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Agriculture's globalization:
Endowments, technologies, tastes and policies

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Abstract

The history of agricultural trade stretches back more than ten millennia, but it became more inter-continental from the 17th century and much denser in the 19th century following the repeal of Britain's protective Corn Laws in 1846 and major declines in international trade costs. Trade was chaotic in the period bookended by the two world wars, but trade policy anarchy gave way to greater certainty after the General Agreement on Tariffs and Trade (GATT) was signed in 1947. This paper seeks to identify the forces that shaped that history, and to re-examine the case for continued openness to trade in farm products. It does so in the wake of uneven economic growth and structural transformation and as agri-food systems respond to increased market and policy uncertainties this century – and to growing pressures for agricultural production to become more sustainable and for its food outputs to be more nutritious. The paper points to better policy options than trade measures for achieving most national objectives – options that can simultaneously benefit the rest of the world. Areas for further economic research also are provided in the final section.

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1. INTRODUCTION

Agricultural globalization has a long history. One manifestation of it is the extent to which its inputs and products are traded inter-continentally. Natural barriers to such trade fall following technological advances in the provision of transport, information and communication services. However, national *governmental* barriers to international trade are less predictable: they have fallen over the very long term, but around that long-run trend there have been both lengthy and short periods when trade barriers have been raised by subsets of countries.

This paper reviews the impacts of changes over the centuries in trade cost barriers to global integration of agricultural markets, and in national comparative advantages in agriculture as new technologies are embraced and preferences evolve. Their effects on patterns of trade in food and other agricultural products also are reviewed. On the supply side and given its institutions and policies, a nation's resource endowments and productivity determine the level of its income per capita, in absolute terms and relative to the global average.[i] Globalization, through trade in final products, intermediate inputs, genetic material, technologies and primary factors of production (including labor via international migration), influences the effective levels of endowments available in an economy and their productivity overall and by sector. How much a country trades internationally, and which products dominate its exports and imports, are in turn determined by its factor endowments and productivity *relative to the rest of the world's*, plus its geographic location (affecting relative trade costs), consumer preferences (affecting domestic demand) and trade-related policies (affecting domestic relative to international prices).

A focus on agriculture is warranted because, even though it is a declining sector globally, it still accounts for 27% of global employment and around three-quarters of the world's extremely poor people (World Bank, 2021), and food accounts for one-eighth of global household expenditure not counting eating-away-from-home – and 29% of expenditure in South Asia and 38% in Sub-Saharan Africa, according to the GTAP model's database for 2014 (Aguiar et al., 2019). Furthermore, in addition to providing livelihoods for farmers and others and feeding an expanding global population that may not peak before 2050, agriculture is under pressure to become more environmentally sustainable. This is because it uses more than one-third of the earth's land, two-thirds of its freshwater supply and, if forestry is included, is responsible for one-quarter of greenhouse gas emissions and much of the world's biodiversity loss.

A previous review by Alston and Pardey (2014) focuses just on the supply side of agriculture in the global economy since 1960, ignoring the demand side and international trade. Another overview focuses on what agricultural globalization means for food and nutrition security in developing countries and thereby for the world's poor (von Braun and Díaz-Bonilla, 2008). Yet another survey, by a geographer, critiques the most recent globalization wave's impact on agriculture, weighing its perceived negative attributes against its better-known positive attributes (Robinson 2018). The present review is timely in two respects: because those doubts about the virtu,es of globalization are being voiced more, and because the global trading environment has become more uncertain over the past two decades.

Climate change is altering agricultural comparative advantages and making it more difficult for food production to keep up with the long-run trend rate of global food demand growth; and it is increasing the frequency and magnitude of short-term weather-related shocks to farm supplies that add to the annual toll of natural disasters affecting agriculture and food security (FAO, 2021b). How markets, technologies and national policies will respond to climate change also is very uncertain. China's lowered economic growth rate and greater assertiveness/economic coercion under President Xi is adding to that uncertainty, as are the global rise of economic nationalism and populist protectionism and the spread of COVID-19.

Four indicators illustrate these trends in the global trading environment. One is an index of global economic policy uncertainty, which rose during the global financial crisis (GFC) and has been rising further since 2016 (www.policyuncertainty.com). Another is the steady rise, following the GFC, in the value of world trade facing new measures that reduce imports net of those removed (Evenett and Fritz 2021). A third and related indicator is the rise in populism during the past decade (Eichengreen 2018; Funke, Schularick and Trebesch, 2021). Guriev and Papaioannou (2021) report that the share of academic publications with the word populism or populist in the title or abstract was 50% higher in 2008-16 than in 1999-2007, but was almost five times higher by 2017-18. And a fourth indicator is the recent rise in civil wars and repression (Besley, Dann and Persson, 2021).

The paper begins by reviewing the origins of agricultural globalization including the pre-19th century role of international trade in farm inputs and technologies. It then re-visits the case for openness to trade (Section 3), and the drivers of the evolution of agricultural comparative advantages as economies grow (Section 4). Section 5 summarizes trends in agricultural trade restrictions and their trade effects before and then following World War II. Section 6 focuses on fluctuations around trend in trade restrictiveness as national governments seek to stabilize domestic food markets, particularly in the wake of international price volatility from the early 1970s. Section 7 summarizes the implications of economic growth and policy interventions for global farm trade flows since 1960. Section 8 draws together the paper's findings and their implications for prospective initiatives in the light of recent disruptions to global trade and the greater uncertainties that are affecting agricultural trade. It concludes by listing areas for further economic research.

2. ORIGINS OF AGRICULTURAL GLOBALIZATION

Agriculture is the world's oldest industry. The move from hunter/gatherer to the domestication of crops and animals for food and beverage production began in the Near East and (in the case of rice) China around 8500 BC or possibly earlier (Zohary, Hopf and Weiss, 2012). Trade in those products was initially limited to local exchange but, in the millennia since, long-distance agricultural trade (both intra- and inter-national) has gradually expanded its contribution to global economic growth and poverty reduction. Ancient Greece exported olives to many Mediterranean ports, enriching it and benefitting its trading partners. The capture of Egypt by the Roman Empire caused its grain prices to plummet and its wealth to soar. Then caravans of camels along the Silk Roads provided pathways for trade in luxury products (most notably silk fabric) between East Asia, South Asia, the Middle East, Central Asia and Europe (Frankopan, 2015).

It is only in recent centuries that there has been substantial inter-continental trade in farmers' outputs across the Atlantic and Pacific oceans. That was made possible initially by concentrating trade not on the bulky outputs from farming – whose long-distance trade costs were prohibitive until the 19th century – but rather on farm inputs. Most notable among those

inputs are crop seeds or cuttings, breeding animals, and farm production technologies and know-how. Those farm inputs and technologies were gradually spread well beyond their place of origin, which was mostly in the Fertile Crescent. Indeed the Near East/Western Asia region was the origin of most of today's major foods apart from rice (thought to have been first domesticated in the Yangtze Valley in China – see Molina et al., 2011). They include apples, barley, domestic cattle, chickpea, ducks, goats, honey bees, horses, olives, pigs, and sheep, wheat and winegrapes (Hirst, 2014; McGovern, 2003). Their initial diffusion to other regions was the result partly of migrants from the Fertile Crescent becoming coastal colonists in the Mediterranean Basin (Zeder, 2008), and partly of adaptation in those colonized settings.

The process of colonization and agricultural development began on other continents from the 1500s. Mostly it involved inputs and financial capital and technology transfers from Europe to their peripheral colonies. However, some of the plants and animals that originated in the Americas became globally significant. They include bean, cocoa, cotton, groundnut/peanut, maize, manioc/cassava, rubber, squash, sunflower, sweet potato, tobacco, tomato, and white potato. There are also a few that originated in Africa (coffee, millet and palm oil), a few in Asia (most notably banana, coconut, oat, orange, rapeseed, rice, soybean and tea), plus one from Oceania (sugar cane, which is thought to have been first domesticated in New Guinea around 8000 BC).

The migration of people, plants and animals was not without some human and ecological devastation. Indeed in some locations, whole communities died from disease transmission (Diamond, 1977; Crosby, 2003; Nunn and Qian, 2010). Numerous exotic weeds became pests too, as did insects attached to imported plants (e.g., Phylloxera in grape vines – see Campbell, 2005). However, those negative contributions from trade in domesticated plants and animals and their products were minor relative to the enormous contribution agricultural trade made to the quantity and quality of world supplies of food and fibre.

The complementarity between knowledge of local growing conditions on the one hand, and new crops and animals and associated technical knowhow on the other, led to very substantial output growth. That was greatly assisted by the domestic and international transmission of new crop varieties (Olmstead and Rhode, 2007, 2011; Beddow and Pardey, 2015), which in turn supported population growth. So even though this exchange of farm inputs may not have accelerated GDP per capita or caused commodity prices to equalize across countries prior to 1800, it improved agricultural output and national food security in many countries (Jones, 2002, Ch. 4). Perhaps the most notable beneficiary country is China, where four major crops from the Americas (maize, groundnut, sweet potato and white potato) were being cultivated within a century of Columbus' voyages. Being dryland crops, they did not stress the country's irrigation capability but rather encouraged the conversion of forests to arable land. Jones (2002, p. 55) notes that this globalizing impact contributed to the world's population increasing about 120% between 1500 and 1800, compared with only 18% between 1200 and 1500.

There was a so-called agricultural revolution in Britain from the late 17th century, but its biggest impacts were delayed until the industrial revolution delivered machinery and chemical fertilizers that caused farm productivity growth to accelerate from 1830 (Allen, 1999). The labor-saving nature of the new technologies made them also applicable in land-abundant, labor-scarce New World countries, where intra-national transport and communication costs also were plummeting thanks to steam trains. Hence once maritime freight cost began to diminish from 1870 with the move to steel-hulled ocean steamships, inter-continental agricultural trade was set for take-off. This allowed primary products (which were then mostly agricultural) to continue to dominate international commerce even while trade in manufactures was rapidly expanding.

Since 1800, the ever-lowering cost of international commerce gradually allowed more trade in farm outputs in raw or processed form to be added to long-distance trade in farm inputs. The development of the steamship played a crucial role in making intercontinental trade cheaper. Harley's index of British ocean freight rates, which was relatively constant between 1740 and 1840, dropped by about 70% between 1840 and 1910 (Harley, 1988). This dramatic decline was mirrored on sea routes worldwide (Findlay and O'Rourke, 2003; Jacks, Meissner and Novy, 2010). On top of that, the increasing speed of ocean transport has implied cost savings additional to those indicated by freight rate data, especially for perishable products. That has led to the prices of farm and other products converging across countries, and hence to relative factor prices also converging (Jacks, 2006). As additional evidence of the fall in transport costs, O'Rourke and Williamson (1999) point to the huge declines in commodity price gaps between Europe and both America and Asia between about 1840 and World War I. However, trade costs remain a major barrier to food trade in Sub-Saharan Africa, where they are five times the average of those in the rest of the world (Porteous, 2019).

