial strategy with complementary competition and regulatory policies.

South Africa is an important country to assess and from which to draw wider implications. It has a well-established industrial base, however, it has struggled to diversify into more technologically sophisticated activities with higher levels of productivity growth and illustrates the challenges of the middle income technology trap (Andreoni et al., 2021). It also has a high level of adoption of digital platforms, including local platforms, and is a regional hub for southern Africa in digital technologies and services. South Africa has well-established and respected competition authorities (Fox and Bakhoum, 2019).

Overall, the studies illustrate the value creation potential from digital platforms for economic activity – in exposing suppliers to wider market opportunities and the ability to integrate into global value chains. Given the relatively lower levels of online commerce than in high income countries, the competition issues appear less important. However, the key concern we highlight is the impact on local ecosystems with linkages and, over time, what this means for the share of the value created which goes to South African producers. It is important to anticipate the challenges of market power and possible differential treatment working against local producers, as compared with multinational businesses with which they compete.

We start by assessing the implications of the growing importance of digital advertising and trends in e-commerce, profiling the leading e-commerce platform in South Africa and highlighting the implications for tourism and apparel (fast fashion) in the country. We then consider the experience of machinery manufacturing and healthcare. We distinguish between cases where South African businesses interface with international platforms and where local platforms can and do compete with the large international platforms based on local capabilities, bringing together different user groups and data aggregation, as exemplified by health insurance and financial services.

4.1 Digital advertising and e-commerce, with examples from tourism and fast fashion

Google dominates search in South Africa with an estimated 97% market share³⁰ which means optimising search criteria on Google is important for reach to potential customers. Facebook is the dominant social network, as almost everywhere around the world. Facebook and Instagram have been used by small and micro-businesses to market their products.³¹

By comparison, e-commerce is relatively undeveloped in South Africa and is led by a local e-commerce business. These patterns reflect a key difference between e-commerce and the search and social networking platforms in that e-commerce requires distribution infrastructure to guarantee delivery. In this regard, the poor state of the SA Post Office and challenges of high rates of theft in South Africa mean substantial on-the-ground effort is required (Goga, Paelo, Nyamwena, 2019). In 2019 e-commerce accounted for only 1.6% of South African retail sales.³² Sales are growing rapidly due to the effects of COVID-19 and are expected to double or triple in 2020.³³ The growth is due to online retail offerings from traditional brick and mortar retailers (developing 'omni-channel' offerings) and online marketplaces (Goga and Paelo, 2019). The largest of these is South African e-commerce business Takealot, while the Africa e-commerce platform Jumia entered South Africa in 2019 (although, as yet, it has only focused on fashion). Amazon does not have a South African business but delivers to South Africa from the Amazon.com website using its Amazon Global service. This means that the goods available for purchase are more restricted, and the time and delivery costs are higher than those of local websites as it incorporates international freight (generally air freight). Furthermore, as products are imported, customers also need to pay customs duties and import VAT (which Amazon estimates and bills customers for upfront, refunding customers if necessary) (Goga, Paelo, Nyamwena, 2019).

Takealot is by far the largest online retailer in South Africa in terms of market value, revenue and volumes and had been roughly doubling in size on an annual basis. It was launched in 2011 and became part of the Naspers group. Takealot has grown organically and through mergers and acquisitions.³⁴ Takealot's estimated revenue market share of general merchandise websites in South Africa is over 30% (Goga et al, 2019). It functions across a broad range of product categories and, apart from its own retail line, it also has a marketplace for third party retailers that can use the platform for sales and returns and can use its warehousing and fulfilment capabilities. Takealot operates two 30,000m² warehouses which stock their own products as well as that of third-party vendors. Takealot has also invested in technological capabilities such as artificial intelligence to work on features such as algorithms to create personalization based on browsing history.

³⁰ Statcounter, Search Engine Market Share for South Africa, January 2020, available at <https://gs.statcounter.com/search-engine-market-share/all/south-africa>, cited in Goga, 2020.

³¹ For example, the Brownsense network of black businesses was able to launch on Facebook and has grown rapidly.

³² Euromonitor International. This compares with 14.8% for the USA. Kenya has a higher proportion of e-commerce than South Africa.

