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POST-NEOLIBERAL GLOBALIZATION: INTERNATIONAL TRADE RULES FOR GLOBAL PROSPERITY

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ABSTRACT

This paper analyzes frameworks for the design of the rules for international trading, assuming that it is possible to have some rule of law. In the Arrow-Debreu benchmark, where there is no economic power and political power is seemingly irrelevant, there is no need for trade agreements – free trade is the optimal policy for each country. But under even minimal deviations from that benchmark, trade agreements matter. We focus on environments in which there are market failures, technology is endogenous, and there is political power. Power dynamics play, for instance, a critical role in the design, implementation, and enforcement of agreements, with the latter being a critical difference between international agreements and domestic contracts and a key determinant of the feasibility and consequences of agreements. With endogenous technology, trade rules proscribing industrial policies may lead to lower growth and greater cross-country inequalities. Finally, we develop a framework which may be useful in the design and implementation of trade rules.

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I. Introduction

The rules of the international trading system are one of the determinants of nations' wellbeing and, in the case of developing countries and emerging markets, their development possibilities. They are also a key determinant of how the benefits of growth are shared. These rules determine the scope, set of instruments, and legal limits for policies that affect national and international patterns of production and consumption. Trade agreements throughout history have affected the lives, either for better or for worse, of billions of people around the world and across generations.

Rules and their enforcement are shaped by power.[1] Historically, powerful countries have decisive influence in the determination of details of the trade agreements, and in practice powerful interests within those countries influence those agreements.[2] Both history and

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[1] The precise meaning and measurement of power is beyond the scope of this paper. A rough heuristic in thinking about power (which suffices for the purposes of this paper) is the following. Think of the *surplus* generated by A and B cooperating vs what each would get if acting on their own. A 50/50 division of that surplus in an economic game would indicate equality of power, while if A gets 90 per cent of the surplus, it is intuitively clear that A has much more power than B. Each of the situations described in greater detail below can be modelled as a game, in which the nature and determinants of power could be more precisely defined. In practice, power relates not only to economics but entails military/security relationships as well. The US may exercise more economic power than the relevant economic variables might suggest.

More formally, game theory has provided us tools to analyse the equilibrium which emerge in both cooperative and non-cooperative games. Power is reflected in the extent to which the equilibrium favours one party.

The analysis of this paper focuses just on economic interactions, and in particular trade; but these are embedded in a wider set of relations, e.g. a dependence on protection from an attack from another country. For instance, a hegemonic country's power can be exercised by (a threat of) diminished military support, by the refusal to sell critical military equipment, or to buy certain military goods.

[2] Rodrik (2018) argues that '*when trade agreements were largely about import tariffs and quotas—that is before the 1980s—the scenario* [in which trade agreements are shaped largely by rent-seeking, self-interested behaviour] *may not have been particularly likely* [more consistent with a political economy theory of trade agreements in which the main motivation for governments is to get insulated from the lobbying from domestic vested interests that benefit from protectionism (as in Maggi and Rodríguez-Clare, 2007)]*. But with trade agreements increasingly focusing on domestic rules and regulations, we can no longer say the same*'. That is, the provisions of the trade agreements may not even benefit the country as a whole. (There is a large literature documenting this claim. See, for example, Stiglitz and Charlton (2005) and Stiglitz (1997, 2017). Several instances are provided in the discussion below. See also Grossman and Helpman (1995) on the trade-offs for policy-makers concerned with increasing citizens' welfare and collecting campaign contributions from special-interest groups.)

the events of today, some of which we refer to later in this paper, tell us that the powerful try to modify the rules when they no longer serve them, while they still have enough power to influence them.[3] This was true when England was the leading power in the eighteenth century, and it is true now in the context of the relationships between the US and China.[4]

International trade rules determine not only production specialization patterns but also the extent to which (and what kinds of) industrial policies can be employed. Industrial policies have been decisive in creating comparative advantages in nations that had successful development trajectories, such as those in East Asia.[5] And, earlier, they were crucial for the nations that took a global competitive lead after the Industrial Revolution. As Chang (2002) documents, England adopted industrial policies that were critical for taking a competitive lead in the world economy. Once that competitive advantage was achieved, the country pushed liberalism at the international level—successfully advocating for rules that would make it more difficult for those behind to narrow the gap between themselves and the leaders, and thus enabling the leaders themselves to earn large differential rents, i.e. to have higher standards of living.[6] The title of his book, *Kicking Away the Ladder*, describes Chang's perspectives on what has occurred.

The international rules-based system that was constructed with so much effort in the decades after the Second World War has been seemingly in crisis, particularly with the

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[3] Recognizing the importance of transactions costs and that history matters; that is, once a rule gets established, it is often difficult to change it, and even when there is change, current rules may affect the rules adopted. There are multiple reasons for these hysteresis effects, including political dynamics associated with coalition formation and information and learning that is acquired as a result of the adoption of a particular set of rules. See, for example, Stiglitz (1998a).

[4] Allison (2017) has emphasized the importance of the response of the dominant power to the rise of a challenger, referring to it as 'the Thucydides trap'.

[5] That is, comparative advantages in an evolving global economy are themselves evolving. Countries' dynamic comparative advantages are endogenous, and have important implications for the pace of modernization, itself affected by the induced structural transformations, and the rate at which living standards increase. See, for instance, World Bank (1993), Stiglitz (1996, 1998b), Stiglitz and Greenwald (2014), Greenwald and Stiglitz (2013), and the vast literature on the East Asia Miracle.

[6] One doesn't have to ascribe *intentionality* to what has occurred, to recognize that the rules proscribing industrial policies have had the effects Chang alludes to. Stiglitz (2015) models an international equilibrium with leaders and followers; the rules of the game affect the gap in standards of living between the two.

inability to respond to the Covid-19 pandemic through issuing a waiver for intellectual property that might have saved thousands of lives and tens of thousands of hospitalizations; with the expansion of the 'national security' defence for protectionist measures by Trump's Administration in the US; with the blocking of new appointees to the World Trade Organization (WTO) Appellate Body, thus making it essentially ineffective; and with the US's massive industrial policies/subsidies of the US, with provisions seemingly clearly in conflict with WTO rules.

The consequences, and the way forward, depends at least in part on one's interpretation of what has happened. The US, in defence of its industrial policies, says, for instance, that it is doing so because China is violating the rules. In a rules-based system, if the US was concerned about potential violations by another country, it would be incumbent upon the US to bring those allegations to the Appellate Body; but of course, it cannot do that, because it has refused to allow judges to the Court to be appointed, so the Court has been hamstrung.

There is another interpretation: the rules that the US played such an important role in writing no longer serve its interests. In his Brookings Speech, the US National Security Advisor Jake Sullivan (Sullivan, 2023) lays out a view for the American economy that recognizes that the fundamental tenets of neoliberalism are flawed and also provides testimony that the powerful countries obey 'rules' only when it is in their interest—and they enforce rules on others *because* it is in their interest. He also made clear that now that the old rules no longer serve the US's interests, they will need to be rewritten. But, of course, whether that will be possible is yet to be seen: the distribution of global power has clearly changed from the era in which those old rules were written. And politics today are different from what they were when, say, the WTO was established, so crafting an agreement that could simultaneously pass muster in the US Congress and in most nations around the world may prove nearly impossible.[7]

The view just articulated so well by Sullivan (2023), in turn, sheds new light on the post-Second World War rules-based system: a rules-based system where the rules are largely

[7] Even in the hey-day of US influence, in the era between the end of the Cold War and the 2008 financial crisis, the US was unable to persuade other countries to sign a multilateral investment agreement, showing the limits of the ability of the 'hegemon' to get agreements to its liking. The US also strove to have a financial sector agreement as part of the Uruguay Round negotiations, but failed to do so, leaving this to subsequent plurilateral agreements that had far less coverage.

written by the hegemon and only enforced (and enforceable) when enforcement is in the interest of the hegemon is not really a rules-based system.

This paper is thus motivated by the unravelling of the post-Second World War rules-based system, focusing on the deficiencies in its underlying economics, but even more importantly, in the political analysis, which gave short shrift to the role of power.

The deep question raised by this analysis and the historical patterns described is whether there can really be an international rule of law. (Of course, rules, even if they are sometimes broken by the hegemon, can have consequences; if there are costs to the hegemon, e.g. in terms of credibility or perceived credibility, the existence of rules can curtail the actions of the hegemon.) This paper provides no answer to that question.

Our objective is more to provide a set of frameworks within which these issues can be addressed, calling attention to key aspects that we believe have been given short shrift in earlier discussions, than to derive specific results under particular assumptions.

The paper addresses the question of how the rules for international trading *could* be designed, assuming that it is possible to have *some* rule of law. Elsewhere, Stiglitz and Rodrik (2024) have argued that the response to the reality of creating an effective rule of law in a world with today's power disparities and political polarization should entail 'minimal' agreements—focusing on areas that are absolutely necessary for the functioning of our global economy—rather than the comprehensive agreements that have been the objective of trade rounds in the post-Second World War era.

The rest of the paper is divided into eight sections. In section II, we put current events in a historical context. In section III, we explain the *economic* disillusionment with the globalization paradigm. The next two sections discuss the importance of power dynamics within and between countries and the special problems posed by endogenous innovation and industrial policies. Section VI sets out to present an analytic framework for the derivation of any new international rules and section VII develops a normative framework which could be used in the implementation of these rules. In the final section, we provide a few concluding remarks.

II. Historical setting

The current international trade order is composed of a set of rules as well as institutions, practices, and interpretations that determine the implementation, compliance, and enforcement of the rules. The current order had its inception at the end of the Second World War and has been evolving since then.[8]

The post-Second World War economic order was constructed at a series of meetings that followed the Bretton Woods Conference in 1944. The original idea was that such an order would be managed by three newly created organizations, the International Monetary Fund, the World Bank, and an International Trade Organization, but the last of these was vetoed by the US Congress. Nevertheless, a more limited 'agreement', the General Agreement on Tariffs and Trade (GATT) carried forward much of what had been conceived. A half-century later, the ambition of creating an international trade organization was achieved through the establishment of the World Trade Organization; but its attempt to create a trade architecture that was pro-development collapsed with the failure of the Development Round of trade negotiations,[9] which had begun in 2001 (in a moment of global solidarity following 9/11). Negotiations were finally abandoned in December 2015.

The primary goal of the post-Second World War international trade order was to remove the restrictions on international trade that had been put in place in the 1930s following the Great Depression, restrictions that were perceived as severely damaging for global economic prosperity.

There was also the belief that greater economic interdependence would lead to greater political stability—most importantly, reducing the threat of conflict[10] (Irwin, 2011).

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[8] For a comprehensive analysis of the institutions and agreements that have shaped international trade rules, see Howse *et al*. (2005) and Howse and Langille (2023). On the building of a judiciary system in the WTO, see Howse (2016).

[9] In the Uruguay Round, the advanced countries got much (but not all) of what they had wanted (most importantly, the IPR protections of the Agreement on Trade-Related Aspects of Intellectual Property Rights TRIPS), but the developing countries did not get much of what they had wanted (such as the end to escalating tariffs and agricultural subsidies), hence the demand of the developing countries that the next round of negotiations focus on remedying this imbalance.

[10] A widely shared aphorism was that no two countries that had McDonald's ever went to war with each other. We now know that this is not true.

Keynes, one of the key architects of the post-Second World War international economic order, believed that one needed a *global* system of openness to avoid the beggar-thy-neighbour policies (where the benefits of one country came at the expense of others) that had marked the Great Depression.[11] Countries sought to expand domestic output and employment by imposing tariffs or by competitive devaluations. Of course, when all countries engaged in these practices, none gained—in fact, all were worse off.