In addition to its contribution to that long-run decline in food price gaps across continents, trade between countries has been hugely important also in offsetting short-term seasonal shortfalls in food availability (both within and between years). That had the potential to make famines a thing of the past, were they not still being deliberately contrived by national leaders for local political purposes. Examples of the latter in the 20th century include Ukraine in 1932-33 (Conquest, 1986; Markevich, Naumenko and Qian, 2021), Bengal in 1943 (Sen, 1981; Ravallion, 1987), Korea during the Pacific War (Johnston, 1953) and China in 1958-62, during what was ironically called the Great Leap Forward (Lin, 1990; Dikötter, 2010; Yang, 2021).

With lowered transport costs, and the ever-rising incomes of consumers that raise the demand for variety in all things including foods, plus the emergence of modern supermarkets to satisfy those demands, one might expect the range of products available in food markets to have grown exponentially over the past two centuries. That indeed has happened in terms of the *number* of processed food items available in large affluent cities. Even so, in 2018 just a dozen basic foods accounted for 70% of the gross value of agricultural production, 71% of the calorie intake, and 58% of both the protein and fat consumed by the world's population, and the next eight foods raised the value share to four-fifths (Table 1). The top dozen are three grains (wheat, rice and maize), three meats (pork, poultry and beef), two edible oils (from soybean and oil palm), plus eggs, milk, white potato and sugar (FAO, 2021a). The top 20 basic farm products could not have become so dominant in the world without international trade in agricultural inputs/technologies or their products, given the small number of regions of the world from which those key species originated. Certainly other fresh fruits and vegetables plus a plethora of processed foods supplement our diets and provide important micronutrients, but only a small number have become ubiquitous (apple, banana, orange and tomato).

(insert Table 1 around here)

This convergence on a few food items globally is not inconsistent with the contention by Stigler and Becker (1977) that, if all products could be traded around the world costlessly, and if there were no government interventions distorting consumption or trade such that the retail price of each food was the same in every jurisdiction, the key reason for major differences in consumption patterns would be differences in per-capita incomes. That is, Stigler and Becker contend that as incomes per capita converge, then so too will national consumption bundles as natural and governmental barriers to trade diminish – even as the range of products available within each nation expands. However, there are still vast

differences in the effective consumer prices of food across countries (Headey and Alderman, 2019).

A few more high-valued unprocessed products began to be exported to Europe from the 17th century, including spices, tea, coffee, cocoa, cotton, tobacco, plus (from the West Indies) sugar and rum (Irwin, 1991). But it took Britain's industrial revolution to launch large-scale inter-continental trade in farm products, thanks to the steam engine lowering hugely the cost of transporting bulky products by rail, rivers and sea. Agricultural trade was further helped by the development of refrigeration from the late 19th century and, in more-recent decades, of bulk super ships and then air freight services that allowed fresh perishable products to be traded over long distances for the first time.

That lowering of trade costs generated gains from greater national specialization in production of certain export crops, and it extended the seasonal availability and the quality of perishable foods for consumers. In recent decades it has even opened up the possibility for two consuming seasons per year of annual temperate fresh perishables, given the lowered cost of maintaining food safety and quality while transporting food between the northern and southern hemispheres.

Even so, many people remain skeptical of international trade in food, and some are strongly opposed to it ('buy local'). The reasons are various but are commonly to do with health and environmental concerns. Not surprisingly, farm groups take advantage of those concerns to bolster their pleas for protection from import competition. It is important, therefore, to rehearse the case for continued openness to trade in farm products in the wake of uneven economic growth and structural transformation as agri-food systems respond to increasing market and policy uncertainties and to growing pressures for agricultural production and distribution to become more sustainable and its food outputs safer and more nutritious.

3. RE-VISITING THE CASE FOR LIBERAL TRADE

It has been well understood for millennia, at least since Plato's *Republic*, that trade between two entities can be beneficial to both. The reason why that applies to countries was made very clear just over two centuries ago by Ricardo (1817) with his theory of comparative advantage. Yet most countries have restricted their international trade in farm (and other) products at various times.

Openness to trade is not a guarantee of economic growth, but no national economy has enjoyed long-run growth without being engaged in foreign trade and investment (Irwin 2020). While there is no widely accepted theory of economic growth, common elements of sustained growth experiences include openness to world markets for goods, services, capital and technologies/knowledge stocks, and allowing markets to play a role in resource allocation, consumption and investment. Other critical contributors to economic growth are macroeconomic stability, high rates of savings and productive investment, strong political leadership and governance and, in particular, managing distributional aspects of growth patterns to put boundaries on inequality in its various dimensions (Spence, 2021). The last of those elements – ensuring growth is inclusive – implies it would not be wise for highly protectionist nations to open up overnight; rather, to avoid a counter-productive political backlash, it would be best for any trade policy reform to be phased in over a gradual and pre-announced timeframe. Keeping that in mind, this section rehearses the widely accepted reasons for allowing openness along with complementary policies to facilitate growth while reducing natural resource stresses, poverty, food and nutrition insecurity, and inequalities in income, wealth and health.

3.1 Standard gains from trade arguments

Liberal cross-border trade multiplies gains from production specialization and market exchange. Those gains from trade can come simply from exchange when preferences differ even if the people or regions involved are otherwise identical. And they can come from production specialization when relative factor endowments or technologies differ, from intra-industry trade when seasons or product qualities or varieties differ, and from increased competition from abroad driving down monopolistic pricing domestically. The gains from production specialization are especially great where there are economies of scale, and more so as global value chains increase in importance. By raising the variety of products available to consumers, openness boosts diet diversity and food safety and quality, the demands for which rise with per capita income.

Openness to trade is more important the smaller a country (Limão and Xu, 2021). This is because without it there is less scope for specialization in production to exploit economies of scale, more scope for monopolistic pricing, and less likelihood that a weather shock (e.g. to crops) in one part of the country will be countered by an offsetting shock in the rest of the country. Openness is thus much more important now than at the end of the first globalization wave not only because weather shocks are greater and more frequent thanks to climate change, but also because in 1914 there were just 58 sovereign states (Gancia, Ponzetto and Ventura, 2018) before empires were split up while today there are nearly four times that number.

These standard arguments for openness have been brought into question at various times, but welfare economists have shown most such criticisms to be unfounded. This is because typically superior domestic policy measures can deal more efficiently and equitably with those concerns than can a border trade measure (Bhagwati, 1971; Corden, 1997). Specifically, so long as complementary first-best domestic policies are in place for encouraging accumulation of various forms of capital (natural, human, knowledge, financial, physical), for providing public goods, and for offsetting local environmental and other externalities and risks, trade openness will be welfare-maximizing for all economies unable to influence their international terms of trade.

These arguments apply also to countries with an element of monopoly power in the international marketplace. While it is true that empirical studies suggest some countries have market power in at least one good (Broda, Limão, and Weinstein, 2008), that power cannot easily be exploited by taxing the country's trade if other countries can retaliate (Johnson, 1953-4). The General Agreement on Tariffs and Trade (GATT) and now the World Trade Organization (WTO) were designed at the outset to minimize such trade tax 'wars' via their most-favored-nation and reciprocity Articles, and by the WTO's dispute settlement mechanism that limits infringement retaliation to no more than a proportionate response. With these institutions in place, even large economies are incentivised to not exploit their market power, to the great benefit of smaller economies and the world as a whole (Bagwell and Staiger, 1999, 2002; Staiger, 2021).

In the past it has often been claimed that in poor countries, taxing trade is the lowest-cost way of raising essential government revenue. As countries develop though, the capacity of the state to rely more on income taxes than on trade taxes gradually improves (Besley and Persson, 2011; Besley, Dann and Persson, 2021; Arezki, Dama and Rota-Graziosi, 2021). Moreover, countries with the weakest tax capacity can begin trade liberalization by replacing an import tariff with a consumption tax of the same magnitude which, even if collected only at the border, would raise the same revenue. Any subsequent imposition of that new tax on domestically produced goods and services would add to treasury funds.

This century has underscored a further reason for openness. It is the vastly increased scope to separate in time and space the various productive tasks along each product's value chain, thanks to the information and communication technology (ICT, or digital) revolution. Firms are increasingly able to take advantage of factor cost differences across countries for specific tasks without having to sacrifice gains from product specialization or move the whole of their production operation offshore where the risks of intellectual property theft may be greater. This includes trade in services, which goes alongside and facilitates trade in most goods (Liu et al., 2021), including farm products (OECD, 2021b).

While unilateral trade sanctions have proven over many decades to be very ineffective in harming a small target country in a multi-country world when there is no retaliation (Hufbauer et al., 2009), the damage can be much larger when the world's largest economies so engage and especially when they retaliate in kind. As well, sanctions plus retaliation raise trade policy uncertainty, which has heterogeneous adverse effects on export participation across income groups, being higher for countries with low-quality institutions and in the presence of global value chains (Osnago, Piermartini and Rocha, 2018).

There is an important exception to the above gains-from-trade arguments, however. It has to do with environmental externalities and how they – and policy responses to them – can spill over to other countries and the global commons. International transport is one polluting contributor: its direct damage is small, but it contributes also indirectly by facilitating the relocation of pollutive production and consumption (Cristea et al., 2013). Whether the damage from greater transportation when importing food is more or less than the pollution from producing abroad instead of locally is an empirical question. In the comprehensive global study by Avetisyan, Hertel and Sampson (2014), transport costs are shown to be important in the case of dairy products but, overall, environmental benefits from differences in domestic emissions intensities of production outweigh transport costs in about 90% of the country/commodity cases they examine, undermining the food miles/eat local argument.

There are cases where trade measures have been used to entice countries to join an international abatement agreement (Copeland, Shapiro and Taylor, 2021; Borchert et al., 2021), but there are also cases where removing current trade barriers and subsidies could improve the global environment (Anderson and McKibbin, 2000, Shapiro, 2021, Laborde et al., 2021). An important influence on the outcome in the case of renewable resources is the extent to which property rights are attached to those resources and how well markets for them or their services are regulated in each jurisdiction, as for example with forests (Ferreira 2004; Place, Meinzen-Dick and Ghebru, 2021), water (Debaere, 2014) and fisheries (Erhardt, 2018).

The gains from opening an economy are greater if that opening is accompanied by a freeing up of the market for foreign currency exchange so its real exchange rate can move freely in response to international price or domestic market shocks (or a trade reform), as that ensures producer and consumer incentives change promptly in a way that smooths the adjustments required and thereby continue to maximize national economic welfare (Atkin and Khandelwal, 2020).