³³ <https://www.reuters.com/article/us-health-coronavirus-safrica-e-commerce/south-african-e-commerce-is-a-covid-fired-market-of-risk-and-reward-idUSKCN24G1A6>

³⁴ These include with Naspers-owned Kalahari.com (an early market leader in South African e-commerce based on books) in 2014, the prior purchase of Superbalist (an online fashion retailer) and the 2018 merger between Superbalist and the Naspers-owned online fashion retailer Spree. In 2014 it also acquired the Mr D delivery service (both food and courier).

Takealot is part of the Naspers group of companies, which provides the financial backing for long-term investments and has a set of linked businesses, including in the payment system PayU, Similarweb (an internet data research company), and OLX the classified website. Naspers has also invested in other developing country online businesses such as India's food delivery platform Swiggy. Having been a very early investor in 2001, Naspers owned around 31% of Tencent up until this was spun-off along with Naspers' other international internet assets into European listed Prosus in March 2019.

Despite its relatively small size, the competition authorities are already alive to market power concerns and Naspers attempted acquisition of the internet business Webuycars was blocked by the Competition Tribunal in March 2020 (although this is currently under appeal).

Tourism

Value creation and platform functions

South Africa has a developed tourism industry with value creation based in natural offerings and the strategy to build and market a diversified destination to global tourists. The industry has international chains and local businesses with international reach. Digital advertising has rapidly become very important for attracting customers and very well illustrates the value creation benefits to smaller businesses of digital platforms (Goga, 2020). In addition to search (on Google), online travel agencies, led by Booking.com and Expedia, are the main source of bookings for many hotels (Goga, 2020).

The digital platforms provide local hotels with access to a range of customers that they would not otherwise be directly exposed to. Second, the hotels obtain analytics from the booking sites which they would otherwise not have obtained. Third, the hotels are able to purchase niche ads to target specific customer segments. Where this increases the flow of international tourists into hotels in South Africa, there are substantial benefits.

Market power and value extraction

At the same time, there are reasons for concern that smaller locally owned businesses are in an unfavourable position where they compete directly with large international chains. The commissions paid to online travel agencies are around 15%. In addition, practices such as MFN (price parity) clauses appear to be in operation which restricts local businesses from offering discounted prices on other channels to support a diversity of routes for customer bookings. Larger international hotel groups negotiate lower commissions and are naturally better able to optimise search and invest in this not just for South Africa but globally. The differential treatment can therefore work against smaller local businesses. However, it is important to recognise that these types of effects are present in other traditional advertising and booking channels also.

The benefits in increasing overall customer flow to businesses in South Africa along with data and analytics on consumers for targeting marketing effort, while at the same time having potential discriminatory effects against smaller and local businesses, mean that policy-making as referee

is crucial for optimal competition enabling wider participation. The growing role of meta-analysis sites and importance of reviews (such as Tripadvisor and the evolving Google review offering) highlight the dynamic nature of the regulatory and competition challenge.

Apparel / Fast fashion³⁵

Value creation and platform functions

South Africa's apparel sector grew alongside textiles under relatively high levels of protection through to the 1990s. Under liberalisation it lost substantial local market share to imports and has very weak export performance. The South African retail environment generally exhibits strong traits of being a follower from a digital technology perspective. Online sales platforms and digital streams focusing on customers remain limited. While there are examples of progress in the use of advanced digital technologies (particularly in logistics and distribution centres), overall adoption rates and levels of sophistication appear low, with genuine supply chain integration at scale remaining elusive. Digitalisation therefore risks widening the existing technology divide.

Around the world, digital platforms are changing the way apparel is designed and sold, and increasingly control the customer relationship. Customer data, including from online sales, is propelling competitively-priced customisation. This can be seen in trends towards smaller batch runs in production as retailers shift to shorter time horizons and seek to reduce inventory redundancies and fashion irrelevance. The value is linked to the current nature of the design given changing fashions. The product itself is more closely linked to anticipating and matching the consumer behaviour towards patterns and designs in close to real time (Goga et al, 2019).

Data on consumer online search and fulfilment on e-commerce platforms are transmitted by the platform to suppliers in order for them to produce and trial new designs.³⁶ For example, online search can measure the time spent looking at variations on colours, materials and looks without making purchases and, as altered designs come onto the market, where the uptake is greatest. While retailers assess consumer behaviour, it is difficult for them to collate the same level of data on search and customer preferences.³⁷ As the shift towards e-commerce intensifies, the platforms' collation and analysis of data becomes part of the product offering as it is embodied in the responsiveness of designs and delivery.