The GATT worked as a process with successive rounds of negotiations in which a host of topics were considered. It was hoped that comprehensive agreements, with many winners, would succeed in generating the necessary political momentum that would lead to the agreements being adopted. The basic principle was called 'most favoured nation' (MFN), that one treated all countries (signing on to the agreement) as well as one treated the country one favoured the most, i.e. there was to be no discrimination. This means that anything like 'friend-shoring' (giving more favourable treatment to one's especial friends) was thus not allowed, with one exception, for imports from members of a *free trade area* (FTA) (a group of countries that allowed total free movement of goods and services within them)—provided that the increased trade that resulted from the FTA was not outweighed by the trade diversion away from countries not in the trade pact. This principle was based in part on a hypothesis about political dynamics, the assumption that closer integration would bring benefits which would be so great that there would be a demand for still more integration.

The last 'successful' (in the sense that a significant agreement was signed) round was the Uruguay Round, completed in 1994. It created the World Trade Organization, seemingly finally accomplishing what had been started a half century earlier. That agreement went beyond the GATT in one fundamental way—there was a mechanism for adjudicating disputes. GATT worked by consensus, so the country allegedly breaking the rules could vote against having sanctions imposed on it. It was not quite the law of the jungle, but the powerful countries still had more tools for getting their way than others. The US, for instance, extended preferential tariffs (access) to many developing countries, and a country that got in its crosshairs would be threatened with losing its preferential access—at great cost to its exporters. A country thought to violate one of the US-created rules on intellectual property (not yet part of international law) would be threatened with trade

[11] For a broader discussion of these policies, see Stiglitz (1999).

sanctions. With the establishment of the WTO, countries could still withdraw preferential benefits to developing countries, but otherwise, there was a process of adjudicating disputes; and importantly, the span of what was covered increased to include intellectual property rights. Tariffs on goods and services were reduced to average low levels, though with a pattern of escalating tariffs, which resulted in the continuation of colonial patterns of trade: developing countries disproportionately focused on exporting raw materials and developed countries focused on activities that transformed raw materials into high-value products.

(i) The unravelling of the WTO

Things haven't worked out the way that was hoped by those advocating for a globally integrated economy. As we noted earlier, there has not been a large successful round of negotiations since the completion of the Uruguay Round in 1994, 30 years ago. Political support for an open trade regime of the kind envisioned at the end of the Second World War has waned; indeed, today there is open hostility, and the leading advocate for the open international order, the United States, has embraced policies that are widely viewed as inconsistent with WTO rules.

To understand why the system unravelled so quickly, one need only recall that the system was supposed to enhance economic efficiency and prosperity *for all*. But equally important, it was supposed to promote peace and security. A borderless world could only work well when there was a certain degree of comity among countries—which the WTO was supposed to promote.

Interests, power, and ideology shaped the system, and especially when power and ideology changed, the system lacked the flexibility to change in a corresponding way. Most importantly, the 'system' failed to deliver on its promise of prosperity for all and, in the end, it promoted international cooperation less than had been hoped. Indeed, the expanded rules-based trade world seemed to make large groups in both the developing countries and developed worse off, creating enormous opposition, and leading to massive protests at the first attempt to have a post-Uruguay Round (in Seattle, in 1999).[12] Later expansions of regional trade agreements to cover the Pacific (TPP, the Trans-Pacific Partnership) and the Atlantic (TTIP, the Trans-Atlantic Trade and Investment

[12] See Stiglitz (2002) and Stiglitz and Charlton (2005).

Partnership) faltered under President Obama and, today, restarting such negotiations is totally off the political agenda in the US. The hypothesis that the WTO would create a political dynamic that would lead to enhanced economic integration proved false.[13]

The rules of the GATT and later of the WTO were constructed in a world of US dominance, after the Second World War and later after the fall of the Berlin Wall, respectively. The patterns of specialization implied by those rules and their enforcement had heterogeneous consequences: they lifted hundreds of millions of people out of poverty, led to static efficiency gains, but they also created other hundreds of millions of losers (in both developed and developing countries) who did not share in those static efficiency gains. Indeed, globalization, supported by the new rules, led to market equilibria in which some saw their incomes decrease—in some cases absolutely, in other cases relatively. The resulting increases in income and wealth inequality contributed to societal polarization and social instability. The adverse distributive effects were seemingly larger and the efficiency gains smaller than the advocates of the new liberal trade order had suggested, especially once one takes into account the losses associated with the unemployment of resources implied by the lack of the adjustment capacity of markets (see, for example, Stiglitz, 2017). This has particularly affected Africa, where the rules and their enforcement[14] led to premature deindustrialization, with consequences for modernization and structural transformation (Rodrik, 2016).[15] The increase in inequities were seen not only within countries but also between countries, as the specialization benefitted mostly the countries that had either the advantage of sectors that had a knowledge base and institutional structure more conducive to learning, or the capability to implement industrial policies, for example China (see, for example, Stiglitz and Greenwald, 2014). These facts suggest that overall the consequences of deeper integration and the dynamic gains from trade have been ambiguous (Rodrik, 2021), even

[13] This was not inevitable: had domestic politics been different, the winners might have compensated the losers, and had the advanced countries not been so aggressive in pursuing the interests of their corporations, an agreement that was more advantageous to developing countries and emerging markets might have emerged.

[14] Especially as reinforced and supplemented by IMF structural adjustment programmes.

[15] Ascertaining (quantifying) precisely the magnitude of these effects is hard because of the difficulties of determining the appropriate counterfactual.

if from a global perspective deeper integration, done the right way (accompanied by the right policies), might have contributed to an increased global GDP.

More specifically, for decades, developing countries complained about global rules that limited their capacity to implement the industrial policies that might have enabled them to close the gap in standards of living between themselves and the advanced countries. It was contended that subsidizing nascent industries in developing countries would tilt the playing field; but in reality there was no level playing field. The West already had the knowledge advantage and protected it through patents and intellectual property rights. Indeed, as we observed earlier, the structure of tariffs enhanced the difficulty of developing countries moving up the value chain (Stiglitz and Charlton, 2005). And the asymmetries in restrictions in subsidies (allowing agricultural subsidies, harming developing countries that exported agricultural goods; but restricting industrial subsidies), further tilted the playing field against developing countries.

III. WTO and the end of neoliberalism

The post-Second World War economic order, as we noted, was shaped not only by interests but also by ideology: beliefs about political dynamics and the economic system. In many cases, these beliefs supported economic and political interests; but they were also based on the contemporary prevailing assumptions about how the economic system functions.[16] Just as economic and political interests have changed, so has our knowledge of the functioning of the economic system, and this has also contributed to the unravelling of the post-Second World War economic order.

WTO rules are 'officially' based on the core neoliberal/neoclassical assumptions that give rise to the fundamental theorems of welfare economics, showing that (under the assumed conditions) markets allocate capital and other resources efficiently.

The theory predicts that, under free trade, countries will specialize (relative to what the country would have produced in autarky) in the production that is intensive in the use of the factor that is relatively abundant. The standard theory predicts that trade leads to an increase in global efficiency, that each country would be better off under free trade,

[16] Though this was true in 1944, it was not so in 1994, at the time of the signing of the Uruguay Round. By then, within academia there was widespread understandings of the market failures described below.

though within each country there would be winners and losers, but *within each country* the winners from trade liberalization would be able to compensate the losers.

In the early days of the construction of the post-Second World War economic order, there was no deep understanding of the implications of market failures for the consequences of trade liberalization, including the dynamic comparative advantage consequences of the productions patterns that it would create. The standard theory was static—there was no learning or 'catch up' on the part of developing countries, no innovation or technical change on the part of the advanced countries. In this world, patterns of production or the 'quality' of growth had no implications for future wellbeing. But for developing countries especially, this was a crucial omission.

There a second crucial weakness, in the inadequate attention to political processes within countries and globally. In particular, there was no analysis of the role of power in the determination and enforcement of the rules or in the determination of the processes that would determine the short-term and long-term distributional outcomes. It was simply assumed that *if* there were national gains in each country, then the benefits would somehow (perhaps by a process of 'trickledown economics') accrue to all; and that if there were a rules-based system, all would obey the rules—including the powerful countries, even when it was not in their narrow self-interest to do so.

(i) Adverse distributional consequences

In the hey-day of neoliberalism, some would claim that trickle-down economics ensured that if the country was richer, each group within its society would be better off. There was never theory or evidence in support of such claims; to the contrary, theory (the Samuelson–Stolper and factor price equalization theorems) said that it was not only those in the specific industries where there might be a surge of imports that would be affected, but a *trickle-down* process was at work: it was not only workers in one of the import-competing sectors that were hurt in advanced countries, but *all* workers.

Political leaders and economists glided over the fact that there was a big difference between being able to make everyone better off and actually making everyone better off: the way politics worked left large groups worse off, or at least that was how matters were perceived. Redistribution from the winners to the losers not only hardly occurs, but the changes in the distribution of income and wealth affect the distribution of power,

reinforcing inequalities to an extent that can become dysfunctional for societies (Stiglitz, 2012).

There is a further problem: even if free trade resulted in an improvement in welfare, *freeing* trade—not going all the way—may not. This is the fundamental insight of the theory of the second-best. The theory of the second-best also provides an important critique of the assumed political dynamics, because if the 'partial' reforms are not welfare enhancing, they won't create momentum for further reforms.

It needed to be assumed that were it desirable to redistribute (necessary if trade liberalization were to be a Pareto improvement), such redistribution was costless, and could be achieved by lump-sum transfers. No country employs such transfers, and redistributive taxation is costly. Economics and politics 'conspired' to undermine the ability of the new order to fulfil its promise of making everyone better off.

(ii) Costly adjustments

It was also even more unclear then than now that markets would not necessarily adjust quickly and essentially without costs to a trade liberalization shock, hence an analysis of unemployment and other adverse consequences was left aside (Guzman and Stiglitz, 2020). Not only did unemployment mean that there were large static costs, there were also large dynamic costs: the hysteresis effects on the unemployed were not considered, understating the social and political consequences that liberalization might entail.

Empirical evidence since the great wave of liberalization, NAFTA and China's succession to the WTO, have shown that markets do not adjust quickly: they do not reallocate resources smoothly, as the advocates of neoliberalism claimed, so that the claims of overall growth benefits often didn't materialize.[17] As Stiglitz (2002) put it, moving workers from low productivity protected import competing sectors to unemployment was *not* efficiency or welfare enhancing. And that was what often happened in both developing and developed countries. One case extensively analysed in the recent literature is the 'China shock' in the late 1990s and early years of this century, as China become more integrated into the global economy, which led to large changes in

[17] Delli Gatti *et al*. (2012) provide a theoretical rationale for costly sectoral adjustments and an analysis of the consequences, in line with what has been observed—but departing markedly from the neoclassical model.

the patterns of trade. Adjustment in the US labour markets has been very slow, with wages and labour-force participation remaining depressed for at least a decade following the shock, and with exposed workers experiencing a reduction in their lifetime incomes (Autor *et al*., 2016, 2021).[18]

(iii) Imperfect risk markets exemplifying broader market failures[19]

Another flawed assumption in the neoliberal doctrines underlying current trade agreements was perfect risk markets; in the absence of critical risk markets, free trade can make everyone in all countries worse off (Newbery and Stiglitz, 1984) and the move from quotas to tariffs—a central element in trade 'reforms'—can be welfare reducing (Dasgupta and Stiglitz, 1977).[20]

(iv) National security and global supply chains

The underlying theory missed another important and related factor: national security concerns related in turn to the possibility of disruptions of global value chains in an integrated world, which, as we will see, are being quoted as a justification for industrial policies in the advanced economies. (While the WTO embraced national security exemptions, these were intended to be narrow and limited; but the post-pandemic world with fragile supply chains has suggested that they are far more extensive.) Two things have changed since 2016: the realization of the consequences of extreme interdependence, which Rodrik refers to as hyper globalization,[21] and a heightened sense

[18] Choi *et al.* (2021) show similar results for NAFTA.