3.2 Dynamic gains from openness

The above comparative static arguments are strengthened when links between trade and economic growth are added. Econometric evidence regarding the impact of trade reform on economic growth were critiqued in a survey by Rodríguez and Rodrik (2001). In the two decades since then, researchers have tried to overcome the various methodological problems that plagued earlier studies (e.g., Estevadeordal and Taylor, 2013). A new survey by Irwin

(2019) finds trade reforms to have had a consistent positive impact on economic growth on average, although the effect is not uniform across countries.

Channels through which openness to trade boosts innovation and an economy's growth rate include the scale of the market when new knowledge is embodied in the products traded, the degree of redundant knowledge creation that is avoided through openness, and the effect of knowledge spillovers (Keller, 2021). More-open economies also tend to be more innovative insofar as that involves greater trade in intellectual capital, in addition to greater competition spurring innovation and thereby productivity growth through creative destruction of low-productivity firms by the most-productive firms (Feenstra, 2018; Akcigit and Melitz, 2021; Melitz and Redding, 2021).

Dynamic welfare gains from trade can occur even in countries that specialize in non-innovative, low-technology sectors. They occur not from production but via consumption: innovation in high-tech sectors in the rest of the world lowers the price of those sectors' output and thus improves the international terms of trade of the less-innovative countries. This is a specific example of the more-general point that open economies benefit from the growth of other open economies with complementary trade specialization via the effect the latter has on the international terms of trade.

Whatever the degree of openness between national economies, an additional global dynamic gain can come from lowering uncertainty in the trade environment. One of the great benefits of the WTO has been that its member states agree to legally bind their import tariffs such that traders can be confident that they will pay no more than that ceiling rate, or otherwise have the right to be compensated. China's accession to the WTO at the end of 2001 also reduced uncertainty in global trade for both China and its trading partners (Handley and Limão, 2017) – something the current US-China tariff 'war' is undoing.

3.3 Looking beyond aggregate national output and consumption effects of openness

Despite all the above benefits, critics of openness and globalization have raised various concerns (e.g., Stiglitz, 2017; Helpman, 2018; Rodrik, 2020), and have pointed to the need to address them seriously if populist contenders are to be kept from reversing past trade liberalizations. The main criticisms have to do with income, wealth and health distributional consequences, plus environmental outcomes.

The current globalization wave has seen a massive decline in the incidence of global poverty (Atkinson, 2019; Ravallion, 2020), ill-health (Deaton, 2013), and inequality of incomes across countries (Milanovic, 2016). Yet much has been made of the rise of income and wealth inequality *within* countries during the current globalization wave (Stiglitz, 2012; Bourguignon, 2015), and the lack of improvement in self-accessed well-being or happiness (Layard 2020) – notwithstanding the simultaneous massive declines in absolute poverty and ill-health nationally and globally. An example of such concern is the persistence of inequality within both the urban and rural sectors in China and the continuing high level of overall inequality in that country (Rozelle and Hell, 2020; Ravallion and Chen, 2021). Empirical evidence vindicates the Corden (1997, pp. 72-76) notion of a conservative social welfare function in revealing that governments choose policies that help to avert losses for significant groups from exogenous shocks (see Freund and Ozden, 2008), including food price shocks (Meyimdjui and Combes 2021). This concern with within-country inequality has stimulated more theoretical and empirical research on not only the distributional effects of trade policy reforms (Goldberg and Pavcnik, 2007, 2016), but also on their electoral consequences (Alesina et al., 2020).

Evidence surveyed by Ravallion (2016) suggests aggregate economic growth differences have been largely responsible for the differences in poverty alleviation across

regions. Initiatives that boost economic growth are therefore likely to be helpful in the fight against poverty, and trade liberalization is one such initiative. But cuts to trade barriers also alter relative product prices domestically and in international markets, which in turn affect factor prices. Hence their net effect on poverty depends also on the way those price changes affect poor households' expenditure and their earnings net of remittances and taxes. Where the consumer and producer price changes (whether due to own-country reforms and/or those of other countries) are pro-poor, they will reinforce any positive growth effects of trade reform on the poor.

Simulation studies show that reforms to the agricultural policies of high-income countries could provide a major source of developing country gains from trade reform. Such reform would boost the demand for unskilled labor and for farm products produced in poor countries. Since more than two-thirds of the world's poor live in rural areas (World Bank 2021), and since many poor rural households are net sellers of farm labor and/or food, one might expect such reforms to reduce the number in absolute poverty. A set of analyses reported in Anderson, Cockburn, and Martin (2011), in which global and national CGE model results are carefully combined with household income and expenditure survey data for nearly a dozen developing countries, found strong support for that hypothesis in most of the country case studies considered.

Also under scrutiny are the effects of international trade on the natural environment and resource sustainability (Copeland, Shapiro and Taylor, 2021), including via agricultural trade (Baylis, Heckelei and Hertel, 2021). Greenhouse gas emissions, biodiversity loss, and biosecurity concerns are the main foci of multilateral negotiations (Fan et al., 2021). Future trade analyses will need to draw on models that integrate economic and environmental systems, so as to anticipate future policy demands of left-behind groups and the complementary policy adjustments that might be needed in response.

Before turning to assess appropriate policies for dealing with these societal concerns, it is necessary to understand how comparative advantages and trade specializations are changing and how past trade-related policies have responded and contributed to those developments and ultimately to agriculture's globalization.

4. EVOLVING COMPARATIVE ADVANTAGES IN GROWING ECONOMIES

A review of the theory of comparative advantage (Section 4.1) is helpful for assessing the evidence of changes in agricultural comparative advantages and trade specializations since the 1960s (Section 4.2).

4.1 Theory

One of the best-known facts about growing economies is that their farm sector's shares of GDP and employment tend to fall over time. The reasons for those declines in a closed economy are well-known: low and falling income elasticities of demand for food (Engel's Law) plus rapid advances in farm production technologies mean that the domestic prices and quantities of farm relative to nonfarm products fall.

It is less obvious that the farm sector of a small *open* economy—especially one with an abundance of farm land relative to other primary resources, labor, and other forms of capital—would have to face a relative decline as its economy grows. The fact that it nonetheless almost always does has to do with the rising demand for nontradable goods and especially services as incomes rise. Being nontradable, enough of those products can be produced only by drawing mobile resources from sectors producing tradables. Thus

agriculture's shares of national GDP and employment tend to fall with the expansion even of open, land-abundant economies. They would do so at rates that are influenced also by relative rates of factor accumulation and differences in sectoral rates of productivity growth.

Agriculture's share of national *exports* depends on the country's comparative advantages, however, and so need not fall as the world economy expands. If a country's trade costs fall faster than the rest of the world's, and if its farm products gain more from that development than its nonfarm products, the country may strengthen its agricultural comparative advantage over time.

If the stock of natural resources is unchanged, rapid growth by one or more countries relative to others in their availability of produced capital (physical plus human skills and technological knowledge) per unit of available labor time would tend to cause those economies to strengthen their comparative advantage in non-primary products (Leamer ,1987). By contrast, a discovery of minerals or energy raw materials would strengthen that country's comparative advantage in mining and weaken its comparative advantage in agricultural and other tradable products, ceteris paribus. It would also boost national income and hence the demand for nontradables, which would cause mobile resources to move into the production of nontradable goods and services, further reducing farm and industrial production (Corden, 1984).

Most countries begin the process of economic growth with high trade costs and hence with the vast majority of people engaged in producing the basic necessity of staple food. As the productivity of off-farm labor improves with industrial capital accumulation or importation, an increasing number of workers are attracted to manufacturing and service activities—what Lewis (1954) simply called the modern sector. Lewis assumed that labor was more productive in the modern sector than in the traditional (mainly subsistence agriculture) sector, which leads one to expect the share of the population employed in agriculture to decrease. As trade costs fall or governmental trade restrictions are removed, the country would develop a comparative cost advantage in unskilled labor-intensive, standard-technology tradable manufactures and services. Then, as the stock of industrial and urban human capital per worker grows, there would be a gradual move toward producing and exporting manufactures and services that are relatively intensive in their use of physical capital, skills, and knowledge.

Agriculture's share of GDP would decline slower if total farm productivity growth outpaced that of other sectors—a possibility Schultz (1964) envisaged more than Lewis (1954) and Matsuyama (1992), and as in fact happened for a large sample of countries during 1967-92 (Martin and Mitra, 2001) and in particular for high-income countries during 1970-2007 (Herringdorf, Rogerson and Valentinyi, 2013). So if resource-rich economies invest relatively more in capital (including new technologies) specific to primary production rather than in industrial capital, they would not develop a comparative advantage in manufacturing or services until a later stage of development, at which time their exports from those sectors would be relatively capital-intensive. This is all the more likely if new technologies developed for the primary sector become increasingly labor-saving as real wages rise—leading potentially to what are known as factor intensity reversals, whereby a primary industry in a high-wage country can retain competitiveness against a low-wage country by adopting capital-intensive new technologies.

Factor intensity reversals can occur also in non-farm activities. That can impact the prospects for out-migration of workers from agriculture to non-farm jobs in a low-wage country. For example, suppose that country's large manufacturing firms adopted capital-intensive technologies from high-wage countries. It may generate productivity growth without employing many more people, especially if in doing so the small informal firms using traditional labor-intensive techniques become less competitive within that sector.

Trade patterns are affected also by growth in domestic demands, insofar as tastes or preferences are non-homothetic (Markusen, 2013, Matsuyama, 2019). Food has an income elasticity of demand of less than one, for example. Although this eventually slows the decline in comparative advantage in farm products in resource-poor emerging economies, the rate at which it does so is affected also by consumers switching from staples to higher-valued foods, including intensively fed livestock whose domestic production can be boosted by imported technical knowledge and animal feedstuffs. Consumers also trend away from raw to processed foods and increasingly to highly competitive supermarket chains (Reardon et al., 2003; Reardon and Minton, 2021). As incomes get even higher, consumers look to healthier foods, and want to ensure their production and transportation does minimal damage to the natural environment and to animal welfare. In some cases they want plant-based or laboratory-based alternatives to animal products, especially red meat and cow milk from methane-emitting animals (Rausser, Sexton and Zilberman, 2019). In addition, high-income countries have aging populations, and older people have greater demands for services, many of which are nontradable. This is a further reason to expect agriculture and other sectors producing tradables to shrink as mobile resources are pulled into the expanding nontradables part of the services sector as an economy becomes more affluent (Cravino, Levchenko and Rojas, 2019).

Greater affluence in high-income countries and emerging economies has spurred growth in international trade in mass tourism, allowing airlines and ocean cruise companies to enjoy economies of scale and, through competition, pass them on to consumers. Many small tropical island developing countries have benefitted greatly, generating very strong comparative advantages in tourism services that have eclipsed their traditional comparative advantages in tropical agriculture and horticulture.