The aggregation of consumer data potentially also opens-up opportunities for niche suppliers in countries such as South Africa in export markets. However, the advantages which may come from particular designs and looks will be eroded very quickly as the data from sales and search can be shared with manufacturers around the world. Overall, the value creation potential from digitalisation is not generally being realised in South Africa given the relatively weak existing capabilities.

³⁵ Draws from Stewart (2018), Goga et al (2019), Clothing & Textiles Masterplan; Staritz et al. (2020).

³⁶ Interviews with Lewis Chan and Tak Yip, Founder and VP, Xsight, 4 June 2018.

³⁷ For example, Zara has used in-store hand-held devices that enable sales personnel to capture information on consumer behaviour towards products which is transmitted to a data centre for analysis of trends to be interpreted into new products. This is much more cumbersome and depends on the quality and quantity of data collected in stores compared with that automatically collected from e-commerce searches.

Market power and value extraction

The control over the route to customers, the designs to meet evolving fashions (and the shaping of these fashions themselves) is increasingly in the hands of digital platforms. The search and retailing roles have provided the basis for control over the value creation process itself, in conjunction with manufacturing partners. The increasing importance of digital platforms has therefore further shifted the location of value further away from the manufacturing process.

South African retailers and manufacturers have been somewhat protected from the trends by the relatively low level of e-commerce adoption. The risk is that at both levels, of retail and production, local businesses will be displaced from the market, as e-commerce expands. On the other side, local designers are able to reach wider international markets if they can master the interfaces with the platforms and implement effective digitisation strategies.

4.2 Industrial capabilities: Machinery & equipment³⁸

Value creation and platform functions

Integrated machinery, equipment and electronic control systems are key industries for digitalisation and combine a range of sophisticated and complex technologies. South Africa's machinery and equipment sector has a developed industrial base and encompasses the manufacture of machinery such as mineral-processing equipment, pumps, valves and earthmoving equipment. Machinery, equipment and electronic control systems have strong backward linkages to the metal products industries.

The main functions of digital platforms in the area of process machinery are in the harvesting of industrial data on product operation for optimisation and design purposes. This is closely linked to software and analytics, as part of manufacturing execution systems and enterprise resource planning. These are digitalised systems for the tracking, measurement and assessment of production in real time within and across firms. In addition, there are product life-cycle management systems which integrate data processes, business systems and people across enterprises, to manage products over their lifecycle from ideation, design, manufacture, and upgrading. The digitalisation of information on product performance under different conditions, and including components and services provided by different firms in an eco-system, means the lead firms perform the role of system integrators through the aggregation and analysis of data. This includes the employment of machine learning and artificial intelligence to calibrate production to different conditions.

The digital platforms are part of incremental changes to production eco-systems, with the platforms as facilitators rather than drivers, enabling improved efficiencies and value in coordination, design and customisation. The specialised nature of the machinery and its operation means that the industrial and engineering capabilities are critical to deployment. These aspects are likely to

³⁸ See Barnes, Black, Roberts (2019), Andreoni, Kaziboni, Roberts (forthcoming, 2021), Andreoni, Barnes, Black, Sturgeon (forthcoming 2021).

reside with the original equipment manufacturers, but this is not necessarily the case as the business models evolve to focus increasingly on the industrial data processed through advanced manufacturing software for product operation and design. For example, changes in design on the part of lead firms in the machinery and equipment industry through adopting additive manufacturing for prototyping has reduced time spent on manufacture and testing a prototype from six to eight weeks to two to three days.³⁹

Building on existing capabilities, some South African businesses have taken advantage of digitalisation to create value. The biggest technology driven disruption in the South African machinery and equipment industry has been in predictive maintenance and monitoring systems. This means that the value offering can be in terms of the outcomes, such as amount of rock processed. Using the Industrial Internet of Things (IIoT) mineral processing companies can collect real time data on the health and performance of machinery and equipment remotely, and how the environment including temperatures, pressure and humidity, affect its wear and tear. This involves a combination of industry 4.0 technologies including sensors, big data, cloud computing, data analytics and artificial intelligence. Sensors have allowed firms to remotely monitor their equipment, and schedule repair and maintenance ahead of failure. Predictive analytics and the application of condition monitoring systems use cloud-based programs that can be installed on most processing equipment.⁴⁰ Monitoring equipment and real time feedback has occurred on the back of falling costs of sensors that continuously transmit data with low power and bandwidth requirements.