[19] The 'market failures' discussed here and elsewhere in this paper are simply deviations from the 'perfect' market assumptions that have to be made to prove that markets are efficient. The costs of creating markets and obtaining information are just as real as the costs of production; but these are simply ignored in the perfect markets paradigm.

[20] These central results were not refuted by the advocates of neoliberalism. They were inconvenient, so ignored.

[21] Markets are short-sighted and often seemingly don't take into account adequately future risks.

of the possibility of a new Cold—or Hot—War. The borderless world envisioned as the goal after the Second World War seems less ideal under these circumstances.

(v) Externalities

The neoclassical economic model on which the neoliberal trade order was constructed was premised on two other assumptions, both of which have become central to twenty-first-century policy debates. The first is externalities—actions where what one country does has adverse effects on others. The most important of these today is climate change and biodiversity, but the pandemic brought home the important issue of global public health. Within countries, governments regularly tax externalities (Pigouvian taxes) to discourage their production; such taxes (or similar regulations) are necessary for efficiency. Green tariffs (cross-border adjustments) is an important instrument for the global trade architecture and, at times, the WTO appellate panel seems to have recognized this.[22] But the way actions supposedly designed to address global externalities (climate change) have been taken have been contentious, and arguably have discriminated against developing countries.[23] Suffice it to say that at the time WTO was created, it was not contemplated that the issue would achieve the prominence it has; and there were inadequate provisions for dealing with cross-border externalities.

(vi) Endogenous growth

The final assumption that was missing from the analysis—and the subject of much of this paper—is endogenous innovation. Markets on their own are not efficient in the production and dissemination of knowledge. Market interventions to create a more dynamic economy—or simply help close the knowledge gap between developing

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One can think of there being two market failures at play: a failure to adequately 'price in' risk (just as markets don't price 'carbon') and, relatedly, a failure to take into account the externality imposed on others as a result of inadequate risk management.

In the presence of imperfect risk markets, competitive equilibria are not in general Pareto efficient. See Greenwald and Stiglitz (1986).

[22] See, for example, Stiglitz (2006*a*).

[23] For instance, the EU's ban on palm oil and other agricultural products from newly deforested land obviously discriminates in favour of the older deforested land of Europe, and, like other EU measures, may impose heavy administrative burdens on developing countries. See the discussion below.

countries and the advanced countries—might be seen as 'unfair'. The WTO took a seemingly simple stance—basically prohibiting such actions, except when they were broad (e.g. supporting the educational sector as a whole, not research and development in a particular area). As we argue, this was not globally efficient.

In conclusion, given the state of knowledge at the time and the characteristics of the global economy at the time (and even more so, the global political order which they hoped would be emerging), many may have considered the tenets of the international trade order post-Second World War appropriate. Today's views are more disparate, with an increasing consensus on the need for revising those rules, as a result of theoretical developments, mounting empirical evidence, and, importantly, changes in domestic and international power dynamics, to which we now turn.

IV. Who shapes the rules for international trading: domestic power and international power

In practice, national governments do not behave as if they were maximizing the welfare of a representative citizen, but instead they respond to pressure from different constituencies and competing special interests.[24] The ways in which each country influences the rules of the global economy thus require an understanding of the domestic power dynamic *within* those countries.

Workers' interests—even those from advanced nations—are generally underrepresented in international negotiations. Corporate interests have a disproportionate influence in international trade ministries, and thus have disproportionate influence in shaping the international rules. Thus, with the US having such influence over international agreements, the US corporate sector has played an influential role in the construction of WTO rules (especially in conjunction with other rules, e.g. concerning taxes and

[24] Competition between opposing lobbies has been found as a significant factor in the determination of trade policy, a result that is not consistent with the premise of governments deciding trade policy on the basis of maximizing some well-defined social welfare function (Gawande *et al.*, 2012).

investment),[25] rules that have weakened workers' bargaining power not just in developing countries but also in the US (Stiglitz, 2017).[26]

The failure to recognize the role of domestic politics in determining countries' positions in international economic negotiations is just one of the failures in the conceptualization of international agreements. Not all countries have the same power—and those with the most power have the most say.

Non-cooperative and cooperative game theory has provided a rich set of frameworks for thinking about alternative approaches to analysing power, with a rich set of insights, which we draw upon in the following analysis (see, for instance, Axelrod and Keohane, 1985).

Of course, if there were a large number of countries of roughly the same size, none would have market power. This is the competitive world upon which neoliberalism focused. Competitive equilibria are efficient. But it was evident that the international order (or disorder) of the Great Depression was not efficient, with countries engaging in beggar-thy-neighbour policies. Many advocates of global agreements see them as resolving the prisoner's dilemma that Keynes was concerned with: with each country adopting such policies, even if they understood that when all did so, the welfare of each was reduced. While the decentralized outcomes Keynes described can be thought of as best being

[25] For instance, investment agreements give American investors in a foreign country more property protection ('rights') than in the US; and tax provisions imply that companies producing abroad may face lower taxation and, thus, the threat of an American company to move production abroad if workers don't accept wage cuts or worsened working conditions is credible. For a discussion of investment agreements and their consequences, see Stiglitz (2018).

[26] The American labour movement has long opposed many if not most of the major trade agreements that the US has entered, to no avail. But the problem is deeper—the corporate interests effectively write many of the key provisions. In a world where 'the devil is in the details', they set the details. A recent example exemplifying what is at issue concerns compulsory licences for critical pharmaceutical products in the midst of a pandemic. In the original TRIPS agreement, compulsory licences were important for part of the 'deal'. But then, with the advent of the HIV-AIDS epidemic, it became evident that the mechanisms for implementing this provision were inadequate. A heated debate occurred over fixing the problem, to restore/implement the original intent. But the fix adopted in turn proved inadequate, especially as Covid-19 raged. South Africa and India, accordingly, asked for a waiver—totally consistent with the principles underlying the original agreement and its revision. The UK and Switzerland were among the countries that refused. There were large consequences to the failure to enact the waiver.

described as non-cooperative games, agreements can be thought of as the outcomes of cooperative games.

One of the important insights of game theory is that results can be fragile—changes in the 'rules of the game', in how interactions are modelled, can matter a great deal. A central thesis of this paper is that much of the (implicit and explicit) modelling has left out certain key aspects of trade interactions. [27]

For instance, some analyses fail to take fully into account the fact that, unlike the case of domestic contracts, there is no global government to enforce such agreements. (Even when the WTO's Appellate Body was functioning effectively, it had no powers of enforcement; it could approve the imposition of retaliatory sanctions, but in many cases, these were a very ineffective enforcement mechanism and would hurt the country imposing them more than the country upon which they were imposed.) In such a world, economic theory has to focus both on the writing of agreements *and* their enforcement.

The US has often made a point about enforcement that seems in the same vein: arguing that it will obey international agreements while others may not, the US has been hesitant to sign onto certain seemingly desirable agreements. This is a view of the international order where some countries are 'good citizens' that obey the rules, while others are not.[28]

In this paper (as other papers in this issue), we take a different approach: countries obey rules if and only if it is in their interests to do so; and powerful countries are in a position to violate the rules with limited consequences whereas small, developing countries are not. [29] The question is, if that is the case, how does it affect how we think about international trade agreements?

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[27] For the role of game theory in international trade analysis, see Brander (1995), Abbott and Kallio (1996), Devarajan *et al*. (2018), Bagwell *et al*. (2020).

[28] See also Stiglitz (2017) for a discussion of a particular set of provisions in international agreements, those concerning dumping.

[29] There is obviously extensive compliance with rules without there being explicit enforcement actions, including instances where compliance might seem contrary to at least the short-run interests of a country. There can be several reasons for this. Countries may value their reputations as good citizens, and/or believe that in a world to be governed by a rule of law countries need to comply voluntarily. Alternatively, they may be motivated by the threat of an enforcement action. Enforcement actions need not be limited to those sanctioned by the WTO and need not be limited to trade. They may include other actions, even

A standard resolution to prisoner's dilemma games is to embed the 'players' in repeated interactions, which, if discount rates are low enough, can sustain generally beneficial cooperation (as well as solutions in which a subset of countries cooperate (collude) together to advance their interests at the expense of others). Given the ever-changing nature of the global environment (technology, preferences, beliefs, and power) and the short horizons of key political decision-makers, this formulation does not seem to provide a good description of the world today. If it were, it would be hard to see how some of the glaring global inefficiencies could be sustained.

The short horizons of political leaders/negotiators are of special relevance because, as we have noted, the negotiators often represent special interests within a country rather than the interests of the country as a whole. Changes in politics and particular events can have large effects, and at least in some countries; and participants in the negotiation processes know this. One can think of this as changes in the preferences of the players in the 'game' and in the pay-off matrices. This affects the nature of the agreements that the negotiators strive and are willing to make. Thus, a powerful country today, or a special interest group dominating the position of a powerful country today, knows that its influence may wane, and, accordingly, may strive to develop agreements that are hard to change—that embed its current influence well into the future.[30] There can be large hysteresis effects. This, and the fact that other countries know this, may make agreements harder to reach as well as harder to revise, with sub-optimal levels of flexibility. The importance of these effects was illustrated by the inability of the WTO to negotiate a waiver for IPR during the Covid-19 crisis. We discuss this further below.

Taking into account the dynamics of preferences and beliefs is especially relevant in understanding the current conjuncture. Neoliberalism itself has given rise to political dynamics, which the architects of the trade rules seem not to have taken fully into account (indeed, as we noted, their conception was just the opposite to what happened). In many

in other spheres, undertaken by affected countries, their allies, or multilateral institutions. The threat of a curtailment of assistance is an important incentive for compliance by developing countries. Thus, in the discussion below, the term 'enforcement' means simply actions undertaken to induce compliance.

[30] A general theory, in a related context, has been set forth in Korinek and Stiglitz (2008, 2009).

countries, trade liberalization, unaccompanied by adjustment assistance,[31] led to large numbers of disaffected individuals (many unemployed, many facing stagnant or declining wages), and not surprisingly that affected political dynamics. Trade liberalization, in the manner it was carried out, led to its own opposition, rather than to momentum for more liberalization, as its advocates often suggested. This was true in the powerful countries that were central in setting the rules; but even more so in the countries who felt that they had little say in rule-setting. The WTO framework was not politically sustainable. It (or more accurately, the dominant powers that designed it) created the conditions that brought itself into its current quandary.[32]

In a related paper, Susskind and Vines (2024) argue that the construction of the world order can best be described by a two-stage game—in the first stage, both a Stackelberg leader and the followers determine together the rules of the game (knowing how the second stage will play out), and in the second stage all the Stackelberg followers play Nash strategies independently and at the same time the leader (the hegemon) engages in enforcement action so as to extract as much benefit for itself as possible.