4.2 Evidence

Given the differences in relative factor endowments across countries (Table 2) and in national per capita incomes and economic growth rates, this theory of sectoral changes and evolving comparative advantages is consistent with global empirical evidence on changes in sectoral shares of GDP, employment, and exports (Anderson, 1987, Anderson and Ponnusamy, 2019). It has also been used successfully to explain the 20th-century flying geese pattern of comparative advantage and then disadvantage in unskilled labor-intensive manufactures as some rapidly growing economies expand their endowments of industrial capital per worker relative to the rest of the world—the classic example being clothing and textiles. The theory also is consistent with the greater importance of agriculture in some New World settler economies such as Australia. With the help of newer trade theories, it is also able to explain the fall in markups on import-competing farm inputs with opening up (Curzi, Garrone and Olper, 2021), plus intra-industry trade (including in farm products) and the contribution to productivity growth of opening up (Feenstra, 2018).

(insert Table 2 around here)

The shares of agriculture and food in national merchandise exports since the 1960s are reported in Table 3. Globally that share has fallen from around 50% prior to World Wars I and II (Federico, 2005) to 30% in the early 1960s and to just under 10% since 2000 (or 7% excluding processed food), while for developing countries (including India) it has fallen from about two-fifths in the 1970s to a little above 10% in recent years. The fall for China has been far more dramatic though: from more than 50% in the 1960s to just 3% in the most-recent decade. That fall is much faster than occurred in Japan (but similar to the speed of decline two decades later in South Korea and Taiwan, whose shares were still above 50% in 1960), and its impact globally is much larger because of China's huge population.

(insert Table 3 around here)

By contrast, in North America and Australasia the share of farm and processed food products in exports has fallen only by half since the 1960s, and it has fallen even less in Western Europe, such that for all three of those regions it is still above the global average. That is, those high-income countries still have a 'revealed' comparative advantage in agricultural and food products at least as strong as developing countries as a group (Table 4).

(insert Table 4 around here)

Meanwhile, many small island developing economies that were initially colonized to provide tropical agricultural product to the metropole have since developed a comparative advantage in tourism services to satisfy the rapidly growing market provided by airlines and cruise ships. This is reflected in the final column of Table 5.

(insert Table 5 around here)

The Balassa (1965) index of 'revealed' comparative advantage reflects only export flows. To get a more-complete picture, it helps to examine also the index of agricultural trade specialization: the ratio of net exports to the sum of exports plus imports of farm products. It thus ranges between -1 and +1 and is zero if a country is exactly self-sufficient in aggregate. It is shown in Table 6, and reveals several important trends. Both South America and Southeast Asia have remained consistently net exporters of farm products since the 1960s, and India has been a net exporter since its Green Revolution boosted its grain production after the 1960s. Africa, by contrast, has gradually become more dependent on agricultural imports, having been a net exporter in the 1960s and 1970s. China was able to remain a net exporter during its first two decades of openness, but has become increasingly dependent of imports of livestock feedstuffs since the turn of the century. Meanwhile, among the high-income countries there is a complete range of agricultural trade specialization, from very high import dependence in northeast Asia (despite high farm protection) and the Middle East to a gradual fall in import dependence in the European Union (thanks to its protective Common Agricultural Policy and its stimulus to innovation), and continued export strength in North America and especially Australasia.

(insert Table 6 around here)

The European Union's data are worth disaggregating into primary agriculture and processed farm products. Excluding intra-EU trade from EU and world trade, Table 7 shows that this bloc in 2014 had a 'revealed' comparative advantage (RCA) index of below 0.5 for (and was a net importer of) primary goods, but its RCA index is 1.0 for (and it was a net exporter of) processed food, beverages and tobacco. By contrast, the opposite is true for developing countries, and for other advanced industrial countries. This reveals that it is possible for high-income countries to be internationally competitive in processed food even if not abundant in farm land. Further disaggregation would reveal that the EU's competitiveness is focused on high-priced processed foods and beverages. The high prices for some of those products, however, are the result of standards introduced to satisfy a segment of consumers with preferences for a growing array of credence attributes including organic, locally produced, and raised using humane livestock and poultry practices. Those intended benefits need to be weighed against the costs those standards impose, including their negative contributions to efficient resource use and the alleviation of malnutrition and hunger in the countries imposing them, plus the loss of export sales for foreign producers (Rausser, Sexton and Zilberman,, 2019).

(insert Table 7 around here)

Of course trade patterns are also affected by trade-related policy developments. We next summarize two centuries of such developments that have impacted the evolution of actual patterns of trade in farm products, before turning to disruptive 21st century developments.

5. POLICY DEVELOPMENTS AFFECTING LONG-RUN TRENDS IN AGRICULTURAL TRADE

5.1 Pre-World War II

The globalization wave preceding World War I saw substantial liberalization of international trade, including in farm trade and initiated by the repeal of Britain's Corn Laws in 1846 – which, according to a new study by Irwin and Chepeliev (2021), benefitted the rest of the world as much as Britain due to its influence on their international terms of trade. In 1860, the signing of the Cobden-Chevalier Treaty liberalized trade between Britain and France. That bilateral treaty contained a most-favoured-nation (MFN) clause which required any agreed cut in the tariff on each item in the bilateral trade to be applied also to their imports from other countries. It also meant that every European country that subsequently signed a bilateral trade treaty with either Britain or France (and most had done so by 1867) signed onto MFN. The systemic effect of the 1860 Anglo-French accord was thus of much greater significance than its importance to either country alone, as it led to a network of treaties that lowered hugely the average level of import tariff protection, including on farm products. During 1860-1913 the world thereby enjoyed relative serenity in terms of international trade and monetary relations. Even though economic growth then was proceeding at less than half the post-World War II pace, it was very rapid by previous standards, as was international trade growth.

However, just when many of the European trade treaties were reaching their expiry date (nearly fifty of them were to expire in the first half of the 1890s), economic difficulties were making their renegotiation contentious. Tariff wars ensued, so that the threat of retaliation – which had served as a deterrent to raising tariffs – was no longer a constraint on trade liberalization reversal. Even though MFN was retained, relations were strained by the absence of bindings on tariffs (to prevent backsliding), of constraints on non-tariff trade-distorting measures, and of legal means to resolve disputes. Furthermore, the unwillingness of the United States or others to adopt the unconditional MFN principle meant the sustainability of the European commercial policy achievements of that period was far from certain. Indeed, the treaty regime ended abruptly with the outbreak of World War I in 1914.

Post-war efforts to restore liberal trade centred on international conferences. However, despite the rhetoric in support of open markets, those meetings did not lead to renewed trade treaties with binding commitments to openness based on MFN. With no country willing or able to replace Britain as the hegemon, there was trade policy anarchy (Kindleberger, 1989). When economic recession and low agricultural prices hit in the late 1920s, and the US introduced the Smoot-Hawley tariff hikes of June 1930, governments elsewhere responded with beggar-thy-neighbour protectionist trade policies that together helped drive the world economy into depression (Hynes, Jacks and O'Rourke, 2012; Jacks and Novy, 2020). The volume of world trade shrunk by one-quarter between 1929 and 1932, and its value fell by 40%. Over the entire inter-war period both agricultural and other merchandise trade grew hardly at all. According to Federico (2005, page 22-29), world exports of both agricultural and non-agricultural goods declined by 0.8% per year between 1925 and 1938, and real prices of farm (and other primary) products in international markets slumped following their highs during World War I. That decline in international prices of primary products nudged Prebisch (1950) and Singer (1950) to advise developing country governments to encourage industrialization relative to primary production, the adverse impact of which took decades to erode (Irwin 2021).

The first attempts to reverse the growth in protection were discriminatory, benefitting Europe's colonies at the expense of other trading partners. Thus between 1929 and 1938 the share of imports from colonies rose from 30 to 42% for Britain, from 12% to 27% for France, and from 20% to 41% for Japan (Anderson and Norheim, 1993). By the end of the 1930s protectionism was far more entrenched than in the late 19th century when only non-discriminatory tariffs had to be grappled with. Indeed nontariff trade barriers were so rife as to make tariffs redundant and hence a return to MFN irrelevant unless and until 'tariffication' of those barriers occurred. For agriculture that took until the World Trade Organization came into being in 1995.

5.2 Post-World War II

Out of the interwar trade policy experience, many in Britain and the United States were convinced that liberal world trade required a set of multilaterally agreed rules and binding commitments based on non-discriminatory principles. After much negotiation, that led to the General Agreement on Tariffs and Trade (GATT). It was signed in 1947 by 23 trading countries – 12 high-income and 11 developing – who at the time accounted for nearly two-thirds of the world's international trade. The GATT provided a forum to negotiate subsequent tariff reductions and changes in rules, plus a mechanism to help settle trade disputes. Eight so-called rounds of negotiations were completed in the subsequent 46 years, as a result of which many import tariffs on at least manufactured goods were progressively lowered in most high-income countries. Global merchandise trade grew faster in the half century following the coming into force of the GATT than in any other half century in history.

The last of those GATT negotiations, the Uruguay Round (1986-94), culminated in numerous agreements to further reduce trade barriers over the subsequent decade. Two of those agreements involved, for the first time, a serious attempt to liberalize agricultural trade and discipline sanitary and phytosanitary (SPS) trade measures. Another agreement involved the GATT's Secretariat in Geneva being replaced by the World Trade Organization (WTO) in January 1995, the membership of which now involves 164 countries/customs territories that account for more than 97% of world trade. By the end of the implementation of the Uruguay Round, the extent to which different farm products were imported or exported still varied enormously across countries and products (Table B.8 of Anderson 2009). Even though differential trade costs would explain part of that variance across products, it nonetheless suggests there may still be plenty more scope for further liberalization in the 21st century.

Agricultural trade grew much less rapidly than trade in other goods in the 20th century, partly because of the fall in agriculture's share of global GDP (to 3%, down from more than 50% not much earlier than 1900), and partly because of the recent fragmentation of industrial production into ever-more processes and the associated rapid expansion in the number of international links in their global value chains (Antràs, 2016; Baldwin, 2016). But also contributing to relatively slow farm trade growth is trade-restricting policies.

5.3 Long-term growth in and then gradual decline of barriers to agricultural trade

The lack of strong GATT disciplines on agriculture's trade-related policies allowed two separate developments in farm policies between the 1950s and the 1980s: agricultural protection growth in high-income countries (especially Japan and the European Community), and agricultural export taxation in low-income countries. Nearly all of the assistance to Japanese and European farmers in that period was due to restrictions on imports of farm products. But assistance then rose markedly in the early 1980s, generating a surplus that was

being disposed of with the help of export subsidies and which triggered a North Atlantic food export subsidy 'war'.

Meanwhile, developing countries had been heavily discriminating against their farmers. A major World Bank study of 18 developing countries by Krueger, Schiff, and Valdés (1988) shows that the depression of incentives facing developing-country farmers from the 1960s to the mid-1980s had been due partly to various forms of agricultural price and trade policies, including subsidies to food imports as well as taxes on farm exports, and partly to developing countries' nonagricultural policies that hurt their farmers *indirectly*. The two key indirect measures were manufacturing protectionism (which attracts resources from agriculture to the industrial sector) and overvalued exchange rates (which attract resources to sectors producing nontradables, such as services).

