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Trans-border Land Acquisitions

A New Guise of Outsourcing and Host Country Effects

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Abstract

The rush for land acquisition—primarily driven by food shortages, food price volatility, and the run for agrofuel—has drawn considerable attention, as documented by reports published in late 2009, 2010, and 2011. Terminological differences aside, it is—quite distinct from material or service outsourcing—a kind of off-shoring farm production across borders to relatively land-abundant nations and exporting it back to mitigate the adverse effects of food insecurity. While the academic literature is not capacious, this paper, the first of its kind, attempts to study its (potential) effects in the context of a small open economy subject to exogenous shocks. The presence of a sector subject to land acquisition is central to the analysis. In particular, the paper notes that: (i) an increase in world prices of agro-business sector causes skewed effects (shrinkage) in manufacturing or innovative sectors, and subsistence sector (via forward and backward linkages), causing price change vulnerability; (ii) with attractive premiums offered by host country, land acquisition will undermine the avowed objective of mitigating food

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Keywords: land deals, food prices, land premium, wage gap, immiserizing deals

JEL classification: F22, J31, O15

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shortages and aggravate income inequality; (iii) technological progress or inducing technological efforts via skills, capacity building, and infrastructure development will have positive effects if host countries adopt a policy climate favourable to fostering governance and education for revitalizing agriculture. Further extensions to address pertinent (stylized) facts are also explored.

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Acronyms

ADB	Asian Development Bank
ERD	European Report on Development
FAO	Food and Agricultural Organization
FDI	foreign direct investment
IFPRI	International Food Policy Research Institute
SSA	sub-Saharan Africa

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Land is not just a resource to be exploited, but a crucial vehicle for the achievement of improved socioeconomic, biological, and physical environments.

FAO (1999)

These large land acquisitions can come at a high cost. The veil of secrecy that often surrounds these land deals must be lifted so poor people don't ultimately pay the heavy price of losing their land. … With food prices still highly volatile, large-scale land deals are a growing reality in the developing world, highlighting the need for concerted action for the benefit of all parties.

Ngozi Okonjo-Iweala (World Bank)[1]

1 Overview of the issue

In the uproar over food market turmoil and food security problems, frequently heard voices resonate with the discussion on the escalation of food prices, trade bans, export taxes and underinvestment in agriculture in poor countries. As international actors tap into lands beyond their borders in the wake of systemic 'food-feed-fuel' crises, there is no better time than the present for researching the issue. As global food markets experience acute shortages, countries experiencing high demand (China, South Korea, India) and those lacking self-sufficiency in grains (mostly the Gulf states) have begun to look for solutions for avoid steep prices in world markets afflicted by the severe resource crunch. Echoing these concerns, a new flood of activities has evolved to circumvent the adverse consequences of food perils. One such effort is known as 'land deal or grab' where middle-income oil-exporting countries, such as Saudi Arabia, Kuwait or Qatar, are aggressively involved in farmland acquisition in mainly African economies (e.g., breadbasket Sudan) as well as in other countries like Cambodia, the Philippines, Vietnam, Brazil, etc. In addition, the emerging economies (China, South Korea) as well as some developed countries (the UK, Sweden, and the US, and probably others) are also engaged in land deals.[2] Even China, Russia and Indonesia are preferred destinations for the developed countries. About 15-20 million hectares of farmland (i.e., land valued at a conservative estimate at US$20-30 billion) in the least developed countries are under consideration for similar deals (International Food Policy Research Institute, IFPRI, quoted in *The Economist*, 23 May 2009). A recent estimate (*The Economist*, 7 May 2011) documents an upsurge to 80 million hectares. Furthermore,

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1 See Deininger et al. (2011).

2 So important was this issue that even a Nobel Laureate poet (Rabindranath Tagore from Bengal) sough to warn against the malpractice of corrupt aggression on land resulting in social divisions in his works entitled 'Two Acres of Land (Do Bigha Jameen)' and the subsequent 'The Robbery of Soil' in a volume by L. K. Elmhirst (1922). In the Indian context, albeit differently, but recent land acquisitions by domestic business houses have raised uproar in West Bengal. The latest episodes are so current that there is scanty academic literature on the issue. To the best of my knowledge, *The Economist* (23 May 2009: 55–7) was the first to publish a form of verification of this issue. Given the paucity of information, we rely primarily on that article (von Braun and Meinzen-Dick 2009; Cotula et al. 2009, Kugelman and Levenstein 2009) for motivation in this paper. The work by Deininger et al. (2011) at the World Bank builds on previous studies and observations, and this culminated into a book while this paper was undergoing refereeing process.

according to the report, food importers like Saudi Arabia, Kuwait, China, and South Korea 'have opted to grow food on land they own or control abroad rather than import it through international trade (ibid.: 63).[3] Thus, not only is there a clear North-South undertone, but also South-South dynamic echoes as the emerging non-Northern economic heavyweights are in the race, too. The issue has a hint of North-South-South perspective. It is a hot and contentious issue as land plays a central role in the developing and least developed countries because of its insurmountable importance related to identity, property rights, livelihoods of the inhabitants, and most importantly its link to the problem of the 'unholy trilemma' of food (in-)security, feed (in-)sufficiency, fuel crisis (related to climate change).[4]

This kind of investment in farmland abroad is not unique at this juncture, colonial history is rich with evidence of such acquisition bids and land-seeking efforts. However, what make this twenty-first century acquisition under globalization different are the *nature, scope and scale* of the effect. In other words, the primary reason behind this effort is to avert the food supply problem, while avoiding protectionist impulses in attempts to overcome the shortage of staple crops or to develop alternative green technology for boosting productivity in food and biofuels. Apart from private sectors/investors, source country governments are the acquirers. They are heavily involved in partnerships with the host countries dispensing land (leasing or selling immobile resources) either under government ownership or vacant with unwritten customary rights invested in local inhabitants. The incentives of the source countries lie predominantly in using the relatively abundant spare farmland in poor countries to produce crops, and to export them back entirely or partially, depending on the host country's national policy imperatives. Driven by distrust of the world market's capability to export crops, the grabbers grow food on land in mostly poor host nations and import this back as their 'own' food, which would have otherwise been provided either domestically or from the world market via imports—*a kind of offshore outsourcing for importing food* (unlike intermediates, materials, or services) produced abroad relatively cheaply. For the host countries suffering from chronic poverty, food shortages, hunger and malnutrition, the incentives are manifold: foreign investment in farming enables them to get better agricultural inputs like seeds and fertilizers, investment in superior agricultural technology like green revolution, modernization with foreign capital, human resource development from extension services, to name a few—all contributing to improve farm productivity per worker and growth in crop yields per unit of farmland under 'grabbing'. However, there is evidence of host countries being prudent in dealing with farmland investments from countries that traditionally export capital and import food.

The picture is murky, and the lack of academic literature and analysis leads us to consider media reports (biased or impartial) covering the impacts. There are differences in the size and terms of contract negotiations and often these do not involve direct land acquisitions, but rather food supplies via contract farming or investment in irrigation or agricultural/rural infrastructure—the latter being welcomed to some extent, as expected, because it can generate beneficial spillover effects to other segments (von Braun and

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3 According to the report, source countries have bought or leased roughly 20 million hectares (50 million acres) of the 'best farmland' in poor host nations (ibid.). *The Economist* (7 May 2011) reports that this by now has reached 80 million hectares.

4 *Science*, October 2009.

Meinzen-Dick 2009). In other cases, it has led to incidents of civil unrest, overthrow of the government in Madagascar in 2009 over Daewoo, the South Korean company's attempt to acquire 1.3 million hectares for maize and oil palm, Mozambique's resistance to Chinese lease deals, and others—just to mention a few.[5] In this context, we quote von Braun and Meinzen-Dick (2009), who document media reports on such deals (Table 1), although the reports are not specific about the size of the land deals and investment.[6]

> Well-documented examples are scarce, and some reports are contradictory. This lack of transparency limits the involvement of civil society in negotiating and implementing deals and the ability of local stakeholders to respond to new challenges and opportunities.

Primary motive of the new wave of land outsourcing is to take advantage of abundant spare land and cheap labour in the destination countries. As the host economy suffers from poor investment climate, low yield per acre, and dearth of sophisticated agricultural R&D or other mechanized equipment (better seeds, tractors, fertilizers, irrigation facilities) and inadequate infrastructure, there is abysmally low investment in agriculture. Therefore, land deals are executed to overcome these techno-infrastructural deficiencies. Supposedly, the land outsourcer undertakes farmland production by bringing in other benefits which improve the productivity of land and labour. This paper adds value to meaningful debates by analytically investigating the implications of such deals, but being transnational in nature the complex issues of land property relations, property rights, contract farming, land-lease agreements, inequality of bargaining power, and changes in land use are beyond the scope (and volume) of a single paper.

Table 1
Examples of media reports on overseas land investments to secure food supplies, 2006-09

Investor country	Target country	Area (ha)	Current status	*Source*
Bahrain	Philippines	10,000	Deal signed	*Bahrain News Agency,* Feb 2009
China (with private entities)	Philippines	1,240,000	Deal blocked	*The Inquirer* Jan. 2009
Jordan	Sudan	25,000	Deal signed	*Jordan Times,* Nov. 2008
Libya	Ukraine	250,000	Deal signed	*The Guardian* Nov. 2008
Qatar	Kenya	40,000	Deal signed	*Daily Nation* Jan. 2009
Saudi Arabia	Tanzania	500,000	Requested	*Reuters Africa,* Apr. 2009
South Korea (with private entities)	Sudan	690,000	Deal signed	*Korea Times,* June 2008
United Arab Emirates (with private entities)	Pakistan	324,000	Under implementation	*The Economist,* May 2008

Source: Compiled by the IFPRI from media reports. Responsibility for the accuracy of the information presented here, however, lies with the reporting media.

5 See Shepard and Mittal (2009, 2010) and Kugelman and Levenstein (2009) for detailed unfolding of incidents.

6 The list of media reports on land deals is presented in a much bigger format in the same policy brief. Interested readers can check the IFPRI website at www.ifpri.org/ pubs/bp/bp013Table01.pdf. IFPRI's blog at http://ifpriblog.org/2009/04/24/landgrab.aspx.

Because of its recent vintage in the literature, we have not found any prior work and hence, this paper is a first attempt to fill this vacuum. It addresses the question how land deals could affect the host countries and under what circumstances can the perceived effects—beneficial, adverse, or win-win—be realized. The questions addressed are: (i) How does it affect sectoral productivity? (ii) What happens to relative factor income and its impact on inequality across factors of production? (iii) And lastly, does it achieve the desired objective of mitigating food shortage in the source as well as the host country or, is it unfavourable in terms of factor market effects? To analyse these questions, requires an understanding of its repercussions across sectors and factor markets.[7] As factors and product markets are a coupled or interlinked system, a general equilibrium production model in trade would help to shed light on the comparative static effects. Typically, no single trade model captures real world elements. Perfect competitive small-dimensional models 'perform well' in analysing the effect of trade and degree of outsourcing 'associated with the process of fragmentation of production' (Jones 1965; Jones and Marjit 2009). As will be evident, this model considers the medium-run effects of asymmetric sectoral expansion (caused by exogenous shocks) on resource allocation and income distribution—in a similar vein to Dutch disease á la Corden and Neary (1982)—and anticipates the ensuing structural changes under such activities.[8] Section 2 elaborates on the nature of the debate and offers an analytical model whereas sections 3 and 4 derive results and offer insights using the model. Section 5 extends the core model. Section 6 concludes.

2 Nature of the problem, lacunae and analytical framework

2.1 The debate

To the best of our knowledge, one of the foremost comprehensive study having wider coverage of regions undergoing land grabs, is Kugelman and Levenstein (2009), published by Woodrow Wilson Centre for International Scholars.[9] Covering 14 countries, a World Bank report by Deininger et al. (2011) notes that reported large-scale farmland deals totalled 45 million hectares before the end of 2009 alone, compared to the average yearly expansion rate of four million hectares spanning the decade upto 2008 (ibid.: vi). However, all the reports unanimously agree that 'little is known so far'

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7 Land is typically an immobile specific factor in a standard trade model and its homologues. Even nationally, land does not move, as capital or labour does. The only way land is mobile is through switching its product mix, that is, by altering its usage across products. This paper does not consider such a scope as we assume outsourced land to be strictly sector specific. This is reasonable as outsourced land is not meant to be used by locals for production; rather as residual claimants, these people have local customary rights (as enacted by the host government) to land used for subsistence agricultural occupations such as grazing, etc. Typically, few low-skilled farmers work on this tract of relatively inferior land, presumably because, unlike first-class land, it is much less productive for attracting a reasonable return.

8 Given the primary emphasis of the paper, in order to focus on structural features of such land deals and their impact on real variables, we ignore monetary considerations or exchange rate changes. Non-traded good is numéraire in the model.

9 A proliferation of media reports can be found with an internet search. But the three studies that have been identified so far are of an academic nature by reputed institutions like the IFPRI (von Braun and Meinzen-Dick 2009), Woodrow Wilson Center (Kugelman and Levenstein 2009), Oakland Institute (Shepard and Mittal 2009, 2010), and FAO/IIED/IFAD joint study (May 2009), and the World Bank (Deininger et al. 2011).

(von Braun and Meinzen-Dick 2009: 3). The study by these authors (2009) mentions that most of the land acquisitions are targeted by countries with higher capital endowment and water scarcity (say, the Gulf states) or with large populations faced with food insecurity (emerging economic engines like India or China) towards host countries based on their geographical proximity, but mostly on the basis of their low labour cost, abundance of land and water, and favourable climate for crops. But apart from crops, biofuels (first or second generation) are also produced on these lands, causing a shift in land-use patterns, thereby defying the much-proclaimed objective that motivates these deals. Also, Kugelman and Levenstein (2009) report (quoting *The Economist*) that land acquisitions correspond to about one-fifth of EU farmland or all of the farmland in France.[10] The IMF study by Arezki, Deininger and Selod (2011) attempts to determine the factors behind such activities by employing a gravity model with indicators of agro-ecological suitability and land rights security along with bilateral investments. Their findings confirm that 'weak land governance and tenure security' attract foreign investors, and that the quality of the business climate does not significantly influence the deals taking place.