Additive manufacturing, commonly known as 3D printing, marks another frontier that is rapidly changing conventional production processes, creating new design and prototyping opportunities and improving supply chain dynamics. Value creation in the mineral processing industry requires customisation, hence the importance of continuous, rapid prototyping capabilities.⁴¹ The competitive gains from this are evident: lower material waste and reduced processing time, which accelerates speed to market. With virtual simulation of the production process, the design of the product can be tested to ensure peak performance, without 3D printing a prototype.

The IoT is integrating ecosystems and changing business models, which can accrue significant benefits. Lead firms in South Africa can tap into more advanced ecosystems (e.g. Germany and China) and draw information that can be used to strengthen local capabilities. Monitoring innovation and compliance, where traceability is important, can be leveraged off the IIoT. In the mining industry the source of the ores or concentrates need to be closely tracked from extraction to processing.⁴²

Advanced manufacturing systems therefore themselves act as platforms. They can allow for modularity and open innovation or these aspects can be fully internalised, in varieties of business models which reflect the context of the industry and the industrial policies (broadly defined to include technology, R&D, and procurement) (Sturgeon, 2019). Modularity describes a situation

³⁹ Example from Multotec in 2018 (Kaziboni et al. 2019)

⁴⁰ <http://www.miningweekly.com/article/pumping-solutions-positioned-to-address-most-pressing-needs-2018-02-02>

⁴¹ <https://www.multotec.com/content/3d-prototyping>

⁴² Blockchain can be employed here <https://www.weforum.org/agenda/2018/07/4-ways-blockchain-will-transform-the-mining-and-metals-industry/>

where systems enable interchangeability of components and subassemblies through shared interfaces. In supply chains, standards and protocols allow for complex information about products, production and logistics to be exchanged across organizational and geographic boundaries. Open innovation allows for pooling of R&D activities and design, helping companies to vertically specialise – in serving a specific user segment – while benefitting from a wider pool of advanced competencies. This opens-up potential for specialised firms in middle income countries such as South Africa where they have specific knowledge of on-the-ground customer requirements.

Market power and value extraction

The changes under transversal and value chain specific digitalisation have complex effects on the governance of production systems and value chains in which industrial policy can play an important role. Economies of scale and scope in data analysis and design drives further consolidation of industries and value chain governance (see also Kaziboni et al 2021). These trends reinforce the role of multinational companies which are the OEMs in mining machinery in South Africa (even where they have South African roots) (Andreoni and Torreggiani, 2020).

As with apparel, the ability for South African producers to take advantage of the opportunities to build local capabilities and strong production eco-systems depends on the existing capabilities base and appropriate industrial policies. There is a stronger base in South Africa in machinery manufacture than there is in apparel and there are advantages from greater customisation in responding to the requirements of users (mines and mineral processors). These include users in the growing southern African market, outside South Africa. Local capabilities, at different tiers of supply, provide an important knowledge base from which to leverage. There are advantages of proximity and location specific knowledge which underpin partnerships with the engineering, procurement and construction management firms which design, construct and increasingly operate mines across southern Africa.

4.3 High value services: Healthcare⁴³

Healthcare provides a sharply contrasting case study as it is an area where, in South Africa, there is strong demand for private healthcare by the minority who can afford it (given the high levels of inequality) and associated with the perceived quality of public healthcare. Private providers and insurers are amongst the largest and fastest growing companies over the past two decades.⁴⁴ The three major private hospital groups are among the largest companies listed on the Johannesburg Stock Exchange, as is the largest medical aid scheme administrator, Discovery Limited.⁴⁵

⁴³ This draws from Competition Commission (2019) Health Market Inquiry, Final Findings and Recommendations Report, September 2019.

⁴⁴ 16.3% of the population was served by private healthcare in 2018 (Competition Commission, 2019).