A more-comprehensive World Bank study two decades later (Anderson, 2009, 2010) covers 45 developing countries (using the WTO members' self-nominating classification) but also 13 European transition economies as well as 24 high-income countries. Its results reveal that there have been substantial reductions in distortions to agricultural incentives in both high-income and developing countries over the past three decades (Figure 1(a)). This is also clear from three decades of producer and consumer support estimates by the OECD (2021a): the nominal rate of agricultural protection for the 36 OECD member countries (mostly high-income economies) fell from 46% in 1986-88 to 26% in 2000-02 and 9% in 2018-20. However, for 12 (mostly large middle-income) emerging economies, the OECD estimates that their nominal rate of assistance (NRA) for farmers rose on average from 1% in 2000-02 to 4% in 2018-20.

[insert Figure 1 around here]

That improvement in farmers' incentives in developing countries is understated, however. This is because those countries have also reduced their assistance to producers of non-agricultural tradable goods, most notably manufactures. The relative rate of assistance to farmers (RRA) for developing countries as a group went from -46% in the second half of the 1970s to just above 0% in the first decade of the current century (Figure 1(b)). This increase (from a coefficient of 0.54 to 1.01) is equivalent to an almost doubling in the relative price of farm products in developing countries – a huge change in the fortunes of developing-country farmers in just one generation (Anderson, 2009, Anderson and Nelgen, 2013).

However, for several reasons the reform process is far from complete. First, progress has not been uniform across countries and regions, particularly among developing countries: an average RRA for that group of close to zero hides the fact that some in that group of countries have RRAs well above zero and others less than zero. That is, some developing countries have "overshot" in the sense that they have transitioned from having an average RRA that was negative to one that is positive, rather than stopping at the welfare-maximizing rate for a small economy of zero. Second, even if a country has a zero RRA, that may be because the nominal rates of assistance (NRA) for its agricultural sector is the same as the weighted average of that for its other goods-producing (most notably manufacturing) sectors, both of which may be positive. Third, many countries still have within their agricultural sector a wide dispersion in NRAs for different farm industries. In particular, all countries have a strong anti-trade bias in the structure of assistance within their agricultural sector.

More specifically, while the average NRA for agricultural exporters in developing countries has been negative throughout (but coming back from -50% in the 1960s and 1970s to almost 0% in 2000-10), the average NRA for import-competing farmers in developing countries has fluctuated around a trend rate that has risen from 10% to 30% (and it even reached 40% in the years of low international prices in the mid-1980s). That anti-trade bias is further confirmed by the fact that while average import tariffs have come down over the past 25 years, they are still high, and higher for agriculture than manufacturing, with the

agricultural tariff average for developing countries is well above that for high-income countries; and non-tariff measures restricting both exports and imports are far more prevalent for farm products than for mining or manufacturing products (WTO 2021). Furthermore, more-recent estimates reveal that there are still some African countries that directly discriminate against their farm sector (Pernechele, Balié and Ghins, 2018). All this suggests that export-focused farmers in many developing countries continue to be discriminated against in two respects: (1) by the anti-trade structure of assistance within their own agricultural sectors, and (2) by the protection from imports that remains for farmers in other – especially developing – countries and thus limits both South-North and South-South trade. Together these estimates indicate that resources employed within the farm sector of each country and globally are still a long way from being put to their best use.

As for public investments assisting the agricultural sector, an important component is public agricultural R&D, which has had major influences on long-term trends in agricultural comparative advantages. Those investments fell during 2000-02 to 2018-20 from 1.12% to 0.82% of the gross unassisted value of production of the 54 countries monitored by the OECD (2021a). There are two important caveats though. One is that private investments in agricultural R&D have grown dramatically and now exceed public investment (if food processing is included); the other is that developing countries, particularly Brazil, China and India, are rapidly increasing their share of global investment in agricultural R&D (Pardey et al., 2015; Fuglie, 2016). Meanwhile, investment through the Consultative Group on International Agricultural Research fell by more than one-fifth between 2015 and 2019 (Alston, Pardey and Rao 2021). What could change going forward is the willingness of countries to allow the production (or at least importation) of genetically modified and gene-edited products, as those new biotechnologies have great potential to accelerate farm productivity growth (Nes, Schaeffer and Scheitrum, 2021) – something that one prominent anti-GMO protester (Lynas, 2018) has since come to realize and admit.

As for payments to farmers for resource conservation and providing environmental services, this has grown to a significant contribution in Switzerland and the EU, but it shows up only a little in the US and Norway and is very minor or non-existent in all other countries For the OECD as a whole, it amounts to well under 2% of the gross value of agricultural production (OECD, 2021a). Given that there are sometimes positive externalities associated with environmental services, these expenditures may be less than what is optimal from a national welfare or willingness-to-pay viewpoint.

6. SHORT-TERM POLICY RESPONSES TO MARKET VOLATILITY

The growth in agricultural protection to the mid-1980s added to a R&D-induced downward trend in real international farm product prices following the Korean War in the early 1950s, with the developing countries' export taxes only partly offsetting that effect (Tyers and Anderson, 1992). Those prices flat-lined for the last 15 years of the 20th century, before rising dramatically for a combination of demand, supply, and policy reasons. One of the policy contributors was the emergence of biofuel subsidies and mandates in both the United States and the EU, just at a time when fossil fuel prices were rising for a decade from the early 2000s. But policy responses to food price rises have exacerbated the situation. Although agricultural trade policies were officially all converted to tariffs following the Uruguay Round, many of the legal bindings on tariffs were set well above actual applied rates, allowing considerable flexibility to adjust protection rates down or up without breaching the limits imposed by these ceiling commitments to the WTO membership. That allows many

countries' policymakers to seek to stabilize their domestic prices relative to world market prices by varying the protection or taxation rates applied to agricultural trade in the short run.

Such insulating behavior may make sense for a small individual country if no other countries reacted, but such thinking involves a fallacy of composition. This is most easily seen by considering a case where each country's price is linked to the world price and each country responds in the same way to an increase in world prices. If a tightening of world market conditions raises world prices by $10, and all exporters offset this by applying a $10 export tax while all importing countries lower their import duties by $10 for the same reason, the combined impact is a rise in world prices of $20 instead of $10. Thus domestic prices rise by the same $10 they would have risen in the absence of this collectively ineffective intervention. This is similar to all people in a stadium standing up in the forlorn hope of getting a better view of the playing field.

The extent to which that type of impact occurred during the global financial crisis is shown by Martin and Anderson (2012) and Jensen and Anderson (2017) using annual data and by Giordani, Rocha and Ruta (2016) using monthly data. It also occurred following the food price spike in the early 1970s and the price slump in the mid-1980s (Anderson and Nelgen, 2012). In those environments, only countries that insulate by more than the average have any hope of stabilizing their domestic prices using this strategy.[ii] In practice, by becoming less integrated into the international grain market it is possible that domestic markets become *more* unstable in the medium term – as found for wheat in Russia and Ukraine (Götz, Glauben and Brümmer, 2013) and for maize in Africa where imperfect implementation diverted trade into the informal sector (Porteous, 2017).

Slumps in international prices can trigger the opposite government reaction, to protect domestic farmers from a drop in the price of their output. For food-importing countries that can be in the form of a higher tariff or quantitative import restriction, and for food-exporting countries in the form of export subsidies. The use of such measures in the mid-1980s by the EU and North America was one of the reasons the Cairns Group (made up of 15 non-subsidizing agricultural-exporting countries) insisted on the GATT's multilateral Uruguay Round phasing down both import tariffs and export subsidies.

Another important form of agricultural trade policy response for staple foods—frequently observed in Africa—focuses on actual or perceived shocks to domestic supply. When domestic outputs of maize or other key staples are expected to be below normal levels, export restrictions are often imposed or state-traded imports are brought in. Such sporadic policy responses tend to destabilize many domestic and international markets, and frequently reduce food security by focusing on the availability of food rather than on the more economically relevant ability of vulnerable groups to access food (Sen, 1981). A recent example is for maize in Zambia, which added to poverty because the poorest households were net sellers of maize (Koo, Mamun and Martin, 2021).

These two reasons for governments to alter border restrictions (to insulate the domestic market from international price volatility, or to ensure enough supplies in the wake of a domestic production shortfall) are likely to be invoked more in future insofar as climate change adds to market instability. That suggests there will be a greater need to extend WTO disciplines on import restrictions and export subsidies to cover also export restrictions in future, to avoid the futile 'standing-up-in-the-stadium' practice seen in 2008-11 or the export subsidy 'war' of the mid-1980s. Yet some developing countries continue to call for special safeguard measures that would allow them to use temporary import price- or quantity-triggered restrictions at their discretion, in spite of analyses showing why they will be ineffective (Hertel, Martin and Leister, 2010; Ivanic and Martin, 2014).

7. IMPLICATIONS OF ECONOMIC GROWTH AND POLICY INTERVENTIONS FOR TRADE FLOWS

Economic growth and associated structural transformations have been shown to be strongly associated with the long-run trends in policy interventions described above (Anderson and Hayami ,1986; Anderson, Rausser and Swinnen, 2013). Together these developments have been key drivers of changes in global farm trade patterns. Specifically, the phasing down of both agricultural protection in high-income countries and agricultural disincentives in developing countries mean that there is now much greater exploitation of comparative advantages in global food trade than in the 20th century.

Those policy developments have contributed to the changes showing up in the FAO's agricultural trade data: in the early 1960s, the top 20 exporting countries accounted for 65% of global agricultural trade but by the turn of this century the top 20's share was 78%. Together with faster income growth in developing countries, it shows up in the switch in the importance of developing countries in global trade in farm products: their share of exports rose from two-fifths in the early 1990s to three-fifths by 2019 if intra-EU28 is excluded. When intra-EU28 trade is included, the rise is even faster, from one-third to almost one-half during this century's first two decades (Figure 2).

[insert Figure 2 around here]

However, many developing countries gained more of a comparative advantage in mining or manufacturing as they opened up and grew, leading to more trade specialization such that the developing countries' share of global imports of farm products has risen as fast as their export share (Figure 2). These changes mean that agricultural trade negotiations among WTO members are likely to now include more of a focus on South-South and South-North trade instead of just North-North trade as tended to be the case in the GATT's multilateral trade rounds.

Trends in various developing countries' net exports in farm products (exports minus imports), shown in Figure 3, reveal the rapidly changing situation over the past two decades. During that time, the value of global agricultural trade has increased from just over US$430 billion in 2000 to almost $1500 billion by 2019. Latin America's increasing export prominence is clear, as is that of Southeast Asia. Sub-Saharan Africa, by contrast, has remained a slight net importer of farm products. China and India were both close to trade balance in farm products until early this century, but since then they have diverged: India has become a variable net exporter, while China has become an ever-more significant net importer. In the 2010s, an average of 60% of China's net imports of farm products has been maize and soybean, mainly for pork and poultry feedmixes, and another 6% has been dairy products as ever-more-affluent Chinese consumers seek to boost their protein intake.