Between 2006 and the middle of 2009, as reported by von Braun and Meinzen-Dick, foreign actors have sought or secured about 37 to 49 million acres of farmland. Ethiopia, one of the hungriest countries in the world, with a population of 13 million in need of food aid, is leasing out about 7.5 million acres of fertile land to investors who then export the food back to their own countries (Shepard and Mittal 2010, 2009). The study by Cotula et al. (2009) covers qualitative interviews and case studies for certain African countries, viz., Ethiopia, Ghana, Madagascar, Mali, Sudan, Mozambique, and Tanzania. Kugelman and Levenstein (2009) give a broad perspective on the 'roots and reasons' propelling such deals. They provide case studies from across the world and make recommendations for investors as well as host governments. According to their study (2009: 20-1):

> … investment in world's farmland is necessary to invigorate agriculture and alleviate food security. … Foreign investors cannot be held uniquely responsible for agricultural development in nation-states; such a burden ultimately rests with governments.

Land deal needs to be planned and executed transparently so that it complements a government-initiated national programme for agricultural development.

As von Braun and Meinzen-Dick emphasize (2009: 1):

> These land acquisitions have the potential to inject much needed investment into agriculture and rural areas in poor developing countries, but they also raise concerns about the impacts on poor local people, who risk losing access to and control over land on which they depend. It is crucial to ensure that these land deals, and the environment within which they take place, are *designed in ways* that will *reduce the threats and facilitate the opportunities* for all parties involved for a 'win-win' situation.

A recent update on such land purchases is reproduced below (OECD 2010).

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[10] This is a comprehensive region-wide study by Kugelman and Levenstein (2009).

Box 1
South-South land purchases
A new form of colonialism, or a catalyst for agricultural development?

The growing demand for agricultural commodities has resulted in an upswing in domestic and foreign private investment into agricultural production, and an increasing number of large-scale land purchases in countries such as Ethiopia, Madagascar and Sudan. The process is ongoing at present, with several deals under negotiation. At the Food and Agriculture Organization (FAO) Summit on Food Security in November 2009, FAO and International Fund for Agricultural Development announced the need for a code of conduct to regulate and increase the transparency of what has been called 'land grabbing', that is, 'the proliferating acquisition (purchasing, leases, concessions, contract farming, traditional FDI) of farmland in developing countries by other countries to ensure their food supplies' (von Braun and Meinzen-Dick 2009).

Over 40 per cent of acquisitions of land in this way involve South-South partners. Deals are usually between governments, or entities closely aligned to governments, such as SWFs. The list of developing countries that are actively investing in agricultural land abroad extends beyond the drivers and in fact the main acquirers of foreign agricultural land are the Gulf States, Egypt, China and Korea. Characteristics of these acquiring countries include being poor in land or water but rich in capital, having large populations and food security concerns, or facing a population which is changing its consumption and dietary habits due to a growing middle class.

The primary motivations of these acquisitions are internal food security, particularly following the spike in food prices in 2007-08; securing alternatives to fossil fuel; growing distrust in the functioning of regional and global agricultural markets; and portfolio diversification. African countries are the main host countries, but South-East Asian and South American countries also figure.

However, given the lack of food security in host countries like Ethiopia, the purchases are inherently controversial. Some African countries are now seeking to leverage the rising attraction of their land and water, requiring, for example, investors to make commitments to investment in infrastructure or employment as part of any land deal. The construction of schools and health clinics, together with the spillover from imported agricultural technology and knowhow, may indeed contribute to poverty reduction. However, potential downsides remain: loss of control over and access to land, negative effects on domestic food security, increased social instability, reduced local labour and income opportunities, low incentives to use sustainable techniques, and general inequality in bargaining power (UNCTAD 2009).

Source: OECD (2010: 83).

According to the European Report on Development (ERD 2009, henceforth), foreign direct investment (FDI) in land is spreading in most regions on the African continent, such as Ethiopia, Madagascar, Sudan, Mozambique, Congo, Ghana, Liberia, Nigeria, and Tanzania. As per the study (2009: 62):

> … the consequences for African agriculture and African people can be deep, persistent and not easily reversed. The scale is still largely unknown because of the limited qualitative and quantitative information and is neither reliable nor transparent, but available evidence suggests this phenomenon is not marginal. … Still incipient, this building wave can be dangerous for the development of a fragile country. It is therefore important to monitor and prevent any possible negative effects of this 'special' form of FDI in agriculture on social stability and state fragility.

In this report, the adverse impacts of resource rents reducing the accountability of government and misuse of power for rent-seeking activities are mentioned for their

effects on the fragility of these poor nations.[11] According to Asiedu (2006), FDI in sub-Saharan Africa (SSA) is largely driven by market size and natural resources, and such investments do not generate positive spillovers in terms of technology transfers and employment generation. Normally, resource-rich countries get higher doses of FDI. However, other factors such as physical infrastructure, human capital, efficient legal system, political stability, corruption, and governance also matter considerably for attracting FDI in the extractive industries. In the context of FDI in land, these factors are valid to some extent (see below).

Box 2
Large-scale land acquisitions in Africa – unpacking the land deals
Lorenzo Cotula

Land deals are embodied in one or several contracts. These need to be examined along with other legal texts defining their broader legal context, including national and international law. Contracts are complex and differ hugely among countries and even projects. More work is needed to identify trends in contractual practice and compare contractual options. But the analysis of a small number of contracts from Africa highlights some key issues.

Parties and overall structure

In their basic form, land deals involve at least two parties. On one side is an acquirer, generally a private or government owned company. But it can also be a foreign government acquiring land directly; for example, under a Special Agricultural Investment Agreement signed in 2002 between Sudan and Syria. On the other side of the deal is a land provider, either a government or, more rarely, a private landowner. This apparent simplicity hides complexity. Each 'deal' may involve multiple contracts and legal instruments, from a framework agreement outlining the key features of the overall deal, where the host government commits itself to make the land available to the investor, to more specific instruments (contractual or otherwise) that actually transfer the land or subsections of it. The extent to which land deals are negotiated or standardized varies across countries and the different stages of negotiation, with instruments to allocate land tending to be more standardized (as for the lease contracts in Mali's Office du Niger). Each deal typically involves a wide range of parties through the multiple stages of preparing, negotiating, contracting and operationalizing the project. First, multiple agencies within the host government are engaged. Even in countries where there is a central point of contact (one-stop shop) for prospective investors, usually an investment promotion agency, this agency alone will not deal with all aspects of the land deal. Private investors have the advantage of being able to act as a single legal entity with a cohesive set of values. But even here the picture may be more nuanced. Among the possible scenarios, the implementation of deals signed between governments may be driven by private operators, either from inception or as part of subsequent efforts to regain momentum. For example, the Sudan-Syria deal enables Syria to delegate implementation to the private sector, subject to this issue being cleared by the government of Sudan.

Land rights transferred, safeguards for local interests

Land leases, rather than purchases, predominate in Africa, with durations ranging from short terms to 99 years. Host governments tend to play a key role in allocating land leases, not least because they formally own all or much of the land. So, the extent to which governments take account of local interests in land, water and other natural resources is key. But host governments may contractually commit themselves to providing land before consulting local land users. In addition, the lack of transparency and checks and balances in contract negotiations encourages corruption and elite captures of benefits. In Mozambique and other countries, national law requires investors to consult local people before land allocations are made. In Ghana, deals with local leaders are common. But even in these cases, shortcomings in implementing legal requirements and in the accountability of local leaders are a recurrent problem.

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11 This report (ERD 2009: 62) also refers to these practices as 'outsourcing food production as a national strategy'.

Box 2 (con't)
Large-scale land acquisitions in Africa – unpacking the land deals
Lorenzo Cotula

Security of local land rights is also key. National laws vary, but some recurrent features undermine the position of local people. These include insecure use rights on state-owned land, inaccessible registration procedures, compensation for only the loss of improvements such as crops rather than land, and outdated compensation rates. As a result, local people can lose out, and even investors aiming for good practices suffer from a lack of clear government procedures and guidelines.

The economic equilibrium of land deals

Land fees and other monetary transfers are generally absent or small, due to the desire to attract investment, the perceived low opportunity costs and the lack of well-established land markets. This alone does not mean the deal is unbalanced: benefits to host countries may include investor commitments on levels of investment and the development of infrastructure such as irrigation systems. Given the prominence of investment commitments in the economic equilibrium of land deals, enforceability is particularly important. Government land allocations are usually subject to the investor's compliance with investment plans for the first few years of the project, after which the allocation is confirmed. But African governments have rarely used this lever to hold investors to account, with the wording of contracts not specific enough to be enforceable. And one-off assessments at an early stage of implementation do not enable continued monitoring and sanctioning of investment performance over a project's lifespan.

Although the structure of land deals is extremely diverse, a small sample of contracts suggests that much more can be done to tighten key areas affecting economic equilibrium, particularly when these contracts are compared with contractual practice in other sectors like oil and gas. With considerable variation among cases, the contracts tend to lack robust mechanisms to monitor or enforce compliance with investor commitments, guarantee benefits to local people, promote smallholder participation in production activities (say, through contract farming, joint ventures with local landholders or other forms of collaborative production), maximize government revenues and balance food security concerns in both home and host countries.

Source: ERD (2009: 65-7).

The World Bank Report (2010) reiterates this apprehension. Even though investments could lead to higher productivity in the longer run, lack of transparency and secretive or veiled tactics between the buyers and sellers (lack of governance) could be detrimental to this optimism. The report does not unequivocally lend support to the much hyped 'benefits' of conducting such a deal, and warns against mismanagement due to weak governance and corrupt underhanded dealings. Moreover, by presenting a mixed picture across 14 countries in Africa, Latin America, Europe, and Asia, the report points to the failure on the part of most host governments to ensure rights to land and livelihood for local people, which undermines the potential benefits from improved productivity. In some countries there is room for potential productivity improvement on currently cultivated land (even without land available for expansion) in order to address food insecurity (ibid). Therefore, it is imperative for host governments to make land acquisition deals clear and transparent, and also to invest in factors for boosting technological effort, skills, and proper institutions to protect their citizens. The report calls for a 'country-led approach to outside investment that sets clear criteria'. For such investments to have beneficial and sustained effects on the development of host economies, the report outlines (with inputs from FAO, UNCTAD, IFAD and multi stakeholders) seven guiding principles, viz.: (i) respect land and resource rights, (ii) ensure food security, (iii) ensure transparency, good governance and a proper enabling environment, (iv) consultation and participation, (v) responsible agro-enterprise investing, (vi) social sustainability, and (vii) environmental sustainability. Quoting Deininger et al. (2011):

> Currently none of the African countries of interest to investors achieves even a quarter of its potential productivity. Rather than just focus only on an expansion of uncultivated land, it is important that investors and governments support improvements in technology, infrastructure, and institutions that can improve productivity on existing farmland.

In the same vein, Cotula et al. (2009) observe that most of these countries lack proficient mechanisms to ensure local rights, production of domestic supply over exports, catering local interests, livelihoods, and welfare. Thus, the win-win situation should be viewed with cautious optimism rather than harping on a myopic viewpoint.[12] Mixed reactions to large-scale land acquisitions stem from differences in perceived benefits owing to a lack of transparency in deals negotiated between foreign firms and the host or the 'local elites' sharing commonality of interest at the cost of the smallholders or local communities, as mentioned by von Braun and Meinzen-Dick (2009). Given their under-representation, there is room for 'unfavourable' terms of the deal and hence, there is room for discord. The literature available so far provides evidence based on information from the pessimists,[13] and to quote von Braun and Meinzen-Dick (2009: 2), 'unequal power relations in the land acquisition deals can put the livelihoods of the poor at risk'. In fact, reliance on free access to 'common' resources for subsistence without the security of formal titles is quite prevalent in African countries where lands are not *de facto* unused or idle, contrary to what is often portrayed by the stakeholders (ibid.). Whatever the type of land (unused or unproductive under customary tenure agreements) having no formal arrangement or title to the land makes the smallholder vulnerable. According to the ERD (2009), although foreign investments in land are gaining prominence in the hope that the exchange of abundant resources (land and water with rising value) with scarce ones such as capital, infrastructure, skills and technological progress will deliver benefits, ill-conceived deals could be counter-productive, depending on the 'key' element serving local interests in land and natural resources. Similarly, Cotula et al. (2009) note the 'lack of robust mechanisms to monitor or enforce compliance with investor commitments, guarantee benefits to local people, balance food security concerns in both home and host countries'.

ERD (2009: 65) also mentions in the same vein that 'ensuring the poverty-reducing effects of domestic and foreign investment in Africa's farmland is very challenging, even more so in fragile countries'. This concern has been reiterated by Soete and Habiyaremye (2010), albeit in a different context, in naming the adverse effects of a policy deal as the 'immiserizing wealth' phenomena. According to their theory, the abundance of natural resources in regions like Africa could lead to incidences of

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12 According to Olivier De Schutter, the UN Special Rapporteur on the Right to Food, on his report to the Committee on Sustainable Development, 'the issue is not one of merely increasing budget allocations to agriculture, but choosing from different models of agricultural development the ones which may have different impacts and benefit various groups differently' (quoted in Shepard and Mittal 2010: 1).

13 Even though the World Bank Report (2010) is optimistic about the impact in terms of productivity and infrastructure, it mentions that potential productivity gains are very low in most of the African countries of interest to investors, below expectations and perceived benefits. It warns about the 'secretive tactics between buyers and sellers' involved in these deals. As mentioned before, this report is now available in book form (Deininger et al. 2011).