⁴⁵ Medical schemes in South Africa are not for profit and operate in the interests of their members, while administrators are for profit.

We focus on the role of data on health and lifestyle which has underpinned Discovery Ltd emerging as an important digital platform, including gaining a banking licence in 2017. Data on individuals' health and lifestyle are very valuable for a range of products and services. As explained above, such data as a competitive asset has been identified as a concern by competition authorities including in mergers, with health data specifically relevant in the Google Fitbit merger under consideration in mid-2020 in a number of jurisdictions. Health data are also subject to particular privacy concerns and health insurers have access to this on terms not readily available to others.

Value creation and platform functions

Discovery Ltd was established in 1992 and listed in 1999 and has subsequently expanded to a range of financial services. It also has established related companies in the UK, USA, Singapore and China. At the end of September 2020, it was the 25th largest company (by capitalization) listed on the Johannesburg Stock Exchange. Discovery Health Medical Scheme had 56% of all members in open medical schemes⁴⁶ in South Africa 2017, which places it above the 45% threshold for the presumption of dominance in the South African Competition Act. It is highly profitable on the range of benchmarks assessed by the South African Competition Commission's Healthcare Inquiry (2019: 126) and at a multiple of its next best competitor. The role of innovation, strategy and management in these profit levels is acknowledged by the Inquiry, along with the likely role played by market power in setting fees.

Medical scheme administrators are involved in the design and management of the medical scheme including the design and pricing of different options and negotiation with the providers of services. There is a complex regulatory environment (although important gaps have been identified by the Inquiry).

Discovery Ltd developed a wellness programme, Discovery Vitality, into which medical scheme members can opt. Various lifestyle data are collected and reward points are earned related to healthy behavior including exercise and eating habits. This is linked to discounts on gym membership, exercise equipment and healthy food purchased in supermarkets. Discounts are also offered to Vitality members on a range of other products and services such as flights. While inducing healthy behavior, in a virtuous circle of lower payouts and lower premiums, the programmes can also be fidelity inducing as well as being targeted to attract lower risk clients. There are large scale economies in the data analysis as well as associated with bargaining for discounts on an expanding range of goods and services.

Discovery has expanded into a range of other insurance areas and banking based on its strengths in behavioural analysis and tailored product offerings. This includes the information from the Vitality programme which according CEO Adrian Gore (2015) is 'the foundation of our business model, driving every one of our offerings'. In 2017 Discovery obtained a banking licence and started operating in 2019, marketing itself as the 'world's first behavioural bank'.⁴⁷

⁴⁶ Closed schemes have members which are typically limited based on their employer. Open schemes are open to all and compete for members.

⁴⁷ <https://www.discovery.co.za/bank/bank-healthier> accessed on 2 October 2020.

The range of financial offerings are based on the data built up on individuals which has 'evolved into a complete wellness system that tracks everything from physical activity to nutrition' (Gore, 2015). By linking with other devices, and incentivized by reward points, Discovery can combine data on lifestyle and health indicators with individuals' retail and leisure spending.

There are strong network scale economies as Discovery bargains with its members combined potential purchases to negotiate discounts on products including, for example, fuel for those purchasing car insurance. The concentrated nature of income in South Africa means the disposable income of Discovery members is a substantial proportion of household disposable income in South Africa. In healthcare this bargaining power was used to counter the market power of the hospital groups in negotiating to place individual hospitals on preferred provider schemes and offer lower cost medical insurance.

Market power and value extraction

The heart of the power of digital platforms is the data aggregation and analysis while preventing it from being accessed by others. While this generates efficiencies for those who join, it can tip the market and enable market power to be exerted. In the case of Discovery, the discounts to its members that it has negotiated through exercising substantial buyer power may be below average total cost (that is, covering average variable costs of the supplier), implying prices will need to be higher for other customers to cover the fixed costs. Discovery may be able to charge fees charged on the services offered that are above competitive levels, even while scale economies mean lower overall costs. The combination of control over consumers data, network and scale economies imply substantial first mover advantages.