Of course, in the real world, there is not just a single hegemon. As Susskind and Vines (2024) acknowledge, in the process of determination of the global trade order there were multiple countries sufficiently powerful to exert influence in the definition of the rules. For example, at the end of the Second World War the United Kingdom was less powerful than the US and yet an influential party in the writing of the new rules. [33]

But—as Susskind and Vines go on to argue—the differences in views and interests (and conceptions of the world) between the UK and the US were small compared to those between, say, the US and China, which now see themselves very much as rivals. A different model may be needed—one that may be more appropriate for the world going forward—in which there are two large powerful countries that battle for influence in

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[31] Which neoliberalism, with its emphasis on well-functioning markets, said was unnecessary during the Clinton Administration,

[32] Similarly, and more broadly, Stiglitz (2024) has questioned the sustainability of neoliberal capitalism. For instance, while premised on high levels of competition, its roll back of the state has created the conditions for large accretions of market power.

[33] Collectively, of course, even small countries may have some, but limited, influence in determining the cooperative outcome.

search for hegemonic benefits—such as the US and China. This is the environment featured in Kikuchi and Liub (2023), in which there are two Stackelberg leaders, each of them being the leader of a bloc, and followers must choose which bloc to join.

Of course, in the current environment, most of the 'followers' are trying to engage in trade with both blocs, with the extent of trade and investment interdependence depending on how each bloc treats them. A key issue in the rivalry between the two hegemons is whether they demand exclusivity for all or some of their followers. If one hegemon demands exclusivity, by definition, the other will 'enjoy' exclusivity. It may be difficult for those in the rest of the world not to choose.

There is one aspect of the model of 'conflict' rather than ordinary 'rivalry' that needs to be noted. In an ordinary rivalry, one country ('player') may undertake actions that raise its rivals' costs. Such actions, of course, are in general socially undesirable, and global agreements might be designed to circumscribe such actions. Still, in a rivalry, each country is seeking to maximize its own income. In the case of conflict, a country's wellbeing may be defined *relative* to those it sees as its foes: it is the difference in standing that matters, not the levels. Countries may undertake actions which hurt themselves, if they also hurt their rivals more.[34]

Two more important observations: agreements affect political dynamics, and this is particularly relevant in an ever-changing environment. An agreement may be partially the result of the formation of a particular political coalition, but it also shapes coalition formation. The rules of the game create interests—those who benefit from the particular rules have an interest in preserving them. Agreements and the actions to which they give rise reveal information, and this too can affect coalition formation. By contrast, there are an infinite set of possible coalitions, and with coalition formation being costly, it is often difficult if not impossible for alternative coalitions (with different perspectives on changes in the rules) to form, especially given the low prospect of any particular set of rules (advancing the interests of any particular coalition) being successful. Of course, this is not always the case, especially when the harm imposed by some special interest provisions of a trade agreement are very evident: the rules advancing the interests of Big

[34] This may be the case with some of the US restrictions on technology exports, which hurt US exporters, both directly and in their ability to set global standards. However, at least in the short run, the restrictions are seen as hurting China more.

Pharma have been challenged by the producers of generics and civil society health advocates. This is a case where there is what might be thought of as a natural coalition.

Thus, the trade agreements with China led to a large number of firms entering, and once they entered, they formed a natural coalition in maintaining a trade relationship—their economic interests often prevailing over other interests and perspectives, such as advocates for democracy and human rights, who wanted the US to take a stronger stance against China's actions, and who thought that by not doing so, it weakened its global credibility on these issues.

We cannot explore all of these alternative conceptualizations. Our main point here is simply that rules-writing cannot be separated from rules-enforcement, and from the many other critical determinants of how a global agreement plays out in a dynamic environment. And the asymmetries in power that are so important in rules-writing manifest themselves as well in rules-compliance/enforcement.

V. The international trade rules frameworks, industrial policies, and endogenous innovation

In section III, we described the unravelling of neoliberalism, with the understanding of pervasive market failures and the need for government intervention. Of the many market failures noted there, one is of special concern in this paper. As we noted, the fundamental theorems of welfare economics assume that there is no innovation.[35] The lack of innovation trivially implies that countries cannot change their comparative advantage, typically implying that the static comparative advantage coincides with the dynamic comparative advantage.[36]

[35] The complete space of states that characterizes the economy is fully known and fixed, hence the space of states does not depend on human creation. Kenneth Arrow, of course, recognized this, seen most clearly by his learning by doing paper (Arrow, 1962). Stiglitz (1975) makes clear the link between endogenous technology and endogenous information—in both of which the welfare theorems fail. See also Stiglitz and Greenwald (2014).

[36] Comparative advantage might change over time, e.g. because of changes in weather brought on by climate change.

If there is endogenous innovation, matters change. First, there is a role for investment in learning—research and development, R&D.[37] Second, the type of growth does matter. There may be some sectors and some modes of production that are more conducive to learning and for which there are greater spillovers to other sectors. Thus, today's production patterns affect patterns of production and comparative advantages in the future. This is especially true with 'localized' knowledge (localized to modes of production, sectors, and/or geography). Knowledge related to one technique or one place or one sector may have limited spillovers to others (Atkinson and Stiglitz, 1969).

Third, markets are never efficient on their own. Knowledge is a global public good. When returns are not fully appropriated, then firms will have insufficient incentives to produce, to engage in R&D, and to choose appropriate means of production. IPR and trade secrets can enhance appropriation, but also distort the usage of knowledge and lead to market power—again undermining economic efficiency. Efficiency *requires* government intervention of some kind, including what are sometimes referred to as *industrial, learning, and technology* policies (which we refer to simply as industrial policies).[38]

Trade affects what is produced and how it is produced, and thus incentives for R&D and opportunities for learning by doing. Greenwald and Stiglitz (2006, 2014) provide a simple but canonical example where there are two sectors, and learning by doing only occurs in one sector (M for manufacturing) and none occurs in the other sector (A for agriculture). There are perfect spillovers, so all the benefits of learning in M accrue to A. Then a developing country producing according to comparative advantage produces only A and stagnates. Industrial policy creates a short-run distortion from which there are long-term benefits. So long as the future is not discounted too highly, it will be optimal to have some industrial policy.

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[37] Learning also occurs through learning by doing and learning by investment (Arrow, 1962). Because of learning by doing, production itself cannot be separated from innovation/learning. Larger firms have greater incentives to produce, even if their current costs are the same, because of the larger learning benefits. Thus, a seemingly 'neutral' trading regime over time can lead to increasing inequalities in knowledge and capabilities, and thus to incomes, unless there is a transfer of technology and/or of income.

[38] It is important to note that industrial policies do not necessarily promote 'industry' as narrowly defined; they can support any sector of the economy.

Take the historic case of England and India opening to trade with each other in the nineteenth century, with England having a relatively abundant endowment of capital and India of unskilled labour—creating a scenario wherein England specialized in production that was capital-intensive (assumed here to be textiles) and India in production that was labour-intensive.[39] If learning was limited to (and greater in) textiles than elsewhere, as seems to have been the case, this enhanced the comparative advantage of the textile exporter, i.e. England (assuming that knowledge didn't flow well across national boundaries). Opening to trade then created a further dynamic comparative advantage for England, leading to further divergence.[40]

The returns to investment in R&D will also be affected by the size of the sector and the appropriability of the returns. Trade liberalization in manufacturing and strengthening patents relevant to manufacturing increase the size of manufacturing in developed countries and increase the return to capital there (when there was trade integration based on Heckscher–Ohlin, with countries with lower wage rates, and capital is immobile). This increases the return to R&D in manufacturing in those countries and diminishes them in developing countries. Seemingly, an unadvertised part of the 'specialization' associated with allowing countries to pursue their comparative advantage is specialization in dynamic vs static sectors, with the former disproportionately in the advanced countries and the latter in developing countries, so while both share in gains from the static comparative advantages, dynamically (and therefore in terms of present discounted values), one group of countries, the poor, may lose not only relatively, but absolutely, compared to isolation.[41,42]

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[39] This story, of course, doesn't perfectly fit the facts, because to gain its position as a textile exporter, it used its colonial position *vis-à-vis* India, imposing tariffs and restricting India's textile production. The long-term dynamics to which this possible reversal of static comparative advantage gives rise are those described below.

[40] It was not, perhaps, so much natural economic forces that were at play in this case as Britain's own industrial policies, which imposed tariffs on Indian textiles (Davis, 1966).

[41] These results are also consistent with Galor and Mountford (2006, 2008) predictions that while in the industrial nations the gains from trade in the second phase of the Industrial Revolution would be directed primarily towards investment in education and growth, that would not be so for non-industrial countries.

[42] Production decisions at any time should, of course, take into account the learning benefits of production; but under the conditions hypothesized, this would almost certainly exacerbate the

The corollary is that countries that have an increase in the types of production associated with learning and with greater learning spillovers because of their 'static' comparative advantage also have an advantage for building a dynamic comparative and absolute advantage. It is the absolute advantage that matters for disparities in standards of living. Penalizing industrial policies gives a further advantage to the countries that already have an advantage in knowledge. Industrial policies can thus both decrease these disparities in advantage and—at the same time—increase the global growth rate.

Industrial policies may also be needed to resolve market coordination failures that result in suboptimal investment in sectors that feature learning-by-doing and R&D. By helping to resolve coordination problems, government intervention may enable or accelerate entry into strategic sectors where the initial fixed costs of entry are high (Bolton and Farrell, 1990; Rob, 1991). Consider a new potential market for which entry is costly and where future profits are uncertain and depend on information (such as demand) that cannot be known until the market is operative. No firm has the incentive to be the first entrant. Every firm prefers to free-ride on other firms, and then to benefit from the information they generate, without paying the cost of acquiring this information. Thus, potential social value is not created. To solve this problem, the state could subsidize or become (by creating or using a public company) the first entrant, and that will encourage other firms to follow. [43]

Market-directed innovation and learning may result not only in the wrong level of investments in innovation, but also in the wrong *direction* and *strategy* of innovation—too much innovation directed at saving unskilled labour, even when there is already high

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divergences noted. The UK would be more willing (at the margin) to produce textiles, and thus, if there were not total specialization in textiles based on a static analysis, the dynamic analysis would move UK further in that direction.

These effects are exacerbated by capital market constraints. Consider a case where India had, for some reason, a true long-term comparative advantage in textiles, assuming it could catch up in technology. But that would require its firms running at a loss in the short run, so it could expand and outcompete UK firms. Capital constraints mean it might not be able to do so. See Dasgupta and Stiglitz (1988). They are also reinforced if there is 'learning about learning'. See Stiglitz (1987).

[43] A similar argument applies to policies which subsidize new firms. See Emran and Stiglitz (2009).

unemployment (see Stiglitz, 2014*b*), and too little innovation directed at climate. The direction of innovation is obviously affected by market prices, and so if market prices differ from social values, innovation will be misdirected. When there is unemployment, the market wage is likely to differ from social values (shadow prices). We know that the market is not appropriately valuing environmental impacts. The pandemic showed that lack of resilience of the economy, leading many to suggest that the market was not appropriately valuing resilience—not taking into account the social costs of disruptions to supply chains.

Similarly, capital constraints and imperfect risk markets may inhibit the private sector from undertaking large, risky projects, even if the net social value of such projects is positive.[44] (We can again express this as a deviation between the market discount rate and the social discount rate.)

As Stiglitz and Greenwald (2014) point out, industrial policies can be thought of as an important set of tools to address any situation where private outcomes are different from socially desirable ones, either because of explicit market failures of the kind we have been discussing (endogenous technology, environmental spillovers, lack of competition, lack of risk markets, coordination failures) or because the distribution of income generated by the market is deemed socially unacceptable and industrial policy innovations may be an effective (pre-distribution) way of achieving distributive objectives. The motivations are often intertwined: markets may engage in excess labour-saving innovation (Stiglitz, 2006*b*, Stiglitz and Greenwald, 2014), leading dynamically to lower wages and more unemployment.