Table 2
Ensuring the poverty-reducing effects of new investments in farmland

Clear definition and recognition of pre-existing resource use rights.	Land titling of resources; mapping of community resources and informal use of resources. Involvement of local populations indecision-making process.	Most of Africa's people do not hold formal use or property rights of natural resources they have access to. Land titling requires time and resource costly processes. International experience shows that badly designed land tenure reform and titling programmes can exclude more vulnerable groups and can create destabilizing forces. Transparent and informed engagement of local stakeholders is particularly difficult in countries with low levels of education and weak social contracts between citizens and state institutions.
Design of contracts to balance between the priorities, perspectives and incentives of the investors, governments and local populations.	Implementation of transparent and participatory decisionmaking process. Technical assistance to capacity building for contract design, supervision and management.	See observations above. One of the main obstacles to this condition is the imbalance in bargaining power and negotiating capacity between investors, governments, and local communities and farmers.
Credibility and enforceability of commitments by investors and host governments. Identification and compensation of the rights of people negatively affected.	Baseline assessments of environmental, social and economic conditions. Monitoring of contracts by state institutions or international stakeholders. Actions to ensure transparency and dissemination of information.	Local populations usually lack financial and human resources to meet these conditions. Recipient governments are likely to lack necessary capacity and fiscal resources or willingness to maintain effective structures and impose credible threats of punishment for noncompliance. Problems of asymmetric information can hinder the definition, evaluation and monitoring of compliance.
Creation of better and more labour opportunities.	See actions above on contract enforcement and design. Strengthen involvement of trade unions and labour representatives.	Economic and financial sustainability of the projects might provide new investors with motivations to implicitly or explicitly retract their commitments for implementation of labour standards and labour-intensive techniques. Trade unionization of workers might be against interests of national elite.
Agricultural projects that increase productivity and are environmentally sustainable.	See actions above. Setting up and strengthening institutions (rules, agencies and structures) for environmental regulation and supervision. Technical assistance to new investors and mechanisms to adopt local knowledge of agricultural techniques.	See observations above. In many parts of Africa, land has a low resilience to agricultural intensification. External investors might lack an appropriate knowledge of local ecosystems and sustainable production practices. Contract farming arrangements, joint ventures, and systems of contract growing can improve absorption of local knowledge and benefit sharing among investors and local populations. But these results are likely to be jeopardized by asymmetric economic and power positions of the counterparts.

Source: ERD (2009: 67, Table 4.2).

'immiserizing wealth' unless structural transformation and economic diversification are pursued by promoting educational attainment, accumulation of human capital and knowledge capital and/or technology. Colonial practices upheld to the present day lead to inviting 'disruptive and predatory foreign forces that have hindered innovation-based growth and economic development' (ibid.: 1). As investor commitments are essential for the success of such FDI in agriculture, an ill-designed deal and lack of enforcement or compliance can make this unsustainable and affect the 'economic equilibrium of land deals' (ERD 2009: 64). The risk of this type of foreign private investment is enormous as it entails the chance of inducing negative impact on long-term national objectives of entrusting stability, food security, and employment. Most FDI in agriculture in Sudan is of the nature of resource-seeking although 21 per cent of the population were undernourished in 2003-05 (ibid.: 65). Soete and Habiyaremye (2010) discuss the 'paradox of plenty' in terms of exploitation of tremendous endowments while crowding out the accumulation of social, human and knowledge capital. Eruption of civil wars and conflicts are the result of such misappropriation of 'prodigious wealth'. In addition, UNCTAD (2008) reports that transnational corporations have siphoned off income from investments in natural resources/minerals extractions with detrimental effects on those regions. Also, adverse inter-sectoral effects cannot be ruled out.[14] Failure to convert resource abundance for the benefit of the people, and the mismanagement leading to contraction of agriculture, manufacturing, or innovative sectors are discussed in the context of bad policies, weak governance, and institutions hindering the structural diversification necessary for equitable growth and development. Soete and Habiyaremye (2010) argue that the only way to avert this 'illusion of wealth' is by investing in human capital, building technological capability, diversifying production to use the resources to produce higher value-added products, and thus, averting social conflict.

Following the arguments of Soete and Habiyaremye, land deals could be 'immiserizing deals' that crowd out the perceived benefits unless issues such as building institutions, social and human capital, infrastructure, innovative capabilities, technological efforts (knowledge ecology á la UNCTAD 2007), etc., are given due importance. This is in tune with most of the reports. There is a lot of opposition to negotiating and transacting such deals as the critics of land acquisitions question the potential of these to solve chronic food crisis, under-investment, or to promote overall economic development of poor countries. For example, conflicts are common among host country workers and different interest groups for benefit-sharing under arrangements such as exporting crops entirely or partially (even when the host is facing a famine spell), land-switching from other sectors (traditional and modern), sectoral readjustment or shifting of production induced by land takeover. In this context, a phenomenon similar to the 'Dutch disease' may emerge where the coexistence of booming and declining sectors is possible (Corden and Neary 1982). Although this kind of effect is explained in the literature in terms of extractive and other traded sectors, in the context of FDI in land purchases such a resource allocation and the resultant income-distribution effects following an ensuing structural change are quite plausible. In fact, as FDI in land involves sectoral readjustment in terms of land use, structural changes of this sort cannot be overruled

To tackle the issue of conflicting objectives, Braun and Meinzen-Dick (2009) suggest a 'dual approach', first, by establishing a transparent code of conduct for the host country

14 See Soete and Habiyaremye (2010: 4-5).

and foreign investors, and second, appropriate policies designed by the host government to take advantage of the opportunities and to control for adverse effects, so as to counter any immiserizing effects. Transparency, sharing benefits with the locals and adherence to national trade policies when domestic supply is at stake are emphasized. The report (Braun and Meinzen-Dick 2009: 4) mentions that:

> At the root of foreign investments in agricultural land are the food crisis and the volatility in food markets that have undermined trust in trade on the side of importers. The combination of an international code of conduct, on the one hand, and improved domestic agricultural policies, on the other hand, would make a virtue of the investments that investors consider a necessity and facilitate win-win outcomes. Well-designed foreign direct investment could embed transfers of knowledge and institutional strengthening into the investment and related trade flows, thereby improving productivity in the target countries of these investments. In the longer run, a healthy trade relationship could grow out of such investment islands, building trust in trade, at least on a bilateral basis and potentially more broadly, in an increasingly volatile world food system.

As Deininger et al. (2011: 1) note, 'this debate has suffered from two main weaknesses... there has been a dearth of rigorous, empirical analysis of what is happening on the ground'. Given this wide array of foreboding and presumption, we try to offer an analytical viewpoint into the problem and rationale for the 'claims' by paying attention to both sides of the argument—the investment and its benefits as well as the perceived loss from such a deal. Although international organizations like the Food and Agricultural Organization (FAO), the World Bank, Asian Development Bank (ADB) are involved in emergency packages and foreign aid for tackling food problems, the 'land deal' arrangement for outsourcing food production to relatively capital-scarce, land-abundant countries is opening up new forms of off-shoring, unlike 'value chain slicing' under manufacturing (materials) and IT services, the two most common forms of outsourcing during 1980s and 1990s. This paper makes an attempt to shed light on this third form of outsourcing of immobile land services from a host country perspective. Table 2 (ERD 2009) lists the preconditions in order for such a deal to be effective.

The literature in this new area is scanty and no analytical study has so far been attempted. In the same vein of the reported concerns, the paper models the implications of the payment of land premium, effects of catalysing new technology, as well as the result of price shocks. We analyse such a representative small open economy in the world market; that is, a host country that based on its economic status has no power in the global markets to affect terms-of-trade for goods.

2.2 Core model

A variant stylized model based on Jones (1965, 1971) is developed to closely resemble the phenomenon of land deals and its consequences. The host economy comprises four sectors, viz., low-skilled (domestic capital-intensive) manufacturing (M), staple crops export sector (A), exports sector based on skilled intermediates (Z) and non-tradable

subsistence sector (X) serving locals.[15] M and Z are unskilled (e.g., low skill manufactures in the informal sector) and skilled sectors (innovative sector such as software production units garnering limited skilled force) on the basis of their specific factor without any intersectoral mobility, whereas capital is construed as financial capital which, depending upon differentials in return, is mobile between M and Z. X is an indigenous, non-inventive, primitive sector (e.g., handicrafts, cattle grazing, medicinal plants, or wood products).

The host country, like many in Africa or South-East Asia (and China), has vast amounts of land (T) some of which, say T_o, is outsourced for farm production and exports and the rest (T_d) is retained for locals under customary rights with low return. Also, the country is endowed with unskilled population (U), whereas skilled workers (S) and capital (K) are relatively scarce.[16] This represents primarily an underdeveloped agricultural economy. Unlike the Latin American and dynamic Asian economies undergoing shifts in comparative advantage (bimodal in manufacturing and services), exports are typically land-intensive and few skilled labour-intensive goods are produced (exportable), while domestic capital-intensive manufacturing is an import-competing sector to support the pool of low-skilled workers. As skilled and unskilled workers are also specific to Z and M sectors, respectively, with only K being mobile across them, this resembles specific factor model a la Jones (1971) and Caves, Frankel and Jones (2007). Sectors A, M and X are linked via mobile unskilled workers. T_o and T_d constitute specific land with non-homogeneous characteristics used in the production of A and X, respectively. Thus, returns to T_o (r_o) and those to T_d (r_d) are not the same.

The host country has cheap land to spare. Due to lobbying by the net food importer or believing that this would entice more investments, the host government decides in favour of longer tax holidays, domestic concessions, and offers tax exemptions for such activities, or other amenities in kind, which effectively increase the return to land-to-be-acquired, and thus, it acts as a land-premium to outsource production.[17] Under chronic food shortage, malnourishment, and potential famine, a poor host country is more than willing to offer a reasonably higher premium directly or in alternative forms. As ERD (2009: 64) observes, 'land fees and other monetary transfers are generally absent or small, due to the desire to attract investment, the perceived low opportunity costs, and the lack of well-established land markets'. This disturbs the economic equilibrium of a land deal. Also, according to the study, because of enforceability and compliance problems with investment commitments, these deals are 'risky' in terms of outcome, social instability, food insecurity and land mismanagement giving rise to 'perverse

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15 Although production of cash crops like rubber, sugar, banana is quite common historically (i.e., a banana republic), the new trend induced primarily by food shortages (due to trade bans and production slumps in major grain producers) is a way to shift to cereal or staples. Sector A is a kind of 'booming staple crops sector' where a boom occurs due to land-shifting via land deals. Subsistence sector covers grazing cattle, or the production of medicinal plants and herbs, which are predominantly non-traded.

16 Foreign capital extension here does not try to focus on the role of land deals. That is the subject of a different model.

17 Evidence exists; see, for example, Kugelman and Levenstein (2009) and Shepard and Mittal (2009, 2010).

incentives to use unsustainable production techniques' (ibid.: 64). All said, a reasonably high premium raises the post-concession returns to T_o.[18]

In our model, T_o, T_d, and S are not mobile whereas K, U are mobile to some extent. Thus, the whole structure is based on a mixture of Heckscher-Ohlin and specific variety (Jones 1965, 1971; Sanyal and Jones 1982). Literature has been inundated with models based on Heckscher-Ohlin and its derivatives for exploring the trade, technology, and wage inequality debate.[19]

What makes this model different from the standard mode of fragmentation of production and trade in middle or intermediate products (Sanyal and Jones 1982) is the absence of vertical or horizontal processing of products. Rather, it essentially involves trade in final products like agricultural crop output, unlike services, manufactures, and assembly activities involving trade in middle products.[20] This kind of 'land grab' is an asymmetric replica of outsourcing without encompassing a vertical or horizontal slicing of the value chain. Unlike the others, it occurs in the land-intensive food sector where immobile specific factor in the host country is acquired and final output is exported out entirely (or, at least partially according to host conditionality). As is furnished below, this has distributional ramifications across the economy.

We assume perfect competition in product and factor markets. Mobility of unskilled labour ensures a uniform low-wage (w_u) across M, A, and X sectors. In contrast, immobility of specific land types causes the return to vary across A and X. But, K, being mobile across M and Z, attracts uniform returns (r_k) whereas skilled labour, being specific only to Z, attracts a wage (w_s) higher than w_u.

Following notations are used to describe the model structure:

P_j = exogenously given prices for j^{th} final good, $\forall j \in \{M, A, X, Z\}$ where

M = import-competing (importable) low-skill manufacturing sector;

A = agricultural staple crops sector subject to outsourced production and exports;

X = non-traded agriculture and related sector;

Z = high-skill sector (exportable);

w_u = unskilled labour wage;

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18 If the premium is sufficiently higher than the premium to other locations, then the incentive to outsource more might lead acquirers to invest in barren fallow land T_d for conversion**. Here, we assume that the premium is reasonably high but no higher than the world market so that specific factor property is valid.

19 See, for example, Jones (2000); Marjit and Acharyya (2003); Anwar (2009); G. Das (2009); S. Das (2005); Weiss (2008); Beladi, Marjit and Oladi (2006); Feenstra and Hanson (2003); Feenstra (2004); and Wood (1997), amongst others.

20 In case of fragmented production encompassing outsourcing of materials or services, trade in intermediates is a salient feature and reflects patterns found in emerging economies like BRIC nations (Brazil, India, China) that export software or exhibit structural change in export patterns. However, for most of the countries experiencing 'land grab', the incidences of outsourcing (India or China) are not as common as these lack the expertise or skilled workforce working in software or business process outsourcing. This is true for some African and Asian nations (Cambodia) although only limited evidence exists.

w_s = skilled labour wage. Assume that originally, $w_s > w_u$;[21]

r_k = return to homogeneous capital;[22]

T_o = land outsourced (i.e., acquisition of land under deal irrespective of modes of acquirement)[23] and

T_d = land preserved via customary rights for locals and used in domestic non-traded agricultural sector or fallow land of inferior quality used for peripheral activities like cattle-raising, grazing, primary products, forestry, etc. Thus, it can be envisaged that: $T_d = (1-\beta)\ T$ where $0 \leq \beta \leq 1$. $T_o + T_d = T$.

r_o = return to T_o;

r_d = return to T_d;

r_p = premium paid per unit of land leased out for outsourcing, creating a wedge between r_d and r_o;

a_i^j = i^{th} input required to produce one unit of j^{th} final good, $i = U, S, K, T_o, T_d$;

θ_{lj} = $w_l a_l^j / P_j$ is the distributive share of l^{th} labour-types in the production of $j \in \{M, A, X, Z\}$, $\forall l \in \{S, U\}$;

θ_{kj} = $r_k a_k^j / P_j$ is the distributive share of owner of capital K for $j \in \{Z, M\}$;

θ_{tj} = $r_t a_t^j / P_j$ is the distributive share of owner of t^{th} specific land for $j \in \{A, X\}, \forall t \in \{T_o, T_d\}$;

$\lambda_{ij} = \dfrac{a_i^j Y_j}{f_i} = j^{\text{th}}$ commodity's input share in i^{th} factor's endowment, where Y is generic output and f is generic endowment; $\sigma_j, \forall j \in \{M, A, X, Z\}$ is the elasticity of substitution in production;

$\overline{K}, \overline{S}, \overline{U}$, and $\overline{T_d}$ are factor endowments of respective primary inputs.[24]

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21 Even in developing economies skilled labour attracts considerably higher wage than their unskilled counterparts, although levels are lower than in rich nations. Income gap is persistent in nations with incidence of poverty.