[insert Figure 3 around here]

Agricultural exports as a percentage of primary agricultural value added globally averaged 10% in the lead-up to the new millennium, but by 2019 it was just 7.5%. This contrasts with that for manufacturing rising from just under 70% to more than 90% over the first two decades of this century. Meanwhile, for all goods and services (including the many nontradable government services), that share has risen from an average of just under 20% in the 1980s and 1990s to 30% in the 2010s (World Bank, 2021). When food, beverages and tobacco manufacturing are considered, however, agriculture looks considerably more dynamic. Value added data are not available for that sub-sector globally, but the FAO provides estimates of the gross value of production of all agriculture and processed food. Global exports of that aggregate were just 26% of the gross output value in the 1990s, but averaged 32% in the 2000s and 35% in the 2010s (FAO, 2021a). That is, while raw farm product trade is not expanding relative to farm production, the propensity to trade processed

food, beverages and tobacco is growing quite rapidly – and it slowed down much less in the 2008 global financial crisis than did trade in other manufactures. However, the EU dominates processed food exports and developing countries are net importers of such products (Table 7).

8. RECENT DISRUPTIONS TO GLOBAL TRADE AND WAYS FORWARD

The hyper-globalization of the first two decades of this millennium, plus the global financial crash of 2008 and China's re-emergence on the world stage, have contributed to a swell of anti-globalization sentiment this century. Adding to these concerns are the digital revolution, climate change, biodiversity loss, and water and biosecurity/food safety issues, not to mention the COVID-19 pandemic in 2020-21. Populist national political responses have included key countries withdrawing from multilateralism and imposing 'temporary' protectionist import tariffs and other trade sanctions, adding substantially to global market and policy uncertainty.

Even though globalization and trade opening are often blamed for increased disruption to and uncertainty in markets, much is due to on-going structural changes that accompany economic growth and to which new technologies and innovations are major contributors. Yet key societal concerns are the trade impacts on such things as inequality of income, wealth and health, unemployment, poverty, and damage to the natural environment and its resources. The COVID-19 pandemic has added to inequalities and reduced interest in cross-border activities.

If trade *per se* is not the main reason for these disliked outcomes, then a trade policy instrument is unlikely to be the first-best response and might even worsen the situation, as might poorly targeted agricultural subsidies. Even so, the task for governments challenged with demands to meet multiple policy objectives is becoming more complex as the voices of ever-more single-focused interest groups become louder via the megaphone of social media, and as concerns for the global commons grow.

Three standard pathways for national governments to reduce agricultural price- and trade-distorting interventions in the light of this century's disruptions to and uncertainties around global agricultural and food markets are canvassed in this sub-section: multilateral, preferential and unilateral.

There has been much less enthusiasm from national governments to cooperate multilaterally this century than there was in the second half of the 20th century. With the relative decline of the US as hegemon and no other country or bloc yet able to substitute for it, we now have a less stable multi-polar world. Yet for addressing global problems such as climate change, biodiversity loss and epidemics, multilateral cooperation is precisely what is needed to get to efficient solutions promptly. Unfortunately US President Trump failed to see the win-win possibilities offered by the WTO, and his unilateral actions against other countries' trade triggered retaliation. Meanwhile, China's President Xi has chosen to use economic coercion via trade measures to intimidate smaller nations. Both countries' actions have further eroded trust in the global trading system. But now that Trump is not in the White House there is again value in exploring ways to bring the most-recent trade concerns the US, EU and others have raised about unfair trading practices to the WTO with the aim of resolving them multilaterally. Since one of the thorniest sectors to deal with at the WTO has been agriculture, Cahill et al. (2021) have suggested new pathways for agricultural negotiations that, if taken up, could re-invigorate other parts of the WTO's long-inactive Doha Development Agenda.

Bilateral or regional preferential trade agreements (PTAs) can assist the multilateral trade negotiation process. For example, they can explore new ways of deepening the integration of markets more easily than can negotiations involving all 164 members of the WTO, easing a path for the more successful of those ways to be subsequently added to the WTO's agenda

(Fernandes, Rocha and Ruta, 2021). However, the deeper the integration agreement the less likely others will join (Maggi and Ossa, 2021). Historically, PTAs have delivered few cuts to agricultural subsidies and tariffs in addition to diverting trade against outsiders (Bureau, Houssein and Jean, 2019).

If generating more multilateral cooperation or PTAs to reduce trade restrictions and uncertainty proves to be difficult, the world nonetheless will be better off the more nations unilaterally resist imposing greater trade regulation – and not just in efficiency terms but also in terms of reducing inequality and especially poverty, food insecurity, malnutrition and ill-health. Even in the face of targeted tariff hikes or economic coercion, retaliation by the adversely affected countries would only add to their losses if it does not lead to removal of the offending measures. Rather than protectionism, the best option for governments dealing with anti-globalization and environmental issues is to directly target the market frictions and market failures that lead to inefficiency, inequality, social immobility and environmental damage.

Specifically, to reduce the risk of back-tracking on the trade reforms of recent decades, attention should turn to strengthening the measures that will make firms and households more resilient in the face of uncertainties, and more assured that optimal domestic policies and institutions are in place to deal with externalities and to supply needed public goods – including meeting expectations to contribute to global public goods such as mitigating climate change and biodiversity loss. For example, taxing GHG emissions would initially add to costs of production, and more in agriculture than in most other sectors, but it would also potentially stimulate new environmentally friendlier technologies. That could provide other income streams for some landholders in the form of carbon sequestration options or the provision of priced ecosystem services.

For those countries becoming more food import-dependent as their comparative advantage moves away from agriculture, slowing that process by raising food import barriers worsens rather than improves their national food security and nutrition, since it raises food consumer prices and thus reduces economic access to food for the vast majority of households who are net buyers of food. As well, protecting net sellers of farm products from import competition is a very inefficient and inequitable way of assisting those farmers as it helps them in proportion to their marketed output—and thus boosts the incomes of the biggest/least-needy farmers most. It also boosts landowners' wealth in proportion the size of their holding. A far more efficient way to assist today's farmers is to reduce any underinvestment in rural infrastructure (to lower transport and communication costs involved in getting farm products to market) and in agricultural R&D (to lower farmers' costs of production or raise the quality and thus price of their product). Both can benefit consumers as well as producers. If that were not enough support for the poorest farm households, a generic social safety net e-payment, such as a conditional targeted income supplement, could suffice.

Should greater multilateral cooperation not only in trade but also in climate change and biodiversity be achieved, it would have important implications for agriculture as governments adjust national policies so as to optimally satisfy numerous social objectives simultaneously. In particular, the welfare cost of deviating from the most appropriate instruments or their optimal intervention levels will become more difficult to assess. This suggests the need for more-sophisticated analyses of policy options for governments to consider. Methodologies for solving this multiple objectives problem are now being developed, and appear to be tractable (see, e.g., Martin, Ivanic and Mannum, 2021; Bellanger et al., 2021). They are starting to be used also to encourage governments to re-purpose farmer assistance policies away from growth-inhibiting and environmentally damaging agricultural price supports and towards environment- and health-enhancing measures. Thus further research is needed to assist the search for politically, administratively and fiscally feasible

solutions, as proposed by the World Bank and IFPRI (2021), Mamun, Martin and Tokgoz (2021) and Searchinger et al. (2021).

Such policy-focused research and empirical open-economy analysis by economists can assist governments more, and have more-lasting impacts, the better analysts understand from the outset the political economy forces at work both domestically and abroad (Swinnen, 2018; Grossman and Helpman, 2021). After all, long-standing agricultural and other policies that distort markets persist not because of the economic illiteracy of policymakers but as a consequence of asymmetries in political power and costs of collective action between those groups gaining and those losing from a measure. It is a recognition of those political forces that is driving analysts to look for ways to re-purpose farm-support measures such that the well-being of a broader range of groups in the rest of the society is improved without reducing greatly the welfare of currently supported farmers.

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Table 1: Shares of key foods in the global gross values of agricultural production and exports, and in global calorie, protein and fat intake by consumers, 2018 (%)

	Calorie intake	Protein intake	Fat intake	Production value	Export value[a]
Wheat	18.6	16.4	2.6	3.9	3.2
Rice	18.0	9.9	1.7	7.2	3.4
Maize	5.3	3.8	3.0	5.7	2.4
Pork	5.3	4.6	11.7	10.5	2.3
Poultry	2.1	5.4	4.2	15.2	2.8
Beef	1.3	3.5	2.6	10.0	4.3
Soybean	3.3	1.3	10.2	2.3	6.5
Oil palm	2.3	0.0	7.6	0.8	2.4
Milk	4.9	8.6	11.4	7.9	3.4
Egg	1.3	2.9	2.7	2.6	0.4
Sugar	6.8	0.0	0.0	2.0	2.6
White potato	2.1	1.5	0.1	2.2	0.9
Sub-total	**71.3**	**57.9**	**57.8**	**70.4**	**34.6**
Barley	1.3	0.5	0.0	0.6	0.8
Sheepmeat	0.4	0.7	0.9	1.8	0.6
Groundnut	1.4	1.2	3.8	0.8	0.3
Rapeseed	1.1	0.0	3.8	0.8	1.4
Tomato	0.4	0.6	0.2	2.2	1.0
Apple	0.4	0.1	0.1	1.2	0.6
Banana	1.0	0.4	0.1	0.9	0.9
Orange	0.3	0.2	0.0	0.6	0.8
Total of above	**77.6**	**61.6**	**66.6**	**79.4**	**40.9**

[a] Export shares include lightly processed items, but not highly processed foods in which the above items may have been ingredients. In 2018, agricultural raw materials accounted for only 15% of exports of all agricultural and processed food, beverages and tobacco (World Bank 2021).

Source: Author's compilation drawing on FAO (2021a).

Table 2: Per worker endowments of agricultural land, mineral resources, and other capital, and GDP per capita, various countries and regions, 2014 (percent of world)

	Agricultural land per worker[b]	Mineral resources per worker[b]	Other capital per worker[a,b]	GDP per capita[b]
Japan	25	1	359	350
United States	115	117	629	503
Australia	192	1509	476	571
Sub-Saharan Africa	72	36	10	17
All developing Asia	103	64	33	37
China	*132*	*53*	*51*	*71*
India	*75*	*19*	*11*	*14*
Latin America	134	118	70	91
M East+N Africa	112	3086	26	108
World	100	100	100	100

[a] Other capital refers to non-natural produced (including human) capital.
[b] A percentage of the world average, based on value in US dollars at market exchange rates.