Recognizing the flaws in neoliberal assumptions on which standard trade doctrines are based opens up the discussion on the role of industrial policies—and how international trade rules may accommodate them. Industrial policies may enable the development of dynamic comparative advantages. Well-designed state interventions will enable dynamic

[44] Consider a case where India had, for some reason, a true long-term comparative advantage in textiles, assuming it could catch up in technology. But that would require its firms running at a loss in the short run, so it could expand and outcompete UK firms. Capital constraints mean it might not be able to do so. See Dasgupta and Stiglitz (1988). They are also reinforced if there is 'learning about learning'. See Stiglitz (1988).

productivity gains associated with sectors where learning takes place, with spillovers to other sectors.

International trading rules prohibiting industrial policies have been defended on the basis that they create a level playing field—and so subsidies were forbidden. Under endogenous innovation, the outcome of those rules is too little innovation—especially of the kind that features positive externalities. An example is the provision of subsidies to green innovation that make it less costly to adopt a new technology and redirects innovation activities of car manufacturers to electric engines. Governments have a role to play, not only in stimulating innovation in general, but also by directing innovation through targeted interventions.

Restricting industrial policies thus harms global growth and wellbeing. But it is especially harmful to developing countries. Where innovative activities occur today is likely to matter for patterns of production—for comparative advantages—in the future.[45]

(i) The revival of industrial policies in the advanced world

Industrial policy is again becoming fashionable, both in the US and in Europe; in practice it was never dead (Mazzucato, 2011).[46] The US has turned to more active industrial policy—despite a long history of criticizing such policies both at home and abroad (such as the industrial policies carried on by China)—mainly through two laws: the CHIPS and Science Act and the Inflation Reduction Act.

The CHIPS and Science Act provides funding to boost domestic research and manufacturing of semiconductors in the US. It includes funding for subsidies for chip manufacturing on US soil and investment tax credits for costs of manufacturing

[45] Governments know this. In particular, the US has come to believe this. It worries not only about its lack of capacities today, say in the manufacturing of chips, but also that China or some other country will get a technological advantage relative to the US. So, if the old rules tie the US hands, too bad for the rules. (As we noted earlier, it sometimes contends that it is doing so only because China is breaking the rules. But the industrial subsidies in the Inflation Reduction Act were clearly more directed at the need to address climate change.)

[46] It was just hidden in the Defense Department (DARPA and ARPA). Greenwald and Stiglitz (2014) argue, however, that there was an 'industrial policy' embedded in much of the financial sector regulation, e.g. concerning bankruptcy, that *de facto* encouraged derivatives and the financial sector more broadly.

equipment, as well as funding for semiconductor research and workforce training, with the main aim of ensuring a domestic supply (to contain the risks associated with the US being too dependent on foreign production of certain critical products) and countering China's competitive lead in production.[47]

The objective of the Inflation Reduction Act (IRA) is fighting global warming.[48] The Act provides funding for subsidies for American consumers who purchase electric cars assembled in the US and that have batteries relying on at least 40 per cent US input components. It also offers tax exemptions to producers of solar panels that choose to operate in the US and subsidizes green R&D activities that are being performed in the US.

The two laws constitute an industrial policy that, especially in certain provisions favouring domestic content, presumptively violates the current rules of the WTO.[49] It is already evident that the IRA has consequences for the international allocation of resources. Some companies have decided to freeze projects elsewhere and relocate to the US.

The last decade has also featured a new era for industrial policies in Europe, which are being deepened especially after Covid-19 and the war in Ukraine. In 2012, the European Commission published a new industrial policy communication that defined the objective of 'raising the share of industry in GDP from the current level of around 16 per cent to as much as 20 per cent in 2020'.[50] In March 2020, the European Commission presented a 'New Industrial Strategy for Europe' (European Commission, 2020). The key objectives were securing the supply of clean technologies and critical raw materials, stepping up investment in green research, innovation, deployment, and up-to-date infrastructure, and

[47] The US still leads in the development of advanced chips.

[48] Though its name suggested it was about reducing inflation, and there were some actions that would have had a minor affect on inflation, the bulk of its expenditures were directed at climate change.

[49] As we noted earlier, these rules ban subsidies, with certain limited exceptions, and favouring domestic production over foreign production.

[50] 'A Stronger European Industry for Growth and Economic Recovery' (European Commission, 2012).

creating lead markets in clean technologies by making more strategic use of single-market regulations, public procurement rules, and competition policy.[51]

The day after the publication of the European Commission's new industrial strategy, the World Health Organization declared the Covid-19 outbreak a pandemic. Covid-19 saw a breakdown in the borderless world without subsidies that the WTO had been attempting to construct: countries imposed barriers to the movement of goods and services, hoarding their Covid-19 resources. A few rich countries massively subsidized innovation and production of Covid-19 vaccines and other products, and then used WTO rules to create vaccine-apartheid.

Supply chain shortages and interruptions combined with geo-political tensions between the 'West' on the one hand and China and Russia heightened national security and broader risk concerns. The changes in the global environment (and especially the war in Ukraine) triggered a substantial revision of Europe's new industrial strategy, which came in May 2021. The updated strategy centred on the need to improve Europe's 'open strategic autonomy' in key areas, including health and green and digital technologies, by diversifying international partnerships, developing Europe's strategic industrial capacities, and monitoring strategic dependencies (European Commission, 2021). Since then, the issue of 'open strategic autonomy' has become central to Europe's industrial policy debate. The European Chips Act proposed by the European Commission in February 2022 sought to address the shortage of chips during the Covid-19 crisis. The Act has the objectives of improving the resilience of the semiconductor ecosystem in the EU to minimize future supply chain disruptions and increasing Europe's domestic capacity for chip production. It provides funding for subsidies for chip manufacturing plants, research and innovation policies, and measures to monitor and intervene in chip-supply crises.

It is hard to grasp the magnitude of the policy shift: from a world in which successive 'reforms' and agreements sought to create a borderless world, in which goods and capital

[51] But European policy-makers, many still wedded to the doctrines of neoliberalism, worry about how industrial policies might differentially affect different European countries. Strong restrictions on state aid have been an important part of the single-market agenda, and, going forward, this may tie their hands in developing effective industrial policies: many of the standard industrial policies may be considered off limits.

could move freely (labour was still restricted[52,53]), to one in which borders matter, and matter a lot. A mantra of free and unfettered trade was replaced with a policy goal of 'de-risking', ensuring that if there were a supply chain interruption, from a conflict, from a pandemic, or for whatever reason, the impact would be limited.[54]

VI. Analytical frameworks for international trade rules

We begin with the perfect markets benchmark (Arrow–Debreu), in which no firm or household has any economic power and in which technology is fixed (or at least not endogenous), and an international regime in which no country has any political power. We then analyse the consequences of relaxing some of its key assumptions, in particular, those concerning no 'market failure', no endogenous technology change, and no political power. We conclude with an analysis of how the optimal global solution would look in an unconstrained global equilibrium, discuss second-best options, and present a case of an (idealistic but in today's world unrealistic) environment featured by principles of solidarity.

(i) Case 1: Perfect markets

Suppose the environment corresponds to the perfect markets benchmark—there are no externalities, price adjustments are costless, there is no market power, there is a complete set of Arrow–Debreu securities, and technology is exogenous. In that environment, the first fundamental theorem of welfare economics holds—the decentralized market solution is Pareto efficient. *It would be in each country's best interest to have free trade*. Therefore, there is no need for any international trade rules.

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[52] And TRIPS had the effect of reducing the cross-border movement of knowledge.

[53] Global efficiency can be achieved (in a world of fixed knowledge) if there is free movement of all but one factor; and under some conditions, the movement of goods can serve as a full substitute for the movement of factors—the essential insight of the factor price equalization theorem.

[54] The US, in the early days of the Biden Administration, talked about near shoring and 'friend-shoring', but the latter inevitably raised the question, who did the US count among its friends, close enough friends that they could be relied upon.

The corollary is that for global agreements to be needed, there must be deviations with respect to the perfect markets benchmark. We analyse three broad deviations from that benchmark: the case of classical static market failures, an environment in which there is endogenous innovation—the case of dynamic market failures, and the case in which the existence of political power is added to the existence of static market failures or endogenous innovation. We discuss each of these deviations separately, but as we will see, they are intertwined.

An important qualification

There is a possibly important qualification to this argument, one indeed which seems to have motivated those like James Meade in the context of the original setting up of the GATT in the mid-1940s.

Suppose there are no market failures, and all markets are competitive and all countries are small. But suppose that in each country there are only two factors of production, namely labour and land. Consider a country which is land abundant—for example, Australia—and so exports land-intensive commodities and imports labour-intensive commodities. Then there will be political pressure for protection to increase the real wage of labour. In countries which import land-intensive commodities, like Britain in the early nineteenth century importing corn, there will be political pressure for protection to improve the real income of landlords. Such policy actions will lower the overall level of world welfare and, indeed, for a certain class of welfare functions, the welfare of *each* of the countries. The losses of the losers exceed the gains of the winners. There could be international trade rules to outlaw this kind of policy.

What is problematic about this argument is that it assumes that the political power of, say, the landlords in nineteenth-century UK are great enough to prevent a socially desirable policy domestically, but somehow, when the issue is put into an international context, are willing to surrender that power, and so too reciprocally, would those engaged in trade distorting behaviour in the other country. The argument is presumably that the deal, which entails the expansion of sales to the other country, offsets the losses—the resulting gains in efficiency can make everyone better off *without lump sum redistributions that would be required if one only liberalized oneself.*

But a quick look at how trade liberalization has evolved and a contemplation of how power dynamics might play out casts doubt on the general validity of this claim. Consider first the case where there are two groups, capital and labour, and that capital uses its power to distort trade to increase its market share by, say, 5 per cent in a two-country model, where the other country has a different power structure, and labour has succeeded in increasing its share by 5 per cent. Assume rough symmetry, so the 'free and fair' agreement which emerges has the two groups counterbalancing each other. Then in one country, the share of capital goes down by 5 per cent, and in the other, the share of capital goes up by 5 per cent. Whether one could achieve such an agreement depends simply on whether the magnitude of the efficiency gains are large enough.[55]

It will be even harder to achieve an agreement if there is uncertainty about the magnitude of the efficiency gains: even if in expected value they exceed the (a priori better known, in this situation) distributive effects, risk aversion could make an agreement impossible. (Even after the fact, we've had a hard time assessing with any precision the magnitude of the efficiency benefits.)

The one case where an agreement might seem to be easy is where there is a similar power structure in both countries, say capital has managed to increase its share by 5 per cent. Now, there won't be the kind of trade liberalization that Meade hoped for, but a managed trade agreement preserving capital's power: why should we expect the given power structure not to operate in the international arena in a way similar to that exercised in the domestic arena? It is possible that the distortion remains roughly the same, in which case the admittedly more limited gains from trade (from taking advantage of the economies of scale and comparative advantage) should lead to both countries agreeing, since there would be no redistributive effects, only (limited) efficiency gains from which everyone benefits. But there is an important caveat to this conclusion. Workers might have more bargaining power in this arena, e.g. if an international agreement requires a supermajority, or if there is greater suspicion of international agreements. And when the efficiency gains arise from comparative advantage, workers in the relatively more capital abundant country will realize the risk that even if the global average share of labour is unchanged, the agreement will result in a lowering of their share—and thus oppose the agreement.