22 K is domestic capital or could be conceived as composite capital made up of foreign and domestic types. Given the primary focus of the paper, we do not distinguish capital by origin. However, the model could be extended to incorporate foreign capital with higher premium and could be used to study the impact of differences in relative premium between outsourced land and foreign capital on the income gap and output response. This model's implicit presumption is that foreign capital inflow in a naturally capital-scarce country is already internalized in the economy via composite K whereas being naturally land-abundant, the impact of foreign acquisition of immobile land is not absorbed at all.

23 Outsourced land implies that domestic land is leased out or transferred outright or purchased and the actors could be the government as well as the private sector; see von Braun and Meinzen-Dick (2009) for a classification of deals among the various actors, buyers and sellers.

24 In these countries, emigration is more common due to economic conditions in the home country and remittances constitute a source of foreign capital. Also, emigration causes braindrain or skill shortages. Skilled immigration rarely happens. Skill shortage hinders development prospects and inhibits innovation or technical progress. Can land deals ameliorate this problem via foreign

'$\wedge$' = proportional changes for a variable, say *V*, so that generically $\hat{V} = \frac{dV}{V}$. Thus, the production setup is generally represented as:

$$\left.\begin{aligned} M &= M(L_u, K) \\ A &= A(L_u, T_o) \\ X &= X(L_u, T_d) \\ Z &= Z(L_s, K) \end{aligned}\right\} \qquad \text{(E1)}$$

Production functions in (E1) are assumed to exhibit linear homogeneity and diminishing returns to respective inputs.

Competitive equilibrium with zero pure profit condition implies that:

$$a_u^M w_u + a_k^M r_k = P_M \qquad (1)$$
$$a_u^A w_u + a_{To}^A r_o = P_A \qquad (2)$$
$$a_u^X w_u + a_{Td}^X r_d = P_X \qquad (3)$$
$$a_s^Z w_s + a_k^Z r_k = P_Z \qquad (4)$$

Prices for *M*, *A*, and Z are world prices because of the small open economy and for *X*, it is numéraire.

Full employment of resources ensures:

$$a_u^M M + a_u^A A + a_u^X X = \overline{U} \qquad (5)$$
$$a_s^Z Z = \overline{S} \qquad (6)$$
$$a_k^M M + a_k^Z Z = \overline{K} \qquad (7)$$
$$a_{To}^A A = T_o \qquad (8)$$
$$a_{Td}^X X = \overline{T_d} \qquad (9)$$

We have nine equations and nine variables, viz., four factor prices, four outputs and T_o (land outsourced or leased as determined by the negotiators).

Following the discussion above, and assuming T_o and T_d as imperfect substitutes for non-homogeneous land types, we invoke

$$r_o = r_d + r_p \text{ where } r_p > 0. \qquad (10)$$

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investment's indirect channel? That is the important spin-off one should be looking at. Government fixes the local land supply for subsistence farming, but the offer of premium or incentive is decided by T_o. As the premium goes up, more deals are signed and T_o is supplemented, for example, through deforestation, or eviction from T_d, due to dismantling of plantations, etc.

25 Agricultural investment in such economies is highly risky, especially in African countries with backward agriculture and lack of green revolution technologies. In addition, there is the danger of

We solve w_s, w_u, r_k, r_d and M, A, X, and Z. Given exogenous r_p and P_j ($\forall$j), we solve w_u and r_d from (2) and (3). Using (10), we get r_o as unique and this leaves policymakers room to use manipulation instrument to suit the purpose on hand. We see that r_o and r_p move in unison with each other.

Substituting w_u in (1), we get r_k. Finally, from (4), we obtain w_s by eliminating r_k. For outputs, equations (8) and (6) determine A and Z, respectively. As $\overline{K}$ is given exogenously, plugging Z in (7), we derive M. Then, plugging M and A in (5), we get X. Equation (8) determines T_o as a function of the level of A, factor returns, and technological coefficients. Considering unit value isoquant and unit cost minimization, the technological coefficients, a_i^j are determined (Jones 1965) by:

$$a_i^j = a_i^j(w_l, r_k, r_t), \forall l = s, u; t = T_o, T_d; j = M, A, X, Z \tag{11}$$

X is the non-traded sector and we can treat it as a *numéraire* sector without loss of generality. All other sectors are traded where the small host country is a price-taker in the world market.

3 Equations of change

We consider comparative statics parametric changes to focus on the ensuing policy changes. For enumerating proportional changes for the equation system (1) to (4), employing envelope theorem (Jones 1965), we derive, following section 2, the factor-return shares, $\theta_{lj}, \theta_{kj}, \theta_{tj}$ to obtain:

$$\theta_u^M \widehat{w_u} + \theta_k^M \widehat{r_k} = \widehat{P_M} \tag{12}$$

$$\theta_u^A \widehat{w_u} + \theta_{To}^A \widehat{r_o} = \widehat{P_A} \tag{13}$$

$$\theta_u^X \widehat{w_u} + \theta_{Td}^X \widehat{r_d} = \widehat{P_X} \tag{14}$$

$$\theta_s^Z \widehat{w_s} + \theta_k^Z \widehat{r_k} = \widehat{P_Z} \tag{15}$$

Suppose that due to a chronic food crisis and food shortage in the host country itself, the government's national trade policy restricts 100 per cent exportation of A; thus, a condition might be imposed to allow the exportation of a high fraction ($0 \leq \alpha \leq 1$),

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riots or protest by civil societies (e.g., riots instigated by food shortage have taken place in Haiti, Congo and Bangladesh) causing disruptions in operations and in further production. Also, Kugelman and Levenstein (2009: 3) document similar incidents in connection with lavish tax incentives and hefty security arrangements for investors in Pakistan. Madagascar's overthrow of the government following South Korean Daewoo Logistics' bid to acquire a large chunk of farmland in 2008 is also noteworthy. Without efforts to address weak governance, mismanagement or secretive deals, the host government indulges in malpractice, covering up with incentive payments, and thus creating an obstacle to a transparent code of conduct and for 'sharing the benefits' with the people. We consider the perceived ex ante risk and r_p to compensate for it. However, risk analysis in the production decision can be ignored without undermining our primary intention. Alternative specification could be $r_0 = r_p.r_d$ where $r_p>1$ and then we get the 'hat' changes (see later). But we can make approximate changes here without undermining our purpose.

contingent on serving the host country's domestic demand.[26] Although von Braun and Meinzen-Dick (2009) explore such policy effects, Fan (2010) cautions against this. However, neither study considers production under a land deal setup. In this context, we could consider the imposition of a punitive tax (t), proportionally increasing with the shares of agricultural export sent back to source, i.e., as α goes up.[27] This would create a wedge between the export price in the world market and the domestic price in the host country by lowering the latter (see, for instance, Piermartini 2004). Thus, the purpose would be to reorient domestic supply towards the domestic market by reducing the final local consumption price. This 'food security effect' is created with substitution effects towards domestic consumption. It is also a source of public receipts for government use in financing domestic resource mobilization such as education, skill, investment in public assets, etc. It can also have an anti-land-seeking effect because as producer price falls, it can create disincentives for the production of agricultural goods via land acquisition.

In this short-run model, α is an exogenously (and uniquely) specified percentage of output of A, determined by ex ante negotiations between the outsourcer and the host.

Let $t = t(\alpha) = t_0\alpha$, $t' > 0$ and $0 \leq t_0 \leq 1$ are constant tariff rates, and t goes up as α increases. In this case, incorporating this alters (13) to become:

$$\theta_u^A \widehat{w_u} + \theta_{To}^A \widehat{r_o} = \widehat{P_A(1-t)} \tag{13a}$$

Simplifying $\theta_u^A \widehat{w_u} + \theta_{To}^A \widehat{r_o} = \widehat{P_A} - m\hat{t}$ where $\hat{t} = t_o \widehat{\alpha}$, and $m = t/(1-t) > 0$ (13b)

Also from (10), $\widehat{r_o} = \widehat{r_p} + \widehat{r_d}$ with $\widehat{r_p} \geq 0$. (16)

Using (16) in (13 and 13b) we can determine the changes due to premium modifications. We see factor prices are uniquely determined by commodity prices and

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26 In fact, von Braun and Meinzen-Dick (2009: 4) and some international bodies like the African Union have initiated a process of setting a *code of conduct* for enacting *good practice* for such land deals, known as 'Adherence to National Trade Policies'. World Bank (2010) also mentions seven guiding principles for 'responsible agricultural investment' (RAI) in the same vein. Among these is the adherence to domestic policies for meeting the host country's food demand to prevent hunger and malnutrition (see *The Economist*, May 2009). A recent IFPRI report by Fan (2010), in the wake of the 2010 food price inflation, warns against export bans by such net food exporters as Russia and calls for setting up a *new international working group* and *new institutional arrangements* for preventing practices such as export bans, panic purchases, and speculation. It also highlights the significance of boosting smallholder productivity via new agricultural technology. However, this paper differs from theirs in terms of production arrangements in a setup typifying cross-border land deals. Thus, it should not be construed as 'export tax' in its strict sense.

27 Export tax is quite common, especially in developing nations (Pakistan, Indonesia) to support domestic interests in times of crisis. The objective is to manipulate final consumption (or, even intermediate consumption in case of processing industry for intermediates) to guarantee food security. α could be fixed via ex ante negotiations between the host and the outsourcer. It can be determined endogenously by the bargaining power in the world market of the governments of investors and the host country, which often depends on the political economic decisionmaking process. It may even be endogenously determined via domestic consumers' demand in the host country. In this paper, we opt for the former specification for 'exogenous'.

changes in commodity prices are flanked by changes in returns to factors. We derive in Appendix I (AI):

$$\hat{A} - \hat{X} = \widehat{a_{Td}^{X}} - \widehat{a_{To}^{A}} = (\widehat{w_u} - \widehat{r_o})\left[\theta_u^X \sigma_X - \theta_u^A \sigma_A\right] + \widehat{r_p}\theta_u^X \sigma_X \quad (17a)$$

Equation (17a) shows that with $\widehat{w_u} \geq \widehat{r_o}$, even with $\sigma_X = \sigma_A$, assuming (a relatively higher unskilled share *X* than in *A*) $\theta_u^X > \theta_u^A$, if $\widehat{r_p} > 0$, then $\hat{A} > \hat{X}$.

Plugging in $\widehat{w_u} = \widehat{r_o}$, we see that: $\hat{A} - \hat{X} = \widehat{r_p}\theta_u^X \sigma_X$ (17b)

Thus, land premium ($\widehat{r_p} > 0$) causes sector *A* to expand more than *X* ($\hat{A} > \hat{X}$), as it drives up the return to land grabbed for farmland activities. In what follows, using the derivations in section 3, we offer three sets of mutually exclusive policy scenarios to show the contribution of the framework.[28]

4 Results and insights

We consider three policy scenarios (*ceteris paribus*) as follows: (i) relative price changes across selected sectors; (ii) rise in land-premium; and (iii) primary factor augmenting technological progress in outsourced farm production (for example, due to R&D in biotechnology, new green revolution, better education, skill formation, etc.) and also simultaneous uniform technological progress in the non-traded sector. In the first three propositions, various exogenous shocks in a small open host country lead to an uneven impact (boom and bust) across the economy.

Proposition I: A *ceteris paribus* increase in world prices of the agricultural export sector (*A*, here) leads to a contraction in the import-competing sector (*M*) and the non-traded subsistence sector (*X*) serving the domestic population. Skill-intensive manufacturing (innovative) sector might expand, thus deepening wage inequality by reinforcing the existing wage gap.[29]

Proof: See Appendix II for derivations and numerical example.

Case 1:

Consider the system of equations in section 3, set $\widehat{P_M} = \widehat{P_X} = \widehat{P_Z} = 0,$, and set $\widehat{P_A} > 0$. It is profitable to produce more *A*, as expected profits and returns go up, thus $\hat{A} > 0$.

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[28] We do not include a punitive taxation shock in the current paper. We could have considered the imposition of prohibitive restrictions on exporting all produce in case of severe food insecurity and its aftermath in a host country where investment commitments are not followed.

[29] This kind of experiment is quite valid, as we see now that export bans have led to recent food price hikes, causing an almost 70 per cent skyrocketing rise in world wheat prices (see World Bank 2010) in five weeks. The FAO global food index rose 5 per cent in a month (*Guardian*, 10-16 September 2010). Thus, continuous price volatility causes vulnerability and has repercussions in many ways, one of which is the increased interest in acquiring farmland, forested areas, and access to water.

Case 2:

If $\widehat{P_A} > 0, \widehat{P_Z} > 0, \widehat{P_M} = \widehat{P_X} = 0,$, then wage inequality deepens; in the same vein as Case 1, here $\widehat{w_s} > \widehat{w_u} > \widehat{r_k} > \widehat{r_d}$ and $\widehat{r_k} < 0, \widehat{r_d} < 0.$

Intuitive explanation for cases 1 and 2

As the price of agricultural crops escalates, expected returns on land shoot up as higher agricultural prices lead to increased profits per unit of farmland. Thus, the economic valuation changes for land as well as for other complementary factors like water and energy (see von Braun and Meinzen-Dick 2009). Water-scarce and agricultural deficient countries which suffer from food insecurity and which are net food importers (the Gulf states or South Korea; as well as some land-scarce nations) seek to attenuate the effects of price volatility and vulnerability to shocks. Competing for land and water resources is, thus, intensifies for agriculture and/or agrofuel. Investors engage in 'land-seeking' (a disguised form of rent-seeking), causing higher farmland prices ($\widehat{r_o} \geq 0$) and lower prices on subsistence farming ($\widehat{r_d} \leq 0$).[30] L_u relocates to sector *A* from *X* and also from *M* due to the incentive of its higher returns (w_u increases, but not as much). But w_u does not rise much, as *A* is more intensive in T_o. As *M* production falls, the sector, being capital-intensive, releases capital which causes a fall in the return to capital ($\widehat{r_k} \leq 0$). This *K* moves to sector *Z* that experiences no price change in this experiment ($\widehat{P_Z} = 0$). With a considerable capital influx from sector *M*, sector *Z* has to use it with skilled labour. Thus, skilled wage shoots up and wage inequality deteriorates so that $\widehat{w_s} > \widehat{w_u} > 0.$ Then, w_s has to increase to satisfy the general equilibrium effects. Sector *Z* uses the capital released from sector *M* with specific skilled labour, and hence, *Z*-production goes up. If skilled endowment is *not* increased in the economy,[31] then *Z* might not increase much.