Sources: Author's compilation drawing on Lange, Wodon, and Carey (2018) and, for population and the share of the population employed, World Bank (2021).

Table 3: Shares of agricultural and food products in total merchandise exports, major country groups and world, 1960 to 2018 (%)

	1960s[a]	1970s	1980s	1990s	2000s	2010s[a]
All high-income countries	*23*	*16*	*13*	*12*	*8*	*9*
Japan	8	3	2	1	1	1
Korea, Rep.	35	13	6	4	2	2
Western Europe	17	14	13	12	10	11
United States and Canada	28	25	20	14	12	13
Australia and New Zealand	84	54	45	36	37	38
All developing countries:	*na*	*na*	*26*	*15*	*11*	*12*
China	51	41	20	12	4	3
India	42	36	24	14	12	13
■ All upper middle-income	na	41	24	15	10	11
■ All lower middle-income	na	na	28	18	14	15
■ Low-income	60	39	29	22	25	na
World	**27**	**21**	**16**	**12**	**9**	**10**

[a] 1960s is 1961-69, except for China which is 1965-69 (from Anderson 1990). 2010s is 2010-18.

Source: Compiled from World Bank (2021).

Table 4: Indexes of 'revealed' comparative advantage in agricultural and manufactured goods,[a] 1961 to 2019

Agric and food goods:	1960s[b]	1970s	1980s	1990s	2000s	2010s[b]
All high-income countries	*0.8*	*0.7*	*0.8*	*0.9*	*0.9*	*0.9*
Japan	0.3	0.2	0.1	0.1	0.1	0.1
Korea, Rep.	1.3	0.6	0.4	0.3	0.2	0.2
Western Europe	0.6	0.7	0.8	1.0	1.1	1.1
United States and Canada	1.0	1.2	1.2	1.2	1.3	1.3
Australia and New Zealand	3.0	2.6	2.9	3.1	4.3	3.8
All developing countries	*na*	*na*	*1.6*	*1.4*	*1.1*	*1.1*
China	2.1	2.0	1.3	1.0	0.5	0.3
India	1.6	1.8	1.7	1.6	1.3	1.3
■ All upper middle-income	na	2.0	1.6	1.3	1.1	1.1
■ All lower middle-income	na	na	1.8	1.5	1.6	1.5
■ All low-income	2.2	1.9	1.8	1.9	2.9	na
Manufactured goods:						
All high-income countries	*1.2*	*1.2*	*1.1*	*1.1*	*1.0*	*1.0*
All developing countries	**na**	**na**	**0.5**	**0.8**	**0.9**	**1.0**
■ Upper middle-income	na	0.4	0.5	0.9	1.0	1.0
■ Lower middle-income	na	na	0.6	0.6	0.6	0.5
■ Low-income	na	na	0.1	0.1	0.1	na

[a] The 'revealed' comparative advantage index in agricultural (or manufactured) products is the share of agriculture and food (or other manufactures) in national merchandise exports as a ratio of that sector's share of global merchandise exports, hence 1 for the world (Balassa 1965).
[b] 1960s is 1961-69, except for China which is 1965-69 (from Anderson 1990). 2010s is 2010-18 for agriculture.

Source: Compiled from World Bank (2021).

Table 5: Top 30 countries by 'revealed' comparative advantage[a] in agriculture, mining, manufacturing, and services, 2014

Agric+Food		Mining		Non-food manuf		Services	
Malawi	8.35	Angola	6.07	Bangladesh	1.65	Bermuda	4.60
Guyana	7.90	Algeria	5.76	China	1.65	Macao	4.55
Benin	7.81	Kuwait	5.70	Botswana	1.55	Grenada	4.36
Paraguay	7.49	Nigeria	5.67	Slovak Republic	1.53	Palau	4.32
Burkina Faso	7.18	Brunei Daruss.	5.58	Czech Republic	1.50	Maldives	4.25
Cote d'Ivoire	7.02	Saudi Arabia	5.24	Mexico	1.44	Antigua&Barbuda	4.23
New Zealand	6.65	Oman	5.20	Korea, Rep.	1.40	St. Kitts and Nevis	4.19
Uruguay	6.14	Mongolia	5.17	Japan	1.37	Sint Maarten	4.18
Ethiopia	5.98	Azerbaijan	5.13	Viet Nam	1.37	Cabo Verde	4.15
Argentina	5.87	Qatar	5.06	Germany	1.34	Aruba	4.15
Burundi	5.73	Kazakhstan	4.99	Slovenia	1.33	Dominica	4.05
Moldova	5.38	Sierra Leone	4.84	Italy	1.32	French Polynesia	4.05
Zimbabwe	5.29	Guinea	4.83	Hungary	1.31	Vanuatu	3.94
Nicaragua	5.25	Zambia	4.62	Switzerland	1.24	Luxembourg	3.93
Honduras	5.22	Bolivia	4.62	Poland	1.23	St. Lucia	3.91
Fiji	4.55	Russia	4.18	Thailand	1.18	Timor-Leste	3.87
Uganda	4.49	Niger	3.87	Israel	1.17	Malta	3.84
Ecuador	4.48	Colombia	3.84	Pakistan	1.17	St. Vincent&Gren.	3.77
Guatemala	4.44	Dem. Rep. Congo	3.67	Tunisia	1.15	Sao Tome&Principe	3.75
Tanzania	4.38	Rep. of Yemen	3.66	Austria	1.14	Samoa	3.72
Belize	4.38	Bahrain	3.64	Romania	1.14	Cyprus	3.62
Brazil	4.13	Mozambique	3.51	Macedonia	1.14	Bahamas	3.58
Kiribati	4.09	Mauritania	3.48	Turkey	1.14	Lebanon	3.58
Mauritania	4.01	Trinidad&Tobago	3.47	Cambodia	1.12	Montenegro	3.54
Senegal	3.54	Australia	3.36	Belgium	1.10	Tonga	3.52
Ukraine	3.15	Peru	3.34	Philippines	1.08	Djibouti	3.49
Chile	3.13	Norway	3.33	Hong Kong	1.06	Afghanistan	3.29
Iceland	2.98	Ecuador	3.15	France	1.02	Curacao	3.28
Costa Rica	2.97	Chile	3.14	El Salvador	1.01	Jamaica	3.14
Myanmar	2.91	Cameroon	2.62	Malaysia	1.01	Nepal	2.85

[a] The index of "revealed" comparative advantage (RCA) is the share of a sector in a country's total goods and services exports divided by that sector's share in global international trade in goods and services. The national export shares range from 62% to 24% for agriculture, 96% to 41% for mining, 86% to 52% for manufacturing, and 98% to 61% for services. (There are well over 30 more countries whose services share of exports exceeds twice the global average of 21%.)

Sources: Anderson and Ponnusamy (2019), based on United Nations (2021) export value data for goods and IMF balance of payments data for services as presented in World Bank (2021).

Table 6: Indexes of trade specialization in primary agricultural products,[a] by region, 1961 to 2019

	1960s[b]	1970s	1980s	1990s	2000s	2010s
European Union 28	-0.34	-0.21	-0.09	-0.02	-0.01	0.02
United States and Canada	0.14	0.25	0.26	0.22	0.09	0.09
Australia	0.81	0.79	0.77	0.70	0.58	0.47
New Zealand	0.83	0.81	0.80	0.73	0.68	0.67
Japan	-0.88	-0.91	-0.91	-0.92	-0.90	-0.88
Korea, Rep.	-0.71	-0.63	-0.70	-0.69	-0.68	-0.64
Taiwan	0.21	-0.20	-0.38	-0.49	-0.74	-0.63
China	0.01	0.10	0.09	0.22	-0.11	-0.39
India	-0.13	0.13	0.21	0.36	0.21	0.21
Southeast Asia	0.33	0.28	0.33	0.19	0.22	0.20
South America	0.56	0.56	0.56	0.47	0.57	0.59
Africa	0.41	0.22	-0.12	-0.16	-0.22	-0.25

[a] Agricultural trade specialization index is net exports as a ratio of the sum of exports and imports of agricultural products (so ranging between -1 and +1, positive for net exporters, and the world index is zero). Does not include processed food.
[b] 1960s is 1961–69.

Source: Compiled from FAO (2021a).

Table 7: Indexes of 'revealed' comparative advantage[a] and trade specialization,[b] primary agricultural products,[c] primary mining products,[d] processed food, non-food manufactures, and services, EU28 and other regions,[f] 2014

	Primary agric. products	Primary mining products	Processed food	Non-food manuf.	Services
'Revealed' comp. adv.					
EU28	0.46	0.24	1.00	1.03	1.67
Other advanced industrial economies	1.30	0.88	0.96	0.99	1.11
Other economies	1.03	1.28	1.02	1.00	0.75
World	1.00	1.00	1.00	1.00	1.00
Trade Specializ'n Index					
EU28	-0.37	-0.68	0.09	0.09	0.04
Other advanced industrial economies	0.19	-0.11	-0.12	-0.11	0.03
Other economies	-0.14	0.14	-0.09	-0.03	-0.04
World	0.00	0.00	0.00	0.00	0.00

[a] The 'revealed' comparative advantage index in agricultural (or manufactured) products is the share of agriculture and food (or other manufactures) in national merchandise exports as a ratio of that sector's share of global merchandise exports, hence 1 for the world.

[b] The agricultural trade specialization index is net exports as a ratio of the sum of exports and imports of agricultural products (so ranging between -1 and +1, positive for net exporters, and the world index is zero).

[c] Including forestry and fishing.
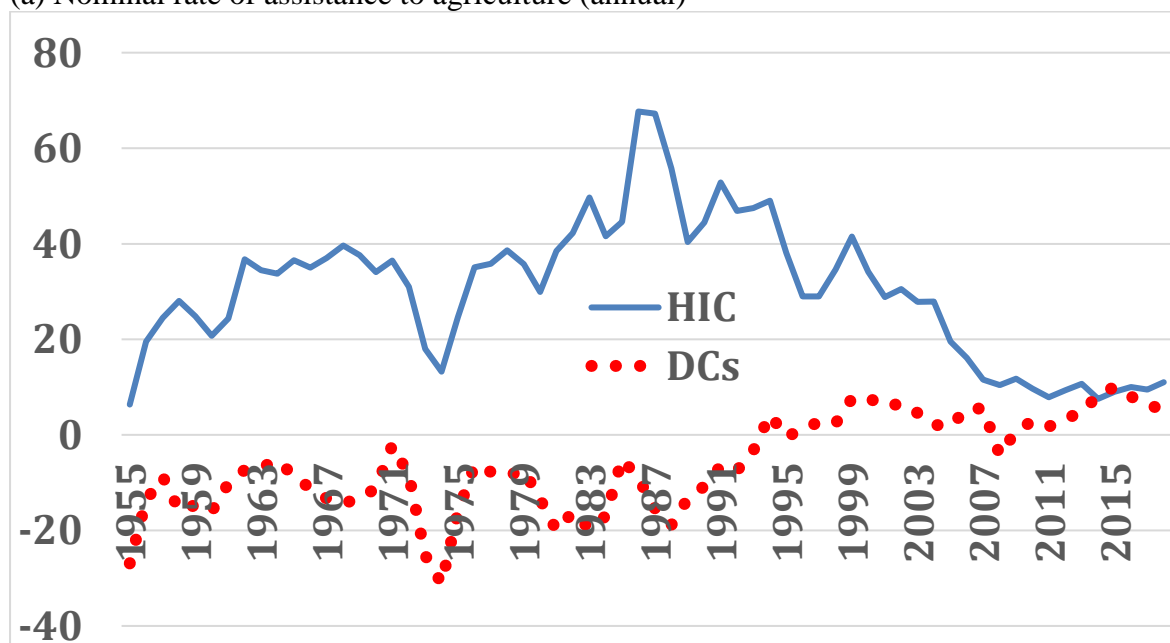
[d] Fuels, minerals and non-ferrous metals.