The control over data has enabled Discovery to build a local platform and to extend the innovative business model to other countries. The implication for competitive rivalry is illustrated in a case brought by Discovery Ltd (with Discovery Life Ltd and Discovery Vitality Ltd) against Liberty Group Ltd, ruled on in April 2020.⁴⁸ Discovery Life links the Vitality status of an individual to discounts on premiums for life insurance under a cash-back scheme, with higher Vitality status associated with greater benefits. Liberty Life introduced a Wellness Bonus where those electing to disclose their membership of external recognised wellness programmes (which included Discovery's Vitality programme) receive a portion of the premium back. The amount depended on the Liberty Wellness Score which took into account the Vitality status where relevant.

As well as accusing Liberty of infringing its trademark, Discovery contended Liberty had made unlawful and unfair use of the Vitality programme, its reputation and the 'back office' work that it entailed. In effect, Discovery claimed this amounted to Liberty free-riding on Discovery's knowhow, and committing unlawful competition. In terms of the claim of unlawful competition the court found against Discovery, as the status of an individual is not proprietary or confidential and is the personal information of the member which they can choose to disclose.⁴⁹ The court also found that proprietary information and know-how is that of Discovery Vitality, which does not compete with Liberty, and not of Discovery Life which does. The use of the information by Liberty may reinforce the person's membership of Discovery Vitality while competing them away from Discovery Life.

⁴⁸ *Discovery Ltd and others v Liberty Life Group Ltd*, (21362/2019) [2020] ZAGPJHC/2020/67, 15 April 2020.

⁴⁹ It also did not find a trademark infringement.

4.4 Comparative insights from South Africa case studies

The consideration of digital platforms in South Africa highlights the importance of understanding the differences between platforms in terms of their functions. In the case of e-commerce, the logistics infrastructure to deliver products is critical. As a result, Amazon struggled to operate effectively and e-commerce is relatively undeveloped, being led by a local provider. There are nevertheless concerns about the market share and position of the lead provider.

In search and social networking, with important links to digital advertising, the situation is quite different as the positions of Google and Facebook (and the other services they own such as Instagram and YouTube) in South Africa are as strong as they are in high-income countries. There is substantial value creation as local businesses are able to reach a much wider set of customers, locally and internationally, than they would otherwise be able to. Similarly, the combination of technologies and connectivity in the Industrial Internet of Things is enabling mining machinery manufacturers and suppliers to evolve their offerings to bring together data on plant performance and differentiated customer requirements with design and customisation capabilities. This holds the potential to build dynamic capabilities, however, there is also the risk that these capabilities will reside elsewhere in multinational operations. This is the case in fast fashion where the weak local capabilities mean that the South African industry does not have a good base from which to build.

In all of these areas, while the digital platforms hold the potential for greater international integration, there is the danger that the relative advantages will be greater to operations which are already in the lead. These will likely not be those in South Africa. This poses a challenge to countries in trying to by-pass the middle-income technology trap.

With regard to South Africa's national strategy, President Ramaphosa of South Africa observed that '[e]conomic growth will be driven by the leaner and more adaptable small- and medium-sized businesses of the future. Industry 4.0 will enable us to "leapfrog" outdated processes and technologies in favour of newer, more sustainable ones.⁵⁰ The case studies suggest that while these growth opportunities may well exist, a digital industrial policy is required to build the capabilities in local ecosystems, in which regulation of digital platforms needs to play an important complementary role.⁵¹

The Discovery case is in some ways the exception that proves the rule. The concentrated nature of demand for private healthcare in South Africa, given the income inequalities and perceived poor quality of public healthcare, has been fertile terrain for a dominant platform to emerge which is extending into adjacent markets. It has been able to grow in part because of a regulatory and competition regime which has not looked to address high levels of concentration, as such, until the 2019 Market Inquiry, and has instead required proof of substantial harm to competition having occurred (Roberts, 2020b). While Discovery Health's Vitality programme has been a base for international expansion, there are concerns about the extent to which it is exerting market power in South Africa.

⁵⁰ <https://www.brookings.edu/blog/africa-in-focus/2020/01/10/a-national-strategy-for-harnessing-the-fourth-industrial-revolution-the-case-of-south-africa/>

⁵¹ See also Barnes, Black and Roberts (2019).

5. Conclusions

Digitalisation and the growing importance of digital platforms of differing types are reshaping global and regional markets, while opening new opportunities as well as challenges for productive development. With a focus on middle-income countries, in this paper we have looked at the transformative impact on digital platforms and the underlying economic drivers of these multi-sided markets, namely network effects, and scale and scope economies. Building on these theoretical insights, we have analysed different strategies whereby digital platform can extract value from these multi-sided markets and the impact of these business models and strategies on other actors, including other businesses, complementors and consumers.