With emigration prevalent in these types of economies, the prospect of *S* increasing is bleak unless government or foreign investors take a genuine interest in it. As *A* is not as L_u-intensive as *X*, it is possible that w_u might fall as surplus labour from the contracting *X* and *M* sectors pools into a reserve army of the unskilled.

Thus, P_A increase has deleterious effects on subsistence farming as well as import-competing sectors. Although it is beneficial for the innovative sector *Z*, it aggravates or maintains existing wage inequality unless skill formation takes place.

But the next case is far more interesting. It enables us to consider divergences, if any, between the return to domestic skilled workers vis-à-vis the return to foreign investor's undertaking land deals, or leasing.

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30 Evidence shows that the price inflation of farmland has been 16 per cent in Brazil, 31 per cent in Poland, 15 per cent in the midwest of the US. There is also evidence of a large increase in the demand for water. Drought is common in Australia and Russia, and so is climate change (*The Guardian*, 10-16 September 2010).

31 For small states or poor economies, the paucity of skills is a constraint and readily available skills to work with unused capital are hard to realize. This might cause idle capacity among domestic entrepreneurs.

Case 3:

If $\hat{P}_A > \hat{P}_Z > \hat{P}_M > 0, \hat{P}_X = 0$, then there is inequality of returns between the owners of outsourced farmland and skilled workers; that is, land acquirers benefit compared to *both* the skilled and unskilled workers. All labour categories might suffer as landowners capture most of the benefits at the cost of workers.[32] See Appendix II for formal proof and numerical results.

Intuitive explanation for case 3

Because P_z increases, the demand for skilled labour goes up as the producing sector *Z* becomes more profitable. This causes W_s to increase from the initial equilibrium. As these economies are skill-scarce or human capital deficient (in a relative sense) and as good talent emigrates (no brain circulation as such, see UNCTAD 2007, 2008), these factors cause wage inequality to worsen. L_u suffers from both sectors. Also, being sandwiched between increases in w_s and w_u, domestic entrepreneurs suffer. As land return goes up following an increase in *A* production, and as the increase in price in sector *A* is much higher than that in sector *Z*, land dealers unambiguously benefit at the expense of all categories of labour and capital. Wage inequality worsens, domestic entrepreneurs suffer, unskilled workers are affected the most, that is $\hat{r}_o > \hat{w}_s > \hat{r}_K > \hat{w}_u$.

Increase in world prices of outsourced farm production (caused by food insufficiency, export bans, or food-agrofuel competition) could have pernicious effects on wage inequality or inequality of factor returns. A skewed change in the composition of outputs is also envisaged; this often leads to immiserizing effects.

Thus, *Proposition I* shows that a rise in world price (exogenous shocks) of outsourced farm production (alike to food price hikes caused by food insufficiency, export ban, farm subsidy removal, or food-biofuel competition) will be detrimental to the host country as the import-competing, manufacturing and local subsistence sectors will contract. Also, as return to outsourced farmland alone escalates and agricultural farm output grows, low-skilled labour moves in, causing the 'manufacturing sector' to contract as unskilled or semi-skilled labour is withdrawn. But 'capital' released from that sector moves to the 'skilled sector' to increase *Z* production; w_s inflates. On the whole, outsourced farmland owners gain the most, squeezing the returns of both labour types, and existing wage inequality aggravates further. We have also shown that with a rise in prices of sector *Z* and sector *M*, if P_M does not increase as much as P_Z, this result is valid.

Considering all three cases under Proposition I, this replicates the presence of a Dutch disease-type effect following exogenous shocks. In this framework, unlike Corden and Neary (1982), we demonstrate that as sector *A* (traded at exogenously fixed world market prices) booms or expands, the other traded sector (viz., *M*) and non-traded sector *X* contract with different impacts on traded innovative (skilled) manufacturing sector, depending on the share of capital. Also, even with wage flexibility the perverse effect on the distribution of income causes immiserization. There is resource movement in the wake of such changes. In Corden and Neary (1982), two effects of a booming sector

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[32] Price increase in P_M could be perceived as a plausible scenario, such as protecting the import-competing sector with tariffs, common among small open economies of host countries.

(resource movements and spending or income effect) are discussed in a different context. Our case, however, differs in the sense that sector *A* stands on its own by using a specific factor and sharing resources (unskilled labour) that can be drawn from *M* and *X* sectors while not being linked to sector *Z* via resource use. As *A* expands, it draws resources away from other sectors, mainly from *X* (because both use unskilled workers and 'generic' land which, under a land deal, could be converted for acquisition) and *M* (because both use unskilled workers). Given the nature of production in sector *X* (the subsistence sector using fallow land for traditional activities), it does not resemble the services sector and hence, the real income increase cannot induce a significant spending effect or higher expenditure for *X*. Thus price of the non-traded sector rises either negligibly or not at all. The model, therefore, rules out the possibility of changes in the real exchange rate (relative price of the non-traded to traded goods) and source of currency appreciation or depreciation. On the whole, the 'resource movement effect' dominates, causing readjustments in the economy via general equilibrium ripple effects spreading across the economy.[33]

Proposition II: A *ceteris paribus* increase in the premium offer (r_p) given to foreign investors for outsourced farmland so as to start crop production will cause that sector (here, *A*) to expand at the cost of the other sectors, viz., *X* and *M*.[34] The idea here is that as $\widehat{P_A} > 0$, more land is leased/purchased by the food-importing nations and by mutual agreement the host country begins to fix ex ante an increase in the premium causing $\widehat{r_p} > 0$.

Proof: See Appendix III for formal proof.

Intuitive explanation for Proposition II

Manufacturing, agriculture, and non-traded sectors all use a common factor—unskilled labour in addition to other specific factors. These countries have a relatively more abundant pool of unskilled workers than skilled ones. Even if skilled or educated workforce is present, they tend to emigrate; there is substantial evidence of braindrain, not circulation (see UNCTAD 2008, 2007). That is, anti-absorption capacity hinders technological development, skill transfer and technology flows.

Under the assumption that in terms of L_u usage across *M*, *A*, and *X*, *X's* use is relatively more intensive than *A* or *M*. This means that *X* is the most L_u-intensive among all three sectors using L_u, followed by *A*, then sector *M*. Also, *M* and *Z* both use capital. However, *Z* is skill-intensive. But between *M* and *Z* (both use *K*), *M* uses less *K* than *Z* (capital's share is higher in *Z*).

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33 As we do not model the demand side, the marginal propensity to consume *X* and *A*—important for driving such spending effects—is not discussed. This does not undermine the primary objective of this study.

34 This experiment is supported by evidence such as tax exemptions, tax benefits and other incentives (such as providing security forces to investors in Pakistan, etc.). Most of the reports mention the *code of conduct* and *weak governance* in these economies. The model could be extended to incorporate a government sector offering legal services via skilled professionals. This can highlight the role of governance and skill formation for organizing better land deals. This is in my research agenda and the subject of another paper; however, the extensions are outlined in section 5 below.

Following $\hat{r}_p > 0$, A expands as more land is now leased or purchased because $\hat{r}_o > 0$ inflates. This could happen through deforestation or shifting of uncultivated or subsistence farmland T_d to T_o through secretive tactics. As A expands and more land is given away, $\hat{r}_d < 0$ because the return to these inferior lands falls. Thus, X being relatively more L_u–intensive and using most of it, releases some L_u. This causes unemployment in sector X as occupants are pushed off.

Then, L_u relocates to sector A using it with the expanded T_o for the production of A (as A is next to X in using L_u intensively)—because more L_u will be needed as more land is acquired to produce more A. So, $\hat{r}_0 > \widehat{W}_u > 0$.

In addition, released from X, some L_u shifts to sector M as this uses it in its production. But M is more K-specific than its use of L_u. Therefore, as most of L_u is utilized in the production of A, the production of M falls causing the returns to K to drop $\hat{r}_k < 0$. They move to sector Z. But Z is skill-intensive and has a greater share of capital than sector M. As manufacturing (M) releases K and they relocate to Z, the unutilized (or, underutilized) capital will not be used fully until there is concurrent inflow of 'skill' workers. In other words, as all of K goes to sector Z, production increases ($\hat{Z} > 0$). The demand for trained and skilled workers is inflated as the unutilized capital will need them to work for the production of the innovative, skill-specific sector, thus causing $\widehat{W}_s > 0$. But this is not sustainable unless there is sufficient skill transfer, investment in skills, or educational attainment. Thus, sector Z may not increase as much. We could add a sector for skill formation where L_u is trained by foreign investors to become skilled.

One caveat

In this result either M or Z is squeezed depending on the relative importance of capital (K) between Z and M sectors. M production might go up if L_u relocates there. In that case, the return to K will increase but sector Z will have less capital. Being skill-intensive and with less capital to work with, Z may experience contraction.

Thus, it is shown that the premium by the host country could be counter-productive as it has adverse repercussions in other sectors (along the same vein as Soete and Habiyaremye [2010] discuss in the context of mineral extraction (coltan and tantalum in Congo) and FDI, leading to skewed and immiserizing effects (discussed in section 1). Also, as mentioned before, the propositions find support from the Dutch disease literature (Corden and Neary 1982) in a different context. Here, the leading sector is not extractive, but it causes a de-industrialization effect due to resource reallocation and income distribution attributed to the ex post spending effect (following changes in income inequality).

Corollary

The above result under the higher-premium offer is valid with $\widehat{P}_A \geq 0$. However, with changes in the assumption of factor shares, the result is perverse (see Appendix III for proof).

Case 1:

Even with a higher premium if A uses relatively more of L_u, then with $\underline{\widehat{P_A} \succ 0}$, the land acquisition policy yields a counterproductive impact that undermines the whole purpose of initiating such efforts. As $|\theta|>0$, non-traded (assuming T_d-intensive) and import-competing sector expands ($\hat{X}>0, \widehat{M}>0$) and exportable sector A contracts ($\hat{A}<0$).

Case 2:

If A is L_u-intensive, then at unaltered $\widehat{P_A}=0$, we can show $\widehat{r_d}>0, \widehat{r_o}\leq 0$. Thus from equation (13), we see that w_u increases more than the return to a specific land through the push from sector A. As the return to specific land in sector A falls, unskilled workers relocate into other unskilled labour-using sectors, M and X. In X, r_d increases, and there is much less incentive for outsourcing farm production causing $\hat{X}>0, \hat{A}<0$. Capital moves to sector M as it finds it more rewarding so as to cause $\widehat{M}>0$. Also following the relocation of capital, $\hat{z}<0$; this causes $\widehat{w_s}<0$. Wage gap improves. Contrary to the desired objective of land deals, there is a fall in the demand for outsourced farm production. Thus, even with foreign investment in land purchases overseas, if the production technique remains unskilled labour-intensive so as to use cheap local labour, then this is better for local workers because inequality improves.

Proposition III: Consider technical progress (i) in land (i.e., land-biased technical change) in sector A and then (ii) simultaneously in sectors A and X. This will lead to improvements in wage inequality and to an increase in welfare as prices fall.[35]

Proof: See Appendix IV for derivations.

(i) Let technical change be confined only to A so that $\widehat{a_{To}^{A}}=-\mathrm{T}, \mathrm{T}>0$, whereas $\widehat{a_i^j}=0, \forall j, i\neq T_o$. Now, using equations (2) and (13) and the envelope condition (Jones 1965) we can write: $-\mathrm{T}=\widehat{P_A}\Big/\theta_{To}^{A} \Rightarrow \widehat{P_A}<0.$ This causes prices of food (which sector A produces) to decline and this primary-factor (farmland) augmenting technical change (through, for example, investment in the productivity of grabbed land) is an advantage from the perspective of both source and host countries. In the wake of such technical

35 This experiment draws rationale from the intended objective of the entire land deal scheme where the proponents argue that it can deliver benefits if it induces productivity improvements through better technology to revitalize the agricultural sector that suffers from a loss in productivity, lack of better and modern technology, or skilled labourforce. We conduct a simple experiment to show the potential benefits from an exogenous technical progress (a 'new' green revolution technology induced by biotechnological or nano-technological breakthroughs) or skill transfers proxied by the technological shifter/coefficients. Further extension to include a skill formation sector where the unskilled are trained to become skilled workers could enrich the analysis; this is the topic of the section 5 extension below. We could include a labour-biased technical change to proxy for increases in skills in both labour classes.

progress, we see $\hat{A} = -\widehat{a_{To}^{A}} = +\mathrm{T} > 0$, thus production expands. We also see that land owners in specific factor are unambiguously worse-off, so that, $\hat{r_o} = \widehat{P_A} \Big/ \theta_{To}^{A} = -T < 0$ and

$\widehat{w_u} > 0, \widehat{w_s} = 0, \hat{r_K} = \hat{r_d} = 0$.

As the return to T_o falls, there is less incentive of land-outsourcing mode. This might cause an expansion of sector *X*, as it is the residual claimant using inferior land. By improving investment in productivity, one can retrograde the rush for land-seeking ex post. It benefits L_u and wage inequality might improve as *X*, with greater use of L_u, can induce a rise in w_u while w_s does not change in this scenario.

(ii) Let us consider a uniform all primary-factor augmenting technical progress occurring simultaneously in both sectors *A* and *X*, causing 'technological coefficients' to fall, so that:

$$\widehat{a_{To}^{A}} = \widehat{a_{Td}^{X}} = \widehat{a_{u}^{X}} = \widehat{a_{u}^{A}} = -\mathrm{T}, \mathrm{T} > 0 \tag{18}$$

Intuitive explanation:

In the first experiment, technological change limited to outsourced farmland improves its productivity and as output expands, the price of *A* falls. Thus, it is welfare improving as prices fall and food becomes cheaper. In addition, land grab diminishes and r_0 drops as productivity benefits outweigh the need for land leasing. As r_0 falls, land acquisition decreases and production in *X* may go up as the released land will now be used by sector *X*. But what about wage inequality and factor returns?