[e] Including beverages and tobacco

[f] Intra-EU28 trade is excluded from EU28 and world trade.
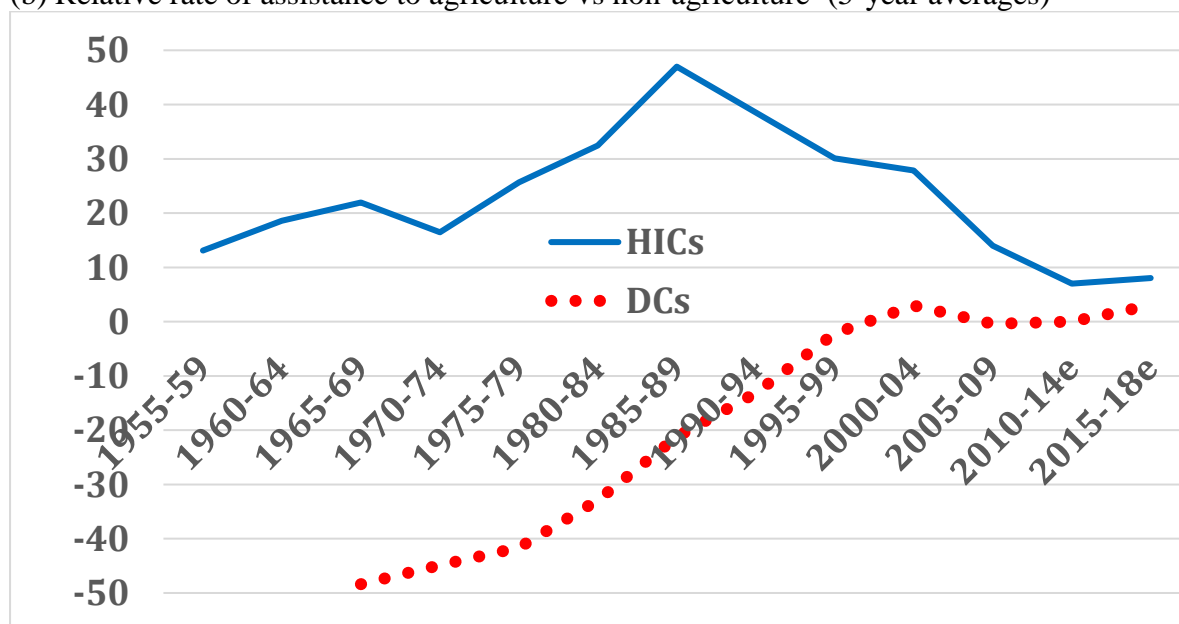
Source: Compiled from the GTAP model's database Version 10, at **www.gtap.org** (with thanks to Ernesto Valenzuela)

Figure 1: Nominal and relative rates of assistance to agriculture in high-income (dotted line) and developing countries (solid line), 1955–2018 (%)

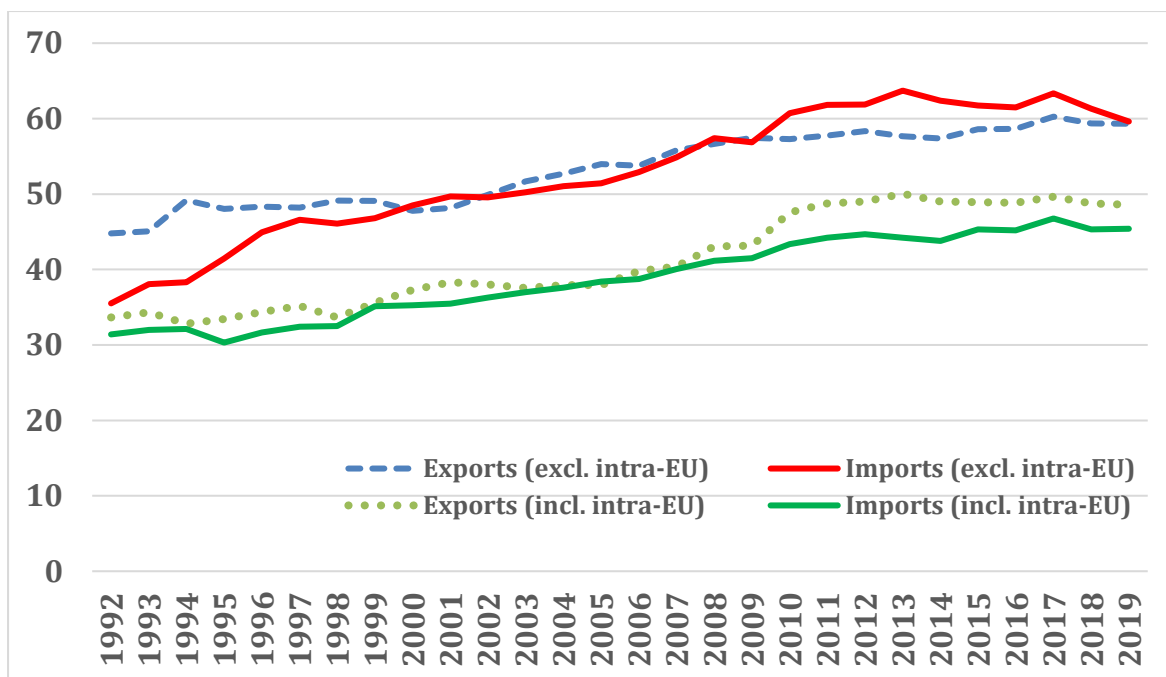(a) Nominal rate of assistance to agriculture (annual)

(b) Relative rate of assistance to agriculture vs non-agriculture[a] (5-year averages)

[a] RRA is defined as $100*[(100+NRAag^t)/(100+NRAnonag^t)−1]$, where $NRAag^t$ and $NRAnonag^t$, respectively, are the nominal rates of assistance (NRAs) for the tradable segments of the agricultural and non-agricultural goods sectors. The NRA is the percentage by which gross returns to producers in a sector are raised because of government sectoral or trade policies.

Source: Anderson and Nelgen (2013) to 2011 updated using nominal rates of protection from www.ag-incentives.org (accessed January 2019).

Figure 2: Developing country[a] shares of world agricultural and food trade,[b] 1992 to 2019 (%)
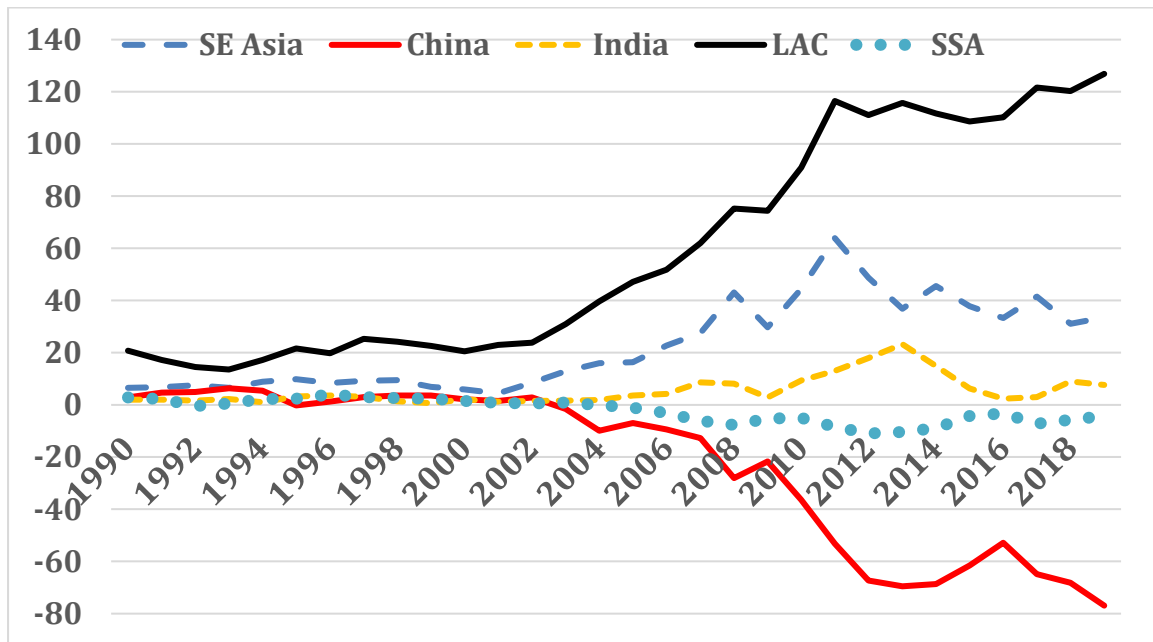
Figure 3: Net exports of agricultural and food products, developing country regions,[a] 1990 to 2019 ($US billion)

[a] Regions are based on those used by the FAO, namely, LAC = Latin America and the Caribbean, and SSA= Africa south of the Sahara.

Source: Source: FAO (2021a).

Notes

[i] Institutions are crucially important, most notably democracy and the rule of law. Acemoglu et al. (2019), for example, estimate that democratizations (based on data for 175 countries from 1960 to 2010) increase GDP per capita by about 20% in the long run, driven mainly by greater investments in physical capital, education and health. See the recent survey of institutional economics by Lloyd and Lee (2018). However, for space reasons they will be left aside in this survey.

[ii] This insight is not new. Hume warned of the folly of export restrictions nearly three centuries ago, as follows: "It is very usual, in nations ignorant of the nature of commerce, to prohibit the exportation of commodities, and to preserve among themselves whatever they think valuable and useful. They do not consider, that, in this prohibition, they act directly contrary to their intention ... To this day, in France, the exportation of corn is almost always prohibited; in order, as they say, to prevent famines; though it is evident, that nothing contributes more to the frequent famines, which so much distress that fertile country." (Hume, 1742 as cited in Giordani, Rocha and Ruta, 2016).