While significant emphasis has been given to the common ways in which platform power impacts global value creation and extraction dynamics, and they are often grouped together, our first contribution was to emphasise the highly heterogeneous nature of digital platforms. The ways in which the platform bases translate into specific opportunities and challenges for productive development is very diverse. We discuss these heterogeneity issues both from a theoretical and empirical perspectives, and with specific reference to three different sectors in South Africa.

The second contribution of our paper has been to review emerging policy approaches and trends, including expert studies commissioned by governments, and enforcement actions and market studies on the part of competition/antitrust authorities. Our review draws mainly from experiences across advanced economies where governments and authorities have been more active. It points to the challenges in regulating market power in a fast evolving and highly heterogeneous digital platforms economy. We find that middle-income countries present a number of specific issues determined by their structural and institutional configuration and the challenges of developing advanced productive capabilities. We conclude that if middle-income countries want to escape the middle-income technology trap, competition and regulatory approaches to digital platforms are not enough.

We address this gap by advancing an industrial policy approach to the governance of digital platforms and pointing to the importance of achieving an alignment between industrial and competition-regulation policies. We explain why an industrial policy approach helps in refocusing on value creation, capture and distribution dynamics, while engaging at the same time with the value extraction power of digital platforms. Building on this, the third main contribution of this paper has been to develop a framework whereby governments can adopt an integrated regulatory-competition-industrial policy framework. Our Digital Platforms Dynamics framework allows governments to identify the multiple set of heterogeneous relationships linking value creation to platform functions, value extraction to platform power and each of them to industrial and competition policy respectively. In this respect, we highlight the central Entrepreneurial and Regulatory role of the state in maximising the value creation opportunities offered by digital platform functions, while counterbalancing platform power and related value extraction. While several policy frameworks and governance solutions are emerging, we claim that a targeted, differentiated and aligned industrial-competition policy approach is the most appropriate for middle income countries. This is because it allows to strategically engage with the economic implications of different digital platforms in view of the specific configuration of the local economic challenges and priorities with regard to developing dynamic capabilities.

The final contribution of the paper has been to test the framework in the context of South Africa and with specific reference to: digital advertising and e-commerce, with examples from tourism and fast fashion; industrial capabilities in the context of the machinery and equipment sector; and, high value services in the context of healthcare. Digital platform and business cases across these sectors made clear how important it is to understand the differences between platforms in terms of their functions and how they can enhance value creation across middle-income countries. This includes pointing to where local platforms can emerge, as in e-commerce where local logistics capabilities are critical and in leveraging data on lifestyle and health into a range of financial services. While the global search and social networking platforms open-up substantial opportunities for local businesses to reach wider markets, the conduct observed in the competition cases and studies in high income countries point to concerns of a bias against businesses in middle-income countries, reflecting their weak position relative to the power of the global platforms. The findings of this deep-dive point to the importance of middle-income countries building institutional and analytical capabilities to engage with digital platforms' governance and data strategies, and to set expectations for the engagement of local businesses and platforms including the fair sharing of value creation. There are specific trade-offs to be faced which depend on the nature of the industries in question, the strength of local capabilities and the importance of the activities for the country's economic development. An over-arching imperative is to put in place policies to support broad-based digital skills and infrastructure if there is to be inclusive and sustainable digitalisation.

Lastly, as this paper was being finalised, the South African Competition Commission posted a paper for discussion on 'Competition in the Digital Economy' in September 2020. Much of its focus is to cover the implications for the main areas of competition law enforcement in terms of mergers, cartels and abuse of a dominant position. It also considers the wider issues raised by digital platforms and big data for economic development and proposes a role for a 'proactive competition law strategy' (p62) as part of a broader competition and regulatory policy framework.⁵² This is very much in line with the thinking we put forward, and we look forward to see how the Competition Commission paper translates into steps to address the regulatory, competition and industrial development challenges posed by digital platforms.

⁵² http://www.compcom.co.za/wp-content/uploads/2020/09/Competition-in-the-digital-economy_7-September-2020.pdf

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