In the second, more interesting scenario, we consider productivity shock in both *A* and *X* sectors absorbing mostly L_u and land classes. There, we see that without premium, the wage of the unskilled unambiguously improves, as does that of r_d and r_0. As there is no difference between r_o and r_d changes ($\widehat{W_u} = \hat{r_o} = \hat{r_d} = T$), the incentive to outsource land peters out, and the land-seeking motive fades. Thus, *X* sector can expand; and wage inequality improves as w_s does not change.

Even with positive r_p, we get an unambiguous rise in w_u more than r_o and r_d ($\widehat{w_u} > \hat{r_o} > \hat{r_d} > 0, \hat{r_p} > 0$), 'skilling the unskilled' is therefore a better tactic than leasing with secretive campaigns. Of course, *A* and *X* expand under these productivity scenarios.

If skilled productivity improves via skill-biased technological change in sector *Z*, w_s will rise, *K*-owners could suffer, and wage inequality might or might not improve. Here, the Dutch disease effect is demonstrated in sector *A* in the presence of Hicks-neutral technological progress in agriculture and non-traded sectors.

Thus, it can be postulated that if unskilled labour's productivity improves (with education, skill formation, literacy, etc., that facilitate human capital, causing the productivity parameter to shift) or land productivity improves via green revolution technology or better package of fertilizer, seeds and other inputs, then wage inequality improves. Land grabbed under outsourced farm production arrangements does not bring benefit unless unskilled labour's human capital is enhanced to increase its efficiency. This has a ripple effect in the subsistence sector producing for the domestic market (here, sector *X*). Furthermore, such a uniform primary-factor augmenting technical

progress in the traditional agriculture and farmland sectors leads to a favourable impact on factor returns, improving initial income inequality. These kinds of improvements in technical efficiency can be envisaged as the result of concerted efforts to improve unskilled labour productivity, say, via human capital formation, agricultural extension services, or educational attainment or literacy, and R&D in biotechnology inducing land-productivity through better quality/variety bio-chemical inputs provisioning, for example.

In all the results, the role of capital intensity in sectors *M* and *Z* drives the changes in relative wages. However, in general, emigration is a major phenomenon in all these countries, causing skill-induced absorption capacity to decline. If unskilled labour is allowed to emigrate (following a decline in *X* and *M* production), then the return to capital will fall and the skilled wage will increase, causing inequality to deepen, i.e., the increase in skilled wage will offset the rise in unskilled wage caused by emigration. In contrast, if skilled labour emigrates, then unskilled wages might increase, leading to improvement in wage inequality although out-mobility of talent will cause their return to rise.

Hence, policies to improve technological change biased towards the sector lacking human capital attributes and modern technology are essential for bridging the income gap, for better food production, and sharing rather than siphoning off the benefits. This needs careful analysis as it affects the social fabric of the host country through the exclusion of those who have the right to enjoy the benefits.

5 Model extension: a simple framework incorporating governance and skill formation

From the reports available so far, it is evident that the lack of an appropriate institutional framework leads to the emergence of an unholy nexus between policymakers, governments, and the stakeholders (foreign as well as domestic private investors) that expropriates land owners (smallholders and those with customary rights) by exploiting the existing 'weakest forms of governance'. Weak governance, corruption, social conflict, civil war, malfunctioning state machinery make host countries unstable, vulnerable and fragile. These countries typically suffer from low human development, reflecting inadequate human capital, inability to mobilize domestic resources, weak infrastructure, and exposure to the risk of conflict breakout. This, in turn, can make FDI and other factors ineffective to help the transition from fragility to resilience. According to ERD (2009: 58), 'without appropriate incentives and regulation, foreign investors can contribute to bad governance and corruption, or participate directly or indirectly in the "war economy" and the funding of warlords and civil conflicts'. In fact, the possibility of a collusion between public officials and private agents is prominent in these countries. Linked to these factors, it is noted that 'drastic changes in access to land and water' can have repercussions for food security, social stability, and economic growth as wrong moves might adversely affect the perception of and trust in public institutions' efficacy and the government's legitimacy (ibid.).

Weak governance is a potential source of failure as it undermines the objective of solving the problem of food insecurity. Although national laws exist in some countries, compliance with the legal requirement of prior consultation with regard to land

allocations is hardly met. The risk of corrupt practices and unequal sharing of benefits leading to a squeeze of other sectors looms large. Often, it leads to an inappropriate code of conduct through bribery, or malpractices such as underhanded dealings (i.e., 'veil of secretive tactics', mentioned by the World Bank 2010). This endangers the 'fairness' of the land deal as more land is being acquired at the expense of property rights, violating the rule of law. It has detrimental effects on the domestic economy (host country), especially those people who rely on subsistence farming, and face food price inflation. The need for government action to appropriately administer these deals is obvious.

Second, often investment commitments involve promises such as guaranteeing productivity enhancement, technological development, and absorption of local and foreign knowledge. If FDI in agriculture leads to positive spillovers via educational attainment and skills acquisition, and domestic policy facilitates these, then the result could have beneficial impacts (see Soete and Habiyaremye 2010; von Braun and Meinzen-Dick 2009; ERD 2009). Human capital development and skill formation are important for seizing the benefits of good governance, absorbing foreign technology, and enhancing productivity. In addition, in order to provide better institutional support and 'quality' policy environment requires 'good quality' human resources. In other words, if government or public institutions need transparency, strengthening the efficiency of 'legal' services through specialized training of the skilled workforce (i.e., those who already have achieved tertiary or higher level of education or have the expertise to undertake further training to become legal professionals) is a way to eliminate the expropriation or extortionary practices that shroud land deals.

In order to overcome these inhibiting elements and to achieve resilience, as mentioned by the ERD (2009), several factors, *inter alia*, are emphasized: building social cohesion and state-building to ensure social compact between state and citizens, adhering to a long-term perspective, facilitating expansion of social and human capital, forming an optimal governance structure, escalating the process of broader development objectives, and stability of the government via legitimacy. This highlights the importance of an institutional and policy framework in the presence of investment flows, and also for ensuring right incentives for the allocation of investments that are of national interest.

As emphasized in the sections above, to offer interesting insights the model can be extended to incorporate aspects of the *code of conduct* and governance issue as well as skill formation. In particular, we add a skill formation sector and a composite legal sector (for ensuring appropriate code of conduct, property rights, rule of law, etc.).[36] The following additional variables are introduced:

G = Government's expenditure (resources) facilitating human capital/skill, legal institutional services such as stronger or good quality governance, property rights, rule of law, etc. The variable is exogenous.[37]

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[36] A more complex formalization could split skills in categories (for example, distinguishing between specific skills needed for legal, research or innovative action) and endogenize government expenditures to several sectors. Also, based on realistic scenarios linking each subsector to other user-sectors could enrich the story. However, this is beyond the scope of a single paper. The current extension shows the mechanism to highlight the importance of the roles of such factors.

[37] We do not explicitly model political economy aspects such as elections, voting or the overthrow of a corrupt government.

L = Sector providing legal institutional services protecting land/property rights. It is a kind of *social capital* also based on trust, mutual cooperation, social networks, etc. (Dasgupta 2009).

S = Human capital, skilled workers or professionals (as before in section 3).[38]

Efficient and quality legal services (L) are attributed to skilled lawyers, the federal judicial system, and transparent government; thus, an appropriate level of G facilitates the shaping of L with the help of skilled legal professionals who come from the reserve of S in the economy. As G becomes stronger representing an efficiently functioning government, L is high, implying better governance, and as S develops further, it contributes to better quality or services of L. Hence, we write:

$L = L(G, S)$ where $\partial L / \partial S = L_S \geq 0, \partial L / \partial G = L_G \geq 0$.[39]

Better quality of these services creates 'wealth' as it enables greater trust, transparency, cooperation, and thus leads to productivity growth (Dasgupta 2009). In fact, given L, if G is high for enacting the rule of law and governance is adequate, then it requires less S, which when released could be utilized in sector Z (hi-tech or innovative sectors). Also, more G could be devoted to sector S, which could boost the production of both skill-using sectors, viz., L and Z. In fact, the rationale for invoking such a mechanism could easily be grounded in the context of an e-government in achieving the MDGs. In particular, we quote UN (2010: 74) that:

> E-government is the use of ICT for strengthening governance and public institutions. It can help make public service delivery more agile and less costly. Similarly, e-government can be useful in the implementation of regulatory reforms by making processes more transparent and by streamlining activities.

To show such a mechanism, we introduce the following technological coefficients:

a_G^S, a_G^L: per unit requirement of G for the production of S and L, respectively, i.e., for providing the regulatory framework or strengthening governance and/or institutions.[40]

Typically, a_G^L represents a technological coefficient proxying mechanism design for governance control so that its higher value implies a better code of conduct, ensuring better property rights. In other words, assuming $a_G^L . L = \overline{G} \Rightarrow$ with such technical progress, $\hat{L} = -a_G^L = g_L > 0$, the intuition here is akin to technical change: as a country's governance mechanism improves (via better resources, endowment of skilled lawyers,

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[38] Intra-skill classification is not acknowledged, so that every skilled professional is assumed to be malleable to performing their designated tasks. Distinguishing between the skill-specific nature of a job is ruled out for simplicity.

[39] Examples: $L = AS^{\alpha}G^{\beta}$ with constant returns to scale.

[40] As is illustrated below, improvement in L could be modelled akin to technological change in this sector in the sense that better mechanism design to overcome weak rule of law and building stronger governance resembles an improvement in technical efficiency or operation of government machinery through training, human capital, better technological facilities like GPS, GIS, ICT, etc.

or proficiency in institutions), then the quality of legal services improves, resulting in a higher level of output. For the educated professionals or skilled sector, assuming that government programmes for educational attainment of the unskilled and training the semi-skilled contribute to better human capital-induced skill, we write:

$$S = S(G,U) \text{ where } \partial S/\partial G = S_G \geq 0, \partial S/\partial U = L_U \geq 0 \; \partial/\partial G(\partial S/\partial U) = L_{GU} \geq 0.$$

Mutual development of *S* and *L* through *G* creates a conducive institutional environment for a better design of land rights instruments. We assume that sector *L* uses relatively more *G* as compared to sector *S*. Thus, *L* and *S* sectors are specific factor sectors linked via mobile input to *G; G* contributes through two channels—through education and skill acquisition as well as through better governance/institutional framework provision. The following technical coefficients are introduced:

a_u^S = per unit requirement of unskilled workers going into skill formation sector;

a_S^L = per unit requirement of skilled workers for governance via legal professionals.

Thus, for price system we add two more *P=AC* relationships on top of equations (1)-(4)(as in section 2 earlier) as follows:

for skill sector $a_u^S.w_u + a_G^S.r_G^* = w_S$ (E1)

for the governance sector $a_S^L.w_S + a_G^L.r_G^* = w_L$ (E2)

where

w_L = return to legal services or payment to such service providers for protecting land rights and for taking care of expropriation and/or extortions, corrupt practices.[41]

r_G^* = return to government investment in educational and social infrastructure. This could also be construed as the price of public education to train the unskilled, semi-skilled, 'skilling the unskilled', and also for supplying such human capital for the legal sector to promote transparency and efficiency. As this is often welfare-improving by the altruistic or philanthropic charities of the government, it is exogenously fixed by the authorities.[42]

Full employment conditions have additional equations; equations 5 and 6 are modified, so that:

$$a_u^M.M + a_u^A.A + a_u^X.X + a_u^S.S = \bar{U} \quad (5E)$$

$$a_s^Z.Z + a_s^L.L = S \quad (6E)$$

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41 This could be a lawyer's official salary without bribes. Thus, it is quasi-fixed in the sense that the user of services of *L*-output has no control over it. In other words, the sector using these services 'pays' (in the form of tax or service fees) this amount as fixed by the government or judicial systems.

42 Without modelling *G* sector, this assumption is logical as the government often provides education with a price (irrespective of levels) fixed by it at a given point in time. Depending on public sentiment or reaction, election process might involve demands for changing such a price endogenously via political-economic decisionmaking, which is not addressed here.

Note that *S* is not fixed, as skill augments endogenously. Although the endowment of unskilled workers is fixed (at a given point in time in the economy), we assume that the skill formation sector increases *S* over time via training, etc. of the fixed pool of the unskilled; there is a flow of skill and hence, better governance or legal services in the economy. In addition, for the government resources constraint, we write:

$$a_G^L.L + a_G^S.S = \overline{G} \tag{E3}$$

Now, with the extension we have in total 12 equations (seven old, viz., equations 1, 2, 3, 4, 7, 8, 9) plus (E1), (E2), (E3), (5E), and (6E) to determine 12 variables: $w_s, w_u, r_K, r_d, w_L; M, A, X, Z, S, L, T_O$.