[55] And recent discussions have suggested that the distributive effects have been greater than the efficiency gains (more on this in a moment; see Stiglitz (2017) and the references cited there).

Though there may exist an agreement where the capitalists accepted a lower share, in return for the benefit of the larger pie, negotiating the required concessions will not be easy, and especially so when there is great uncertainty over both distributive and efficiency effects of any concession.

It is possible (experience might suggest probable), however, that because of the way trade agreements have been negotiated in the past, capitalists in the two countries work together behind closed doors to reach a managed trade agreement which enhances their power—which increases their share of the pie, so much so that workers are actually worse off, with the distributive effects of the agreement more than offsetting the efficiency benefits. If workers sense that this might happen, they will do what they can to resist any trade agreement, i.e. even the opening up of the process of negotiations and the passage of fast track legislation in the US, which seems to have been proven to be necessary to get passage of the agreement in the end. They know that once the process is started, they lose control: their main lever is at the initial point (where, say, Congress has to pass an agreement for fast track.) This may help explain not only the Seattle protests in 1999, the attempt to stop a new round of trade negotiations, but the subsequent failure to reach a global agreement within the WTO or regional agreements.

To return to the central thesis of this paper: in an Arrow–Debreu world without market failures and power dynamics, no trade agreement would be necessary. All countries would unilaterally liberalize. In a world with no market failures but where power (politics) has distorted the equilibrium, it is possible that power could play out in a way that *even with unchanged power dynamics in place* a trade agreement which is welfare enhancing could be reached; but such an agreement would not be a free trade agreement, but a managed trade agreement, managed so that a large (distorted by the existing power balance) part of the gains went to the dominant power(s). But the sanguine view of Meade and others who dominated trade discussions in the era of GATT, of the earlier trade agreements, that trade agreements might enhance efficiency by providing deals that provided offsetting gains to each side seems pollyannish, in light of what has happened: workers were made worse off by agreements (whose effects were amplified by investment agreements) which weakened workers' bargaining position.

Our discussion of distributive effects has focused on those *within* countries, but trade agreements also have distributive effects across countries, and here again power plays out—and in ways that may make global (or even regional) agreements even more

problematic in the presence of power dynamics; for the powerful countries can and have used non-trade instruments or trade policies outside the scope of the agreement under discussion to extract trade concessions, e.g. access to IMF or World Bank funding or preferential trade treatment. The inability to rectify the imbalances and distortions (such as those associated with agricultural subsidies in the advanced countries, or to eliminate the escalating tariffs which work to preserve colonial trade patterns or to allow developing countries to have wider scope for industrial policies—precisely what the US is now doing) embedded in the Uruguay Round in the 14-year-long trade negotiations of the Development Round provides an illustration of how power dynamics plays out in practice.

Of course, we will never get a clean test of Meade's hypothesis (in the context of an Arrow–Debreu world), simply because that is not the world we live in. Rather, we live in a world with imperfect risk markets, endogenous technologies, and a host of other market failures. Factors don't move costlessly from one sector or use to another. Wages and prices exhibit nominal and real rigidities. These mean that trade liberalization itself may be welfare decreasing (as we noted even with fixed technologies, it may be Pareto inferior, a conclusion reinforced by our analysis of economies with endogenous technologies below). And the experience has been that the kinds of redistributions/actions (such as adjustment assistance) which might have ensured that trade liberalization was a Pareto improvement haven't occurred (see, for example, Autor *et al*. (2016, 2021) on the consequences of the China shock for the US, Choi *et al*. (2021) on the consequences of NAFTA for the US). Africa deindustrialized, associated with a quarter-century of stagnation. Parsing out the role of trade policy vs other policies or changes within the economy and parsing out which deviation from an Arrow–Debreu economy with no power accounts for these outcomes is beyond the scope of this paper, the intent of which is more to provide insights into the current predicament that the global rules based order seems to be in (and in doing so, provide some insights into why things have turned out so differently from the way the optimists in the early days of the construction of the rules based order had hoped).

The analysis of this section highlights a certain intellectual dissonance in the usual discussions of trade liberalization: neoliberal doctrines advocate for international trade rules that make the environment as close as possible to the perfect markets benchmark, and typically advance their economic analysis in an apolitical context, in which political

dynamics play but a limited role. The real world is otherwise. As our earlier discussion emphasized, in the absence of distorting market failures and political dynamics, no trade agreement would be necessary; unilateral liberalization would be desirable. In the presence of power dynamics, and no market failures, whether a Pareto-improving trade-liberalizing ('free') agreement is achievable is problematic, as our brief discussion illustrated. Certainly, talking about trade policy—about what an ideal trade agreement might look like—is of only limited value in a world in which power dynamics has evidently played such an important role. Nor is it very useful to ignore the market failures. In particular, the deviations from that benchmark provides a rationale for many of the deviations from free and unfettered trade. In the purely neoliberal world, there would be no point in having trade rules, other than perhaps to overcome the distortions created by power dynamics. In particular, the beggar-thy-neighbour policies associated with the Great Depression were a reflection of a deep market failure. Any rules-based system attempting to address the distortions associated with such beggar-thy-neighbour policies has to be conducted outside a neoliberal framework—which assumes away the very distortions which have given rise to the distorting policies. To do otherwise is intellectually incoherent.

(ii) Case 2: Static market failures

There are different static market failures that imply an efficiency-enhancing role of international trade rules.

Price and wage rigidities

In a world of perfect price and wage flexibility, exchange rates do not matter. A change in the nominal exchange rate would immediately be offset by a corresponding change in wages and prices, such that the competitive equilibrium is characterized by a situation in which the relative prices are equal to marginal rates of substitution between goods, and

real wages equal the marginal productivity of labour. A nominal devaluation would not entail a real devaluation of the currency.[56]

Matters are different with price rigidities. Governments could have incentives to promote policies that enable their countries to earn a larger share of the international demand. The incentives to implement those policies will be larger in situations of significant sub-utilization of the economy's factors of production. One particular case is that of beggar-thy-neighbour policies, where countries engage in competitive devaluations or impose tariffs in order to divert demand from other countries to one's own country. But if everyone acts in a similar way, no one gains, and the global equilibrium becomes even more inefficient.

In this environment, an international agreement may ensure that a reasonably efficient (*given* the rigidities) cooperative outcome emerges, preventing highly inefficient trade wars from which all lose.

Market power of corporations

There are several ways in which market power may affect incentives for trade policies. On the one hand, domestic firms may have incentives to create barriers to trade, for instance through quotas or tariffs, to increase domestic market power and profits. This is the classic argument against protectionism. As we have already noted, the country as a whole pays a price for this protectionism: while corporate profits are higher, consumers are worse off, and the losses of the consumers exceed the gains to the corporations. But politics and power don't always play out efficiently: corporations can achieve in this indirect way benefits that they couldn't get in a more transparent way, say by just asking for a corporate handout.

On the other hand, in the presence of international market power, the companies with a competitive lead will have incentives to promote free trade and gain a larger share of the international market. This may have both static (distributional) and dynamic effects.

[56] This is just the extension of the classical dichotomy to the international arena. The qualifications in doing so that apply in the closed economy (e.g. in a dynamic context, money is an asset, and so anticipated changes in nominal prices affect the demand for different assets) hold here as well.

Market power of countries

Finally, countries as a whole can be viewed as having market power. When a country is large, in the sense that it is not a price taker in international markets, the decentralized global solution may be featured by an inefficient equilibrium of 'too-high-tariffs': while tariffs would create domestic distributional consequences between consumers and domestic producers and raise the government's revenues, part of the effects would be passed to foreign exporters. But all large countries would face similar incentives, imposing a negative externality on each other. This problem can be addressed through a trade agreement—this motive is invoked as one of the fundamental motivations for the WTO system (Staiger, 2022).

Incomplete contracts and the role of 'animal spirits'

The perfect markets framework assumes complete knowledge of the full space of states and the existence of Arrow–Debreu securities, such that every possible source of risk is well identified and fully diversified according to the preferences of market participants. In such environment, there are no 'animal spirits' or expectational shocks. Changes in nominal exchange rates only have nominal consequences.

Under incomplete contractual arrangements, matters are different: changes in nominal exchange rates may have real consequences. For instance, those nominal changes may have effects on the real value of debts. When coupled with static market failures that make incomes dependent on the aggregate demand, a change in expectations that shifts the aggregate demand could create protectionist responses to decrease imports and increase local production—but this in turn decreases incomes in the trade partners, leading to a decrease in their own imports, that may be further exacerbated by similar protectionist responses.

The difference between the perfect markets case and that with incomplete contracts/imperfect set of Arrow–Debreu securities is highlighted by the Newbery–Stiglitz theorem (1984) showing that, in the absence of risk markets, free trade can make all individuals in all countries worse off. These results can be obtained in the simplest of models, e.g. with unitary demand price elasticities.

(iii) Case 3: Learning and endogenous technology

In the standard perfect markets benchmark, there is no innovation. Technology is fixed (or at least exogenous), and the full space of states is well-defined and perfectly known—it is part of the set of initial conditions. In that case, though static comparative advantage could change over time, at any one moment, static and the dynamic comparative advantage coincide.

Matters are different with learning and/or investments in R&D. We know then that the first welfare theorem doesn't hold; markets are in general not Pareto efficient (Stiglitz and Greenwald, 2014). And in such a second best world, trade liberalization may not be welfare enhancing. Indeed, it may be Pareto inferior, leading both countries to be worse off.

More generally, even with small differences in initial conditions across countries, free trade may lead to countries' productivity levels diverging. And with large differences in initial conditions (such as those that mark today's world), free trade may even ensconce neocolonial trade patterns and exacerbate global inequalities in wellbeing.

To illustrate this point, we consider a world in which there is learning-by-doing. We assume that in each period two goods may be produced: an industrial good M, that features learning by doing, and an agricultural good A, with a fixed technology. We adapt the Greenwald–Stiglitz (2006) model, where output is a linear function of labour input in each sector, there is a fixed amount of labour normalized to 1 in each country, and there are full spillovers of knowledge from one sector to the other within the country, and thus over time, there is no change in comparative advantage—but there are no cross-country spillovers. The crucial difference with Greenwald–Stiglitz (GS) is that they considered the case of a small 'infant' (less developed) country and a large economy, showing that the optimal policy for the small country was to impose trade restrictions. To simplify calculations, we assume full symmetry in the two sectors, with respect to preferences, and initially, with respect to technology.

Assume, first, that countries (firms) are myopic, and there is just a slight difference in comparative advantage. Then the firm with the comparative advantage in M specializes in M, the other in A. Consider a two-period model (the analysis holds more generally). Assume, output per worker next period in M is an increasing function of the input of labour this period, $f'(l_M) > 0$; $f(0) = 1$. Thus, in autarky, given the fully symmetric preferences, the output of (each) economy in the second period is $f(1/2)$.

But under free international trade, the country with the comparative advantage in M has an output of $f(1)$ and the country with comparative advantage in A has an output of $f(0)$. Global growth is ½$[f(0) + f(1)] > (<) f(1/2)$ as $f' > (<) 0$. With diminishing returns in learning, global growth is slowed as a result of innovation. Over time, free trade results in increasing disparities in productivities.

However, the country specializing in agriculture initially benefits from the productivity growth in the other country, because the terms of trade will shift against it. How much depends on the elasticity of demand. If, for instance, there is unitary elasticity of demand (say preferences in both countries are logarithmic), then there will be equal expenditures on both goods, so that incomes in both countries are initially the same: the A country benefits fully in the productivity in the M country through terms of trade effects. But eventually, the price of food rises so much that the M country starts to produce it: the slope of the production possibilities curve in the M country provides the limit of the increase in the price of agricultural goods. After this time, the M country produces both A and M and their incomes increasingly diverge, with the A country remaining stagnant and no longer benefiting from the terms of trade effect.[57]

Obviously, if the price elasticity of demand for manufacturers is greater than unity and the income elasticity of demand for agriculture goods is less than unity, there will be increasing disparity in incomes.