As an illustration how to gain insights from this extension, we incorporate *L*-services into sector *X* that faces the threat of land grab through a 'deal' under secretive tactics or improper code of conduct (see ERD 2009; von Braun and Meinzen-Dick 2009; World Bank 2010) in the sense that *L* protects their rights to land and enables them to produce output (as an input into production process) so that: $X = X(L_u, T_d, L)$ and $a_L^X.X = L$ where a_L^X is the technological coefficient. It is obvious that if *L* increases, then the output of *X* increases via ensuring better code of conduct in dealing with FDI in land. In turn, it causes T_d to be used more so as to limit land grab activities, resulting in a fall in T_o. This causes *A* to fall and hence, induces less incentive for land deals. At the same time, unskilled workers released from sector *A* can be trained via sector *S* to become skilled; as *S* increases, it leads to development in human capital and further enhancing the good quality of *L*-services. Illegal land dealings are controlled through both the improvement of human capital and better rule of law. Furthermore, as *X* production increases, the return to unskilled worker (used more intensively) goes up, causing a potentially retarding effect on wage differentials. Thus, wage inequality may narrow.[43]

In addition to equations (12)–(15), the extended model has the following extensions for the equations of change:

From (E1) and (E2), applying the envelope theorem according to Jones (1965), we derive respectively:

$$\theta_u^S.\widehat{w_u} + \theta_G^S.\widehat{r_G^*} = \widehat{w_s} \tag{E4}$$

$$\theta_G^L.\widehat{r_G^*} + \theta_S^L.\widehat{w_s} = \widehat{w_L} \tag{E5}$$

where cost-shares, $\theta_G^S + \theta_u^S = 1, \theta_G^L + \theta_S^L = 1$ and endowment shares, $\lambda_G^S + \lambda_G^L = 1, \lambda_u^S + \lambda_u^X + \lambda_u^A + \lambda_u^M = 1$

Following Jones (1965), using (E1) and (E2), from unit-value isoquant and envelope condition, we write:

$$\hat{a}_G^L = -\theta_S^L \sigma_L(\widehat{r_G^*} - \widehat{w_S}) \text{ and } \hat{a}_S^L = \theta_G^L \sigma_L(\widehat{r_G^*} - \widehat{w_S}) \tag{E6}$$

$$\hat{a}_u^S = \theta_G^S \sigma_S(\widehat{r_G^*} - \widehat{w_u}) \text{ and } \hat{a}_G^S = -\theta_u^S \sigma_S(\widehat{r_G^*} - \widehat{w_u}) \tag{E7}$$

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43 As *L* and *S* are determined endogenously, they are not fixed endowments of skilled professionals and legal expertise of professionals (unlike *U*, *K*).

Thus, for comparative static effects, we need to consider (12)–(15) plus the equations derived for the extended model. Using (6a) and (E6) in (6E.1) in Appendix V, with $\hat{r}_G^* = 0$, after simplification we get:

$$\lambda_S^L \hat{L} = \hat{S} + \lambda_S^Z \sigma_Z \theta_K^Z (\hat{w}_S - \hat{r}_K) + \lambda_S^L \sigma_L \theta_G^L \hat{w}_S - \lambda_S^Z \hat{Z} \tag{E8}$$

To consider the sequence of changes and implications, we need to exploit, using Jones (1965, 1971), some other relationships as shown in Appendix V to derive:

$$\hat{L} = \frac{\hat{G}}{\lambda_G^L} - \frac{\lambda_G^S}{\lambda_G^L}\hat{S} - \theta_S^L \sigma_L \hat{w}_S - \frac{\lambda_G^S}{\lambda_G^L}\theta_u^S \sigma_S \hat{w}_u \tag{E9}$$

This equation shows that:
with $\hat{w}_S = \hat{w}_u = 0, \hat{G} > 0,$ we get $\hat{L} = \hat{G}/\lambda_G^L - \lambda_G^S/\lambda_G^L . \hat{S} > 0,$ iff $\hat{G} > \hat{S} \geq 0$ and vice versa.

with $\hat{w}_S = \hat{r}_K = 0,$

$\hat{L} = \frac{1}{\lambda_S^L}[\hat{S} - \lambda_S^Z . \hat{Z}] \Rightarrow \hat{L} > 0,$ if $\hat{S} > \lambda_S^Z . \hat{Z}$ and $\hat{S} > 0,$ iff $\hat{G} > \lambda_G^L . \hat{L}$ while $\lambda_S^L \neq 0$ (from E9)

This implies that if an increase in government expenditure/resources in providing services exceeds the share spent for increasing the provision of better institution via strong governance/rule of law, and ensuring property rights, then the remainder of *G* is used to finance expenditures on human capital/education so that skill is augmented. Thus, both social and human capital is conjointly increased via public policy support (*G*). In turn, both contribute to an improvement in the quality of the legal institutional framework.

Intuitively, if $\hat{S} > 0$ and $\hat{Z}$=0, given $\hat{w}_S \geq 0, \hat{w}_S \geq \hat{r}_K, \hat{L} > 0$. That is, with an increase in skills or human capital, legal professional services improve to contribute to better quality governance and if production of *Z* falls, a larger skilled workforce gets absorbed into sector *L* with the net impact depending on the term $(\hat{S} - \lambda_S^Z \hat{Z})$. This is clear because if the wage of a skilled worker goes up in sector *S*, then a greater exodus of unskilled workers leads to further skill formation, and a fall in the return to capital in *M* and *Z* sectors; if the increase in *Z* is small compared to the increase in *S*, it will cause migration of the skilled from *Z* to *L* and will lead to an increase in *L* output. Also, if *L* is at a rather optimal level, then the share of skilled workers in *L* might decline with more *S* leading to increased production of *Z* (i.e., via $\lambda_S^Z \hat{Z} = \hat{S} + \lambda_S^Z \sigma_Z \theta_K^Z (\hat{w}_S - \hat{r}_K) + \lambda_S^L \sigma_L \theta_G^L \hat{w}_S - \lambda_S^L \hat{L}$).

Similarly, from derivations in Appendix V, we get:

$$\hat{S} = -[\frac{\lambda_u^M}{\lambda_u^S}\hat{M} + \frac{\lambda_u^A}{\lambda_u^S}\hat{A} + \frac{\lambda_u^X}{\lambda_u^S}\hat{X}] + \frac{\lambda_u^M}{\lambda_u^S}\theta_k^M \sigma_M (\hat{w}_u - \hat{r}_k) + \frac{\lambda_u^A}{\lambda_u^S}\theta_{T_o}^A \sigma_A (\hat{w}_u - \hat{r}_o) + \frac{\lambda_u^X}{\lambda_u^S}\theta_{Td}^X \sigma_X (\hat{w}_u - \hat{r}_d) + \theta_G^S \sigma_S (\hat{w}_u - \hat{r}_G^*) \tag{E10}$$

From (E10), it is evident that if *M*, *A*, *X* increase more, less skill formation is taking place in the economy, as most unskilled workers will find employment in these sectors

at the expense of *S*, *L*, and *Z*, the skill-upgrading/training and skill-using sectors. With $\widehat{M}=\hat{A}=\hat{X}=0$ and $\hat{r}_k=0=\hat{r}_0=\hat{r}_d=\hat{r}_G^*$,then from (E10), we deduce:

$$\hat{S}=\frac{\widehat{w}_u}{\lambda_u^S}[\lambda_u^M\theta_k^M\sigma_M+\lambda_u^A\theta_{T0}^A\sigma_A+\lambda_u^X\theta_{Td}^X\sigma_X+\lambda_u^S\theta_G^S\sigma_S]>0.$$

To show the contribution of this extended framework, we illustrate the mechanism in a simple adaptation of the extension below. Here, *L* is not linked to sector *X* (nor any other sector) for highlighting the role of property rights issue. However, such a possibility is shown later and its implications are derived in a simple variant of this extension. Before that, we consider the following comparative statics analysis (*ceteris paribus*) for sectors *L* and *S* only. This enables us to trace the policy impacts (of government's exogenous shocks) on enacting the code of conduct (via *L*) and attainment of human capital (via *S*). Listed below are the mutually exclusive scenarios and corresponding propositions:

Proposition IVa: Improvement in governance to ensure better code of conduct will lead to an increase in output, as this makes accessibility to the legal professionals convenient and cheaper.

Proof: See Appendix V

Rationale: An improvement in the governance mechanism to ensure better code of conduct is modelled via the technological coefficient (see above) a_G^L so that, *ceteris paribus*, non-uniform technical progress occurring only in the legal sector represents the increased efficiency of the host country government's design for stronger governance. Thus, $\hat{a}_G^L=-g_L, g_L>0$, $\hat{a}_S^L=0$ whereas $\hat{a}_h^m=0, \forall h$ and $\forall m=S,M,A,X,Z$.

Using equations (E2), (E5) and the envelope condition (at given/unchanged factor prices in this sector), we derive:

$$\theta_S^L\hat{a}_S^L+\theta_G^L\hat{a}_G^L=\widehat{w}_L \tag{E11}$$

$$\Rightarrow -g_L\theta_G^L=\widehat{w}_L\Rightarrow 0>\widehat{w}_L. \tag{E11.1}$$

Also, at given factor prices in sector *L*, using the envelope condition and (E11), we have $\widehat{w}_S=0=\hat{r}_G^*\Rightarrow$ from (E4), $\widehat{w}_u=0$ and hence from equations (12)–(15), $\hat{r}_k=\hat{r}_0=\hat{r}_d=0$.

With technical change, final price change due to factor price changes is *less* as technical progress compensates through cost reduction and factor saving.

Also, using equation (E3.1) we get:

$$\lambda_G^L\hat{L}=\hat{G}-[\lambda_G^L(-g_L)+\lambda_G^S.0]-\lambda_G^S\hat{S}\Rightarrow\hat{L}=\frac{\hat{G}}{\lambda_G^L}+\lambda_G^Lg_L-\lambda_G^S\hat{S}\Rightarrow \text{with } \hat{S}=0,\ \hat{L}=\frac{\hat{G}}{\lambda_G^L}+\lambda_G^Lg_L>0.$$

Improvement in the efficiency of the governance mechanism (presumably changes in technology translate into quality changes and alter input coefficients) leads to a reduction in government coefficients in *L*, and makes its provision cheaper, i.e., easily accessible to local people in the host country. Thus, better governance improves the rule

of law, makes land rights conditions better and social capital affordable so as to facilitate better functioning.

Using (E9) with (E11.1), with $\widehat{w}_u = 0$ we can invoke:

$$\hat{L} = [\frac{\hat{G}}{\lambda_G^L} + \sigma_L g_L \theta_G^L] - \frac{\lambda_G^S}{\lambda_G^L}\hat{S} \Rightarrow \text{while } g_L > 0, \hat{L} > 0 \text{ iff } [\frac{\hat{G}}{\lambda_G^L} + \sigma_L g_L \theta_G^L] > \frac{\lambda_G^S}{\lambda_G^L}\hat{S}$$
$$\Rightarrow \text{iff } \hat{G} + \lambda_G^L \sigma_L g_L \theta_G^L > \lambda_G^S \hat{S}$$

Unlike above, it is better to consider changes in input coefficients to changes in input prices as well as technical change, and thus we get the general conditions for impacts on output and prices of technological changes as follows:

With $\hat{r}_G^* = 0,$ using (E5) and (E4), respectively:

$$\theta_S^L.\widehat{w_s} = \widehat{w_L} + g_L \theta_G^L \ \Rightarrow \widehat{w_s} = \frac{\widehat{w_L} + g_L \theta_G^L}{\theta_S^L} \tag{E5.1}$$

$$\theta_u^S.\widehat{w_u} = \widehat{w_s} = \frac{\widehat{w_L} + g_L \theta_G^L}{\theta_S^L} \Rightarrow \widehat{w_u} = \frac{\widehat{w_s}}{\theta_u^S} = \frac{\widehat{w_L} + g_L \theta_G^L}{\theta_u^S \theta_S^L} \tag{E4.1}$$

As θ_u^S <1, $1/\theta_u^S > 1 \Rightarrow \widehat{w}_u > \widehat{w}_s$. Wage inequality improves.

Corollary I: If sector *X*, facing the threat of eviction and land grab, takes recourse to services or inputs from sector *L* (that is, legal protection establishing a code of conduct to prevent violations of land rights), then with improved efficiency of the governance mechanism and better quality and easy access, sector *X* gains and the incidence of land grab may fall. Below we present a simple variant of the extended model.

As before, *L* = *L*(*S*, *G*) and *S* = *S*(*U*, *G*), keeping *G* fixed for this sector.

For linking legal services to land acquisitions, for example, to protect property rights via strong governance and legal land rights, we postulate that:

$a_L^X.X = L$ where a_L^X is the per unit requirement of legal input for *X* sector facing the threat of eviction or land grab. Thus, $\hat{X} = \hat{L} - \hat{a}_L^X$. With $\hat{a}_L^X = -g_X, g_X > 0$, this signifies that the legal sector protecting land rights becomes efficient so that technological coefficient improves, indicating improvement in governance or code of conduct, then we get $\hat{X} = \hat{L} + g_X > 0$

To illustrate the role of better quality of *L* in protecting land rights of small landholders (manifested as rising output of traditional agriculture, sector *X*), let us assume *S* = *S*(*U*), i.e., quality of the unskilled is improved by training or schooling mechanism to translate

into skilled personnel.[44] Then (E2) remains unaltered while we get from price equation (E1): $a_u^S.w_u = w_S \Rightarrow \theta_u^S \widehat{w}_u = \widehat{w}_S$ and $\hat{S} = -\hat{a}_u^S = g_u$ (rise in technical efficiency in skill upgrading) >0.

Under this specific example, (E3) modifies to: $a_G^L.L = \overline{G} \Rightarrow \hat{L} = -\hat{a}_G^L = g_L > 0$. Using the above derivations, this yields:

$$\widehat{X} = \hat{L} + g_X = g_L + g_X > 0. \tag{E4.2}$$

Also, from (E6), we write:

$$\hat{L} = -\hat{a}_G^L = +\theta_S^L \sigma_L \widehat{w}_S > 0, \text{ while } \widehat{r_G^*} = 0 \Rightarrow \widehat{X} = \theta_S^L \sigma_L \widehat{w}_S + g_X. \tag{E4.3}$$

Intuitively, as professional competency is augmented by the more skilled labourforce, a better quality code of conduct comes into existence, resulting in increased output of the smallholder agriculture sector. As *X* expands, more unskilled workers migrate from *A* (the sector subject to land acquisition) to *X* and to *S*, causing a squeeze in the production of *A*. This could lead to an expansion in sector *Z* that utilizes specific skilled labour. Thus, motives for land grab diminish, to the advantage of the innovative manufacturing sector along with smallholder agriculture. Welfare improves and the immiserizing effect, encountered in the basic core model, fades away.

From (E4) and (E5), in this specific illustration, we invoke:

$$\theta_S^L.\widehat{w_s} = \widehat{w_L} = \theta_S^L.[\theta_u^S.\widehat{w_u}] \; (\textit{fixed } \hat{r}_G^* = 0).$$

Hence, from (E4.3) $\widehat{X} = \sigma_L \widehat{w}_L + g_X$ and $\widehat{w_L} > \widehat{w_u} > 0$.

Returns increase for the skilled, governance sector professionals, and unskilled as $\widehat{w}_L > 0, \widehat{X} > 0$.

Therefore, if returns or payments to legal professionals rise due to better quality services, governance mechanisms and skills, then production in the domestic subsistence or smallholders' traditional sector expands, attributable to the host government developing better socio-institutional capital (along with human capital).