It can be shown that the results are exacerbated if firms/countries are forward-looking, for then the country with the slight comparative advantage in manufacturing will realize that its production will be even higher in the future, and therefore the learning benefits are even greater.

With learning that doesn't spill over across countries, whether from learning by doing or from research, we expect divergence, not convergence (a key implication of the Solow model with exogenous innovation), and international rules that proscribe industrial policies (either tariffs or subsidies) condemn a country with just an infinitesimal comparative disadvantage in M (and even no disadvantage in overall standards of living) to fall increasingly behind.

[57] We have now entered into the regime explored by Greenwald and Stiglitz (2006).

While an international agreement proscribing industrial policies might condemn the country with an initial disadvantage in the sector with learning by doing to ever-decreasing relative standing, the absence of international agreement could be even worse, if initially there are large differences. For then the country with a comparative advantage in M may have an incentive to subsidize M, recognizing that there may be insufficient investment in innovation. The subsidy exacerbates the differences across countries, unless the country with a comparative advantage in A subsidizes M enough to make production in its country (and thus learning) feasible. But it may not have the resources to effectively catch up—or to keep the gap between it and the other country from growing ever larger.[58]

The standard welfare theorems are predicated on their existing high levels of competition. So too, neoliberalism was predicated on there being no market power—and standard static models suggested that countries failing to have good competition policy bore the brunt of the costs, with their consumers paying higher prices.

Yet in a world with endogenous innovation, competition is typically limited; *some* market power is inevitably associated with endogenous innovation. Schumpeterian theory almost celebrated this, suggesting that competition to become the monopolist dominating the market at any moment of time not only drove innovation but led to dynamic efficiency. The key hypotheses underlying that contention have all since been disproved.[59]

There is a worry that countries that do not enforce competition policy may get an advantage over those that do; even if the total consumption of the goods produced in the oligopolistic sector is smaller, the output of *each* firm is larger, and therefore it has more incentive to innovate. This has led many countries to advocate national champions, largely putting aside competition policy in key sectors. The global marketplace that then may evolve is one with a few large firms, largely in the advanced countries, earning large rents—again contributing to global inequality. Worse still, in some cases (such as the pharmaceutical industry) large parts of the innovation rest on foundations of basic research that is publicly funded, so the oligopolies and monopolies are appropriating rents

[58] Of course, in reality, knowledge does seep across boundaries. See Stiglitz (2015).

[59] That is, competition for the market is not, in general, a good substitute for competition in the market; that the race to get a patent necessarily provides a large spur to innovation, and the monopolies to which endogenous innovation (especially with patents) gives rise are just temporary. See Stiglitz and Greenwald (2014).

that might more appropriately go to the state (the public). And over time, weaknesses in competition in these global oligopolies may lead to lower levels of innovation. There may even be a deterioration in the quality of the goods and services produced.

Unfortunately, there is no clean, unambiguous policy response of the kind that emerges in the simple, static world of neoliberalism, either at the national or international level. Our intuition is that the economic benefits of competition exceed any rewards that are to be reaped by seeking to have national champions, and that a global agreement to this effect would be of benefit to citizens globally—a view that is obviously opposed by the corporations who see themselves becoming the national champion.

If all other countries have strong competition laws, then any single country might (in a world with no trade barriers) gain an advantage by allowing a single firm to dominate its market. That firm could use the resulting scale and profits to incentivize and finance higher levels of innovation and secure an advantage over firms in other countries. Thus, it is not enough to have an agreement on competition; such an agreement has to be enforced and enforceable. Therefore, as part of a rules-based international trade regime, there is also a need for an international competition authority, which would have jurisdiction on firms engaged in international commerce.[60]

There is one action that smaller countries can take to slightly mitigate the adverse effects on global inequality: they can impose taxes on the (imputed) rents attributable to their activities within their country. Especially in the case of the new digital technologies, where marginal costs are low, such taxes would have little effect on transactions, employment, or investment.[61]

(iv) Case 4: political power, coupled with static or dynamic market failures

Power relations are critical to the determination of international trade rules. There are several aspects of these to which we call attention:

[60] Describing the detailed rules would take us beyond the scope of this paper.

[61] This is a view that has been advocated by the Independent Commission on the Reform of International Corporate Taxation (ICRICT). Not surprisingly, the advanced countries (reflecting the interests of the large tech firms) have been working for international agreements to proscribe digital taxation, which would make matters worse.

(a) Whether one should think of the interactions through the lens of a repeated game or a single play game. In a dynamic environment with power relations that are not too asymmetrical and discount rates that are not too high, cooperation might emerge as an equilibrium, but that will be less likely when time horizons for decision-makers shorten. It may also be difficult to achieve cooperative outcomes when there is too large of an imbalance in power relations, because the powerful may (perhaps in a shortsighted way) try to impose their will on the less powerful, who, resentful, won't go along.[62]

(b) Whether/the extent to which domestic political interests can be tamed, turning market power into political power, as discussed above.

(c) Enforcement and compliance, which was given short shrift in much of the policy discourse. A rules-based system includes not only rules but also mechanisms that determine the enforcement of the rules. Without a global government, there are strong limitations on enforcement, as we have seen. The powerful countries not only have a large role in the determination of the rules, but also are less subject to enforcement actions.

(d) Revision: the world is always changing, and the rules and their enforcement have to adapt. A key issue in the design of agreements is the degree of flexibility and adaptability to changing circumstances. When the rules no longer suit the powerful, they will likely seek changes, to make them better suit their interests (and in the meantime, they may not comply fully with the rules). They may have a large say too in setting the agenda for the changes in rules.

The determination of the rules depends on all the factors listed above. In a scenario in which (i) each country does not internalize the externalities that its actions creates, (ii) it is not possible to redistribute the gains from trade across countries, and (iii) power is constrained in the sense that the most powerful shape the rules but, once set, it becomes too costly to disobey the rules, the equilibrium will be such that the most powerful countries will attempt to set the international rules for trading in a way that favours themselves ex-ante. In equilibrium, there may still be rules—cooperatively arrived at rules that improve the welfare of every country relative to the 'no rules' scenario; the

[62] This is analogous to situations where in ultimatum and dictator games, too imbalanced offers are rejected, even if doing so makes the party worse off.

powerful countries (the hegemon) will design rules that ensure that they get a large share of the surplus from cooperation but are not so onerous to other countries that they refuse to sign or attempt to circumvent the agreement once signed.[63] But the agreements, reflecting the interests of the large advanced countries, will result in suboptimal investment in innovation, and innovation will be unequally distributed—technological progress will occur at a faster pace in advanced nations, and they will design rules to reduce or prevent spillovers from that innovation.[64]

An additional complexity is created if the less powerful countries believe and anticipate that the rules will endogenously affect future power. This dimension implies a trade-off between the positive effects from the spillovers of innovation that occurs in the advanced countries versus the negative effect of becoming relatively less powerful versus the hegemon(s), as the less powerful realize that current rules reinforce income disparities and that subsidies in advanced nations could create an even more unlevel playing field. The magnitude of the negative effects will in part depend on the time horizons that the policy-makers of the disadvantaged countries adopt in the trade negotiations.

Shocks also play a role for the determination of the rules and their enforcement. In a stochastic environment, shocks could affect international power relations. If the costs of changing the rules for the powerful are low enough, a rules-based system can appear seemingly adaptive: it changes according to the circumstances. But just as the powerful

[63] The nature of the equilibrium that emerges will depend too on whether the weak countries can collude, bargaining together; and the nature of the politics in the weak countries: domestic politics can be such that unless the weak countries get a sufficient share of the gains from trade, voters will reject the agreement. The powerful countries should, of course, take that into account. Whether they do is another matter.

[64] Assuming that each country's position is aligned with the preferences of its average citizen, poorer countries push for a global system that is more redistributive while the wealthier would push for the opposite. The poorer will push for global policies that maximize the diffusion of knowledge across borders while the wealthier will try to prevent that diffusion. Incentives to innovate will depend on the rules that are set in equilibrium—as highlighted in the modern Schumpeterian theory of endogenous economic growth (Aghion and Howitt, 2008; Stiglitz and Greenwald, 2014; Aghion, Howitt, and Prantl, 2015), there is a trade-off when it comes to patents and incentives to innovate: a system of patents that protects the benefits of innovation ex-post implies higher returns to innovation ex-ante, encouraging private innovation, but lower benefits from that innovation ex-post.

countries have disproportionate say in setting the rules, they may have even more say in determining their revision.

Again, there are likely to be hysteresis effects. The hegemon can on its own block a revision, even if on its own it could not today have forced the adoption of the current agreement. Thus, revisions occur only when doing so meets the desires or the needs of the dominant power. That's necessary but not sufficient: on its own, the hegemon might be unable to secure agreement, if the others see themselves disadvantaged, or simply not getting a large enough share of the gains.[65]

If the costs of adjusting rules are significant, even if the powerful countries predominantly win, the process through which change occurs will be slow. Besides, if there are rising new voices, there will be more need for compromises not to the liking of the previously dominant power. With sufficient foresight, the dominant powers will likely begin to change the rules 'early', before the rise of new powers, trading off sub-optimal rules today for rules that are better than they would otherwise be in the future, knowing that they will inevitably be revised again.

There are problems too associated with excessive flexibility of rules. Potential future competitors may anticipate that today's current powers will attempt precisely such pre-emptory changes in the rules and, knowing this, their incentives to innovate decrease, as they could see a sudden decrease in returns to innovation if they eventually get too close to being a competitive threat to a more powerful country.

Such a 'system' (or non-system) marked by what the less powerful countries would view as an abuse of power (with selective compliance, enforcement, and revisions of the rules) could create a kind of resentment that has its own externalities—a lack of cooperation in other areas that might be important for global wellbeing, and especially in areas of particular importance to the hegemon.

VII. An Analytic Framework for the Assessment of Global policy

[65] There may be a bargaining process at play, with the powerful attempting to grab for themselves as much of the surplus as they can, threatening that in the absence of a new agreement, they will simply do as they will—a reversion to the law of the jungle. The powerful may believe that the cost of delay in reaching a new agreement is accordingly greater for the less powerful. See Rubinstein (1982).

With the current architecture for global governance of international trade fraying, the question inevitably becomes, where can we go from here? And what could the rules look like in different circumstances? We analyse the global optimum within a standard framework where there are no limits to the sharing of knowledge and the redistribution of income, develop the framework of a Rawlsian perspective for the determination of the international rules, and contrast the normative framework with the intellectual property regime (TRIPS).

(i) Global optimum

In an environment in which growth is endogenous, the question that arises is how to adapt rules to promote innovation. The advancement of knowledge is a global public good—or is potentially so, if that knowledge is transmitted globally and/or the benefits are otherwise shared. If the global economy were just one political unit, if there were full knowledge of the returns to different research projects (or of the learning benefits that would accrue to each production unit and the extent to which that learning would be transferable), the optimal solution would feature globally funded investment in innovation to optimize global dynamics, that would take place in the regions where the (global social) rate of return to investments in innovation were highest, and a distribution of the benefits of innovation at the global society level—there would be no patents or other forms of IPR, research would be publicly funded, and there would be a redistribution of incomes to reflect society's social welfare function.[66]

(ii) A step towards a fair and compassionate solution: a Rawlsian perspective

[66] There are obviously further complexities in the design of an efficient national innovation system, e.g. the ability of the government to select research projects, and identify, incentivize, and finance innovators, that go beyond the scope of this paper. The absence of lump sum taxation, for instance, would affect the level of expenditures on R & D, with the amount balancing the social benefits against the societal costs of raising the necessary funds.

There are further complexities in the context of a world where the social welfare function is not well-defined. These are, for the most part, well-known and won't dwell on them here.

If current WTO rules are enforced, there is too little innovation, especially in developing countries and emerging markets; on the other hand, if they are not enforced (as is the case today) they create a discontent that will undermine cooperation in all areas.

But as our discussion above argued, in the absence of rules, with the end of neoliberalism and the way it circumscribed (but did not eliminate) industrial policies, economic divergences may increase. The rich countries have more resources to finance industrial policies, have institutional frameworks that may allow them to more successfully implement industrial policies, and because of the greater scales of their economies, they have a greater incentive to invest in industrial policies.

This divergence too may well undermine the kind of cooperation that would most facilitate the rapid adoption of green technologies; progress in reducing greenhouse gas emissions might accordingly be far slower than is desirable or possible, and that might especially be the case if IPR rules in the North enable firms there to attempt to extract rents from the South. The knowledge that that might happen might even impede the reaching of binding agreements, for those in the South would know that such agreements would entail a transfer of resources from the South to the North.

In terms of any global social welfare function weighing both global inequality and progress in containing climate change, these endogenous innovation outcomes arising in the absence of rules too would be far from optimal.

There is an alternative vision of global cooperation to the one we have provided in earlier sections where it is the powerful that determine the agreements and who decide whether they will comply with the agreements signed. That alternative is a set of rules based on how they might be written behind a veil of ignorance, before each individual in each country knew where he was to be born—thinking about the matters partially at least through the lens of Rawls, behind the veil of ignorance.[67] It is not the world of realpolitik, as usually envisaged; but recent research on cooperation shows that when allocations of the surplus generated by social interaction is too unfair, individuals will reject it, even if doing so is 'irrational' (Oosterbeek *et al*., 2004). Humans are social animals, and notions

[67] Rawls himself was hesitant to apply his methodology outside the boundaries of a country. See Rawls (1971, 1993) and Stiglitz (2024).

of fairness are deeply ingrained.[68] It is irrational not to take these insights into account, as trade negotiators often seemingly do (whatever the language they use in describing the resulting agreement as a fair trade agreement).

For purposes of this discussion, for simplicity we define a 'fair' agreement much as Nash would in the context of one which requires the assent of all and where the deviation of any would have an unacceptable outcome (i.e. unacceptably high levels of global emissions). Such an agreement allocates the surplus generated by global cooperation equally (among all individuals). We define a "compassionate" solution as one that focuses on an equalitarian preferring global social welfare function (however defined) and allocates a larger amount to those whose initial conditions were worse off. We define a feasible agreement as one that allocates enough of the surplus to each country (here, we are concerned especially with developing countries and emerging markets) that they agree to the agreement, without the exercise of threats using other instruments. All the solutions would have us designing economic arrangements that reduce, or at least do not amplify global inequities. With climate change, if we don't get full cooperation, the consequences for the earth are disastrous. One can argue that the relevant surplus to be divided is a very large proportion of global GDP.

In this paper, we aren't defining precisely what such a solution would look like. It is apparent that any potential solutions are far off. We ask, what are the minimal reforms in the existing arrangements to move us in the direction of (*a*) increasing productivity as a result of a better innovation system; (*b*) successfully addressing the green transition; and (*c*) creating rules with enough fairness and compassion that developing countries and emerging markets can agree to and support them.[69]

Fairness requires some notion of a level playing field (or more level than it would be in the absence of global agreement)—and the recognition that markets on their own are not

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[68] Surveyed, for instance, in Demeritt *et al*. (2024).

[69] Thus, this paper is written in the spirit of the 'reform' literature (e.g. in taxation), where the focus is not so much on what is the optimal system, but what changes in the system would be an improvement over the status quo. Given how far we are from the kind of social optimum described in Case 1 there are *many* reforms that are welfare enhancing. It is beyond the scope of this paper to identify which reforms are most likely to be politically acceptable (especially to the currently powerful countries and interests) and would most enhance global welfare.

only inefficient but also tilted in favour of developed countries, so that both fairness and compassion necessitate writing rules that (at least partially) offset this natural imbalance. For instance, companies in developed countries have more resources to spend on R&D and have greater scale of production, which incentivizes more R&D. US industrial policy is designed to tilt the field *even more* in its favour. That is neither fair nor equitable. Whether it is efficient is a complicated matter. But because it is neither fair nor compassionate—quite the opposite—it will likely engender opposition and enormous discontent; it cannot, other than by the use of power, be part of a global agreement, at least by itself.

Under a Rawlsian objective function, there would emerge changes in the rules relative to the status quo which would cost the developed countries little but would maintain some semblance of a level playing field.

(a) Industrial policies are permissible, and especially so in addressing a global public good, like climate change; and these industrial policies can include those that affect trade directly.

(b) Advanced countries engaging in industrial policies share the knowledge gained with developing countries, especially in areas pertaining to global public goods (such as addressing climate change) and health. This sharing entails not just the passive allowing of the use of intellectual property, but active technological transfer and assistance in increasing technological capacity.

(c) There is a sharing of the rents achieved by multinational corporations, at a minimum through systems of fair global taxation (discussed further below).

(d) Failure on the part of advanced countries to implement and enforce appropriate competition policies can provide the justification for countervailing duties (discussed further below).

(e) If the developed countries provide industrial subsidies, they provide incremental assistance (money and technological assistance) for similar purposes for developing countries.

(f) Narrow ‘green’ trade agreements (as opposed to the broad comprehensive trade agreements of the past) that incentivize developing countries and emerging markets to move forward in the green transition (by enhanced trade opportunities for green products), and preserve their ecological heritage (providing carbon storage and biodiversity for the whole world) while making it more productive.

(iii) Using the normative framework to assess reforms in the intellectual property regime (TRIPS)

Addressing climate change is a global public good; avoiding climate catastrophe is in the interests of all—but under the framework just presented, developing countries would be made to bear only a limited part of the costs of mitigation and would be allowed to reap a significant part of the benefits that might be generated through the green transition, e.g. the benefits arising from lower energy costs. This is especially so because a disproportionate part of the 'carbon' space in the atmosphere has been used up by the advanced countries. The inequity of the advanced countries having 'caused' climate change and then the developing countries having to pay a price—money for mitigation and adaptation taking away their limited resources for development; climate change hitting them hardest; and then paying rents to the advanced country for climate mitigating and adaptation technologies—is such that it will be hard to get their full cooperation on climate change[70], or the host of other areas where the US and other advanced countries seek the cooperation of others.

This section has focused on how the current rules-based system has impaired the ability of the less developed countries to catch up with the advanced countries: with endogenous technological change (and especially learning by doing and learning by investing), a seemingly neutral system not only entrenches existing differences, but exacerbates them.

We have focused our discussion on how the constraints on industrial policy imposed on developing countries in the presence of 'free trade' have inhibited the process of catching up; and even more so now that the US and Europe have embarked on their own industrial policy, seemingly in violation of the rules. But there is another part of the current international trade framework which contributes to keeping developing countries down: the intellectual property rules incorporated in TRIPS (Trade-Related Intellectual Property), which though nominally covering only trade-related intellectual property, in practice is all-embracing. While industrial policies help the country advance its own

[70] What matters, of course, for achieving cooperation is *perceptions*; and it seems clear today that large fractions in the Global South perceive matters to be as we have described them.

knowledge, and prohibitions on industrial policy thus inhibit the countries' production of knowledge, TRIPS is designed to inhibit the transfer/importation of knowledge produced elsewhere: the current rules based regime entail a two-pillar system that entrenches technological disparities.

A key part of the actions designed to create a cooperative "solution" described above is the sharing of knowledge, especially concerning green technology. One way this could be implemented is through a 'green waiver', akin to the Covid-19 waiver that more than 100 countries asked for during the pandemic. The underlying principles have already been accepted in compulsory licences, but the transactions costs associated with compulsory licences are just too great to make them effective. If there is international consensus that with a waiver for developing countries and emerging markets, there would be insufficient R&D directed at climate mitigation, then the appropriate response is for developed countries to allocate public revenues (perhaps from energy and especially fossil fuel taxes and from the reduction in fossil fuel subsidies, which globally, according to the International Monetary Fund, were $7 trillion or 7.1 percent of global GDP in 2022[71]) to subsidize such research.

VIII. Concluding comments

The current rules-based international trading system built under the tenets of neoliberalism was not designed at a time when the central global problem was climate change. The key economic models that informed what a good trade regime might look like were, to a large extent, grounded in analyses with fixed technologies, rather than a world in which endogenous innovation is central. By adopting industrial policies, the US and Europe are openly acknowledging that at least some of the rules need to be rewritten. But that will take time.

Complaints about the inequities and the dynamic inefficiencies that the system of international trading rules creates are far from new.[72] However, as bad as the current

[71] https://www.imf.org/en/Topics/climate-change/energy-subsidies

[72] Doyle (1983) summarized four decades ago the North–South debate in the following way: 'The Southern Structuralists perceive a fundamental stalemate in North–South relations. In their view, bilateral treaties

regime may be, the 'law of the jungle' which would emerge in the absence of any rules might be even worse. This paper has attempted to provide a set of analytic frameworks for thinking about a post-neoliberal rules-based trading regime, focusing in particular on the roles of power, within and between countries, how that plays out not only in the design of the rules but in their enforcement, and endogenous growth. The old system that is unravelling was not consistent with global efficiency (contrary to the assertions of its advocates), and promoted increasing disparities in incomes. We have described briefly, under a set of idealized conditions, the first-best option for the allocation of resources to promote innovation, accompanied by redistribution of resources and knowledge. This option, though, is far from either the old regime or any new regime that is likely to emerge. We have also provided a framework for evaluating alternative regimes.

Any new regime will inevitably be shaped by power. But especially as the world faces the existential climate crisis, with the need for the development and adoption of better climate technologies, the imperative of greater cooperation will become clear—and perhaps that, combined with the understanding of the inequities of the current system that the analysis of this paper has brought to the fore, will help motivate a new global regime which more closely approximates the normative ideals that we have described.

Perhaps giving further hope are two additional factors: (*a*) There is, as Adam Smith pointed out in the *Theory of Moral Sentiments,* a natural empathy towards others—though perhaps less to those outside one's country than within; there is an aversion to extreme inequities, and thus, large groups within the advanced countries have been advocating for fairer international trade agreements. (*b*) A vast literature on the dictator and ultimatum games shows that individuals do not accept allocations which they perceive to be too unfair, even when rationally they should. The knowledge of this constrains the set of acceptable cooperative allocations (more than would be the case if concerns about fairness were set aside), implying that the set of allocations that might arise will be fairer than they otherwise would be.

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and multilateral agreements in the specialized institutions have not succeeded in reforming a structurally inegalitarian world economy which distributes benefits to the North and burdens to the South.'

The objective of this paper has been to enhance our understanding of the efficiency and distributive consequences of current and alternative rules when the endogeneity of technology and power relations are taken into account. Such an understanding is almost surely necessary if we are to quickly reform our international agreements in ways which facilitates the cooperation needed for the rapid development and deployment of new green technologies, necessary in turn if we are to have a rapid transition.

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