With $S = S(U, G)$, we get, $\hat{L} > 0$ and hence, $X > 0$ (see Appendix V)

Now, considering the $P = AC$ equation in *X* sector, we can modify equation (3) and hence, (14) to get (see Appendix V):

$$\Rightarrow \hat{a}_L^X = \theta_{Td}^X (\hat{a}_L^X - \widehat{a_{T_d}^X}) + \theta_u^X (\hat{a}_L^X - \widehat{a_u^X})$$

From this relationship, it is evident that technical expertise or efficiency in the governance/legal sector is the cost-share weighted average of its difference from the

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44 Making $G = 0$ for this sector helps us to highlight the role of skilled legal professionals in providing better quality and stronger governance via *L*, and its impact on *X*-output.

primary factor-augmenting technical change in land and unskilled workers; thus, we could say that if $\hat{a}_L^X > \widehat{a_u^X}$ and $\hat{a}_L^X > \widehat{a_{T_d}^X}$, then surely $\hat{a}_L^X > 0$.

Exploiting the previously developed relationships in terms of isoquant and its properties (equations 17a, b, c, d), we can also derive that:

$$\hat{X} = [\theta_{Td}^X \sigma_{LTd}(\hat{w}_L - \hat{r}_d) + \theta_u^X \sigma_{LU}(\hat{w}_L - \hat{w}_u)] > 0, \text{ when } \hat{w}_L > \hat{w}_u \text{ and } \hat{w}_L > \hat{r}_d. \quad \text{(E4.4)}$$

Proposition IVb: Uniform technical progress in the sector (*L*) protecting property rights will improve the quality of the governance mechanism and will lead to increased output and a reduction in wage inequality. See Appendix V for formal proof.

Rationale: Here $\hat{a}_S^L = \hat{a}_G^L = -g_L (g_L > 0)$. Then, we derive:

$$\theta_S^L \hat{a}_S^L + \theta_G^L \hat{a}_G^L + \theta_S^L \hat{w}_S + \theta_G^L \hat{r}_G^* = \hat{w}_L \text{ and, with } \hat{r}_G^* = 0, \ \theta_S^L \hat{w}_S = \hat{w}_L + g_L \quad \text{(E13)}$$

Considering the system of equations (12)–(15) plus (E12) and (E4.1), we find:

$$\hat{w}_S = \frac{\hat{w}_L + g_L}{\theta_S^L} \text{ and } \theta_S^L [\theta_u^S . \widehat{w_u}] = \hat{w}_L + g_L \Rightarrow \widehat{w_u} = \frac{\hat{w}_L + g_L}{\theta_S^L \theta_u^S} > 0 .$$

Following the previous proposition, we can infer that $\hat{w}_S - \hat{w}_u = -\frac{g_L + \hat{w}_L}{\theta_S^L}(\frac{\theta_G^S}{\theta_u^S}) \Rightarrow [\hat{w}_S - \hat{w}_u] < 0.$ Therefore, inequality declines with the improvements in the quality of governance (attributable to the quality augmentation of skilled workers, i.e., upgrading technical expertise of skill going into legal profession, $\hat{a}_S^L > 0$) and in government transparency $(\hat{a}_G^L > 0)$, translating into a higher level of social capital formation ($\hat{L} > 0$). Intuition is that as the returns to skill increase (w_S>0) and the returns to quality governance also inflate (w_L>0), more of the unskilled are trained workers to become skilled, and an upgrading takes place in *S* and *L* sectors. Thus, the unskilled move from the fixed pool of untrained workers to *S* and subsequently to *L* sector, resulting in a rise in unskilled wage for sectors *M*, *A*, and *X*. As more unskilled workers becoming skilled, the rise in skilled labour via the skill formation training sector leads to a fall in its wage. It is to be noted that the mechanism does not mean that skilled wage is *less* than unskilled wage after the change; rather, it implies that the increase in skilled wage (following ensuing shocks and changes) is less pronounced than that in the case of the unskilled, but the skill–unskilled wage gap still remains, despite a narrowing of the differentials.

Using equation (15), we can show that $\theta_S^Z [\frac{\hat{w}_L + g_L}{\theta_S^L}] + \theta_K^Z \hat{r}_K = 0 \Rightarrow \hat{r}_K = -\frac{\theta_S^Z}{\theta_K^Z \theta_S^L}(\hat{w}_L + g_L) < 0.$

Therefore, $[\hat{w}_S - \hat{r}_K] > 0 \Rightarrow$ from (E8), $\hat{L} > 0$.

Proposition V: Improvement in human capital-induced skill formation through public investment in education, training and schooling (i.e., augmenting technical expertise and efficiency of skilled and unskilled workers represented by an increase in technological

coefficients in *G*-input facilitating the translation of *U* to *S*), leads to an expansion of skill formation, innovative sector, and helps to avert wage inequality and land outsourcing.

Proof: See Appendix VI.

Rationale: Here $\hat{a}_G^S = \hat{a}_u^S = -g_S (g_S > 0)$.

Then, following the derivations in Appendices V and VI, we get:

$$-g_S + \theta_u^S \hat{w}_u = \hat{w}_S \Rightarrow \theta_u^S \hat{w}_u = \hat{w}_S + g_S \tag{E13}$$

and $$\theta_S^L \hat{w}_S = \hat{w}_L \tag{E14}$$

If $\hat{w}_L = 0$, from (E14), $\hat{w}_S = 0$ and from (E13), $\hat{w}_u = \frac{g_S}{\theta_u^S} > \hat{w}_S = 0$

If $\hat{w}_L > 0$ from (E14), $\hat{w}_S = \frac{\hat{w}_L}{\theta_S^L} > 0 \Rightarrow \hat{w}_S > \hat{w}_L (as, \frac{1}{\theta_S^L} > 1)$

and from dividing (E14) by (E13), on simplification:

$$\frac{\hat{w}_s}{\hat{w}_u} = \frac{\hat{w}_L \theta_u^S}{\hat{w}_L + \theta_S^L g_S} \Rightarrow \hat{w}_S < \hat{w}_u.$$

As $w_L (> 0)$ increases, the returns to skill go up; this causes a migration of the unskilled to skilled and legal sector and, following the same logic as in the earlier case, it reduces wage inequality. Also, as technical progress in the unskilled indicates a quality improvement leading to skill formation, in the absence of productivity improvements of skilled workers, marginal productivity of the unskilled workers increases, causing its wage to rise, and reducing the wage gap. Even with $w_L = 0$, the result is valid because under this scenario, productivity enhancement occurs for the unskilled.

From (E3.1), $\lambda_G^S . \hat{S} = \hat{G} + \lambda_G^S g_S - \lambda_G^L \hat{L} \Rightarrow \hat{S} = g_S - \frac{\lambda_G^L}{\lambda_G^S} \hat{L}$ (*if* $\hat{G} = 0$).

We can infer that: $\hat{S} > 0$, if $g_S > \frac{\lambda_G^L}{\lambda_G^S} \hat{L} \Rightarrow$ if $\lambda_G^S g_S > \lambda_G^L \hat{L}$;[45] that is, if public expenditure on education/skill formation exceeds government expenditure on providing better governance via training for skilled lawyers or legal professionals for ensuring stronger governance or a better code of conduct, then the skilled workforce is augmented and can be absorbed into the innovative manufacturing sector (*Z*). This has significance for the land deal issue because if a host country already has better governance and a judicial system in place for protecting local rights, the risky syndrome does not evolve, and the government needs to invest less on building good socio-institutional capital (i.e., in *L* sector's output). The country can put more effort in enhancing its educational infrastructure (human capital) by upgrading the unskilled into an educated workforce (sector *S*), who might contribute to the development of further technical expertise or

[45] Using (E.10) and system of equations (12)–(15), we can also derive that $\hat{s} > 0$.

industrialization via innovation in the advanced sectors (sector *Z*). The existing deep-rooted syndrome of corruption or the veil of secretive deals undermines the objectives of productivity growth, human capital, adaptive capacity, and FDI for better technology in agriculture. For a national economy that is syndrome-free, the host government should take this into consideration before commitment to a land deal.

Corollary: The net impact of skill acquisition, property rights, and host government's control of the code of conduct on land deals depends on the rates of technical progress occurring within the social and human capital sectors as well as on the progress in state machinery or governance mechanism.

Intuitive rationale: Suppose the rate at which the unskilled labourforce converts into skilled is the same as the rate at which government or public institutions facilitate skill formation and/or educational attainment implying $\hat{a}_G^S = \hat{a}_u^S = -\alpha, \alpha > 0$. Efficiency or progress in government machinery also occurs at the same rate as skilled professional training or learning efficacy for legal professionals so that $\hat{a}_G^L = \hat{a}_S^L = -\beta, \beta > 0$. But both rates differ so that $\alpha \neq \beta$. In this case, it is apparent that if $\alpha = \beta$, then both human capital and governance will improve simultaneously; however, in case of $\alpha > \beta$, the desired objective of improving the rule of law will not be achieved despite the higher attainment of human capital. Thus, $\beta > \alpha$ ensures a better outcome, one that is socially good for host country citizens as it reinforces a dual mechanism: better human resources and good quality government.[46]

6 Conclusion

Terminological differences aside, 'outsourcing' (á la *The Economist* 2009) farm production across borders to relatively land-abundant nations for the production of staple crops, and exporting these back to mitigate the adverse effects of food insecurity is a kind of off-shoring. It is quite distinct from the outsourcing of materials or service. The paper fills a void by attempting a theoretical general equilibrium model and exploiting its features to elicit useful conclusions with regard to income distributional and output responses in the wake of policy changes such as price increase, rise in land premium, and technological progress. According to ERD (2009: 68):

> … assessing the contribution of FDI to food security is not an easy task… [It] is a daunting task to address the concerns of the various stakeholders (private sector of investors and host countries as well as governments)… In order to safeguard the concerns of the various parties, it may be useful to develop a framework to highlight the particular aspects of investments, which need to be evaluated so that the negative impacts can be minimized in the future and they can be rendered more sustainable.

This paper attempts to offer a theoretical framework to address such concerns.

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46 The conditions could be derived by extending the derivations in last two propositions.

The model delivers valuable insights with regard to wage gaps and income shares. In particular, it shows that (i) increases in the world prices of agriculture export sector cause indirect harmful skewed effects (shrinkage) in other sectors, viz., manufacturing or innovative sectors, and subsistence sector by pushing people away (via forward and backward linkages), and making them more vulnerable to agro price changes; (ii) due to attractive premiums, land acquisition undermines the avowed aim of mitigating food shortages and aggravating income inequality in host countries even in the presence of productivity change; (iii) adherence to national trade policies to serve domestic people in the face of food shortages has fruitful repercussions in other sectors through a general equilibrium ripple effect; (iv) building up technological efforts (or inducing technical progress) with skills, technological capacity-building, and infrastructure development has positive results if host countries adopt a favourable policy climate for investing in knowledge and education rather than resort to deals under a veil of secretive tactics.

The exercise sheds lights on the two-pronged nature of the debate. For example, the findings of Soete and Habiyaremye (2010) lend support to confirming our conjecture and our results, viz., Propositions II and IV. We have shown that technical progress (in the form of better technology or developing human capabilities that facilitate technological or innovative capabilities) could counter the potential deleterious effects of ill-designed land deals. In addition, the dual approach outlined in von Braun and Meinzen-Dick (2009) and Cotula et al. (2009)—the sharing of benefits and adherence to national trade policy goals, as well as respecting the rights of the locals—is included in Propositions I and III. In fact, Deininger et al. (2011) caution against optimism in attempts to achieve higher productivity if the 'veil of secret tactics between the dealmakers' prevails as it undermines the much avowed objective of improving the labour productivity of the host country. Proposition II in our paper echoes the same concern. The results of Propositions IV to VI highlight the importance of establishing a good code of conduct for protecting land rights via stronger governance as well as building skill for improving productivity. It is shown that public investment in skills and socio-institutional development could cure the economic malaise by freeing the host economy from the malpractices that shroud land deals. For a better, transparent land deal procedure and productive foreign investment in agriculture, host governments need to facilitate these domestic factors as well. Other policy effects such as ownership, risk premium, inequality of bargaining power, or foreign capital ownership are not considered. Although the limited focus does not undermine our purpose, it does indicate that there is room for improvement with the extension or addition of more features, possibly in another paper.

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Mathematical Appendices (I—VI)

Appendix I: Derivations for incorporating premium changes in equation (17a)

Using the production structure in sections 2.2 and 3 (equations 1-15), we derive á la Jones (1965):

$$\sigma_A = -\frac{\widehat{a_u^A} - \widehat{a_{To}^A}}{\widehat{w_u} - \widehat{r_o}} \tag{AI.1}$$

$$\sigma_X = -\frac{\widehat{a_u^X} - \widehat{a_{Td}^X}}{\widehat{w_u} - \widehat{r_d}} \tag{AI.2}$$

$$\sigma_M = -\frac{\widehat{a_u^M} - \widehat{a_k^M}}{\widehat{w_u} - \widehat{r_k}} \tag{AI.3}$$

$$\sigma_Z = -\frac{\widehat{a_s^Z} - \widehat{a_k^Z}}{\widehat{w_s} - \widehat{r_k}} \tag{AI.4}$$

$\widehat{Y_j} = -\widehat{a_i^j}, \forall j \in \{M, A, X, Z\}$, Y is the generic output of j (AI.5)

and $\hat{A} - \hat{X} = \widehat{a_{Td}^X} - \widehat{a_{To}^A}$ (AI.6)

Also, $\theta_i^j \widehat{a_i^j} + \theta_h^j \widehat{a_h^j} = 0 \ \forall i \neq h$: inputs, $\forall j$: sectors (AI.7)

Using (AI.1-AI.5) and (AI.7), we obtain from the equations in sections 2.1 and 3:

From (6), $\hat{Z} = -\widehat{a_s^Z} = [-\theta_k^Z \sigma_z (\hat{r_k} - \widehat{w_s})] < 0$ (AI.8)

From (8), $\hat{A} = -\widehat{a_{To}^A} = [-\theta_u^A \sigma_A (\widehat{w_u} - \hat{r_o})] < 0$ (AI.9)

From (9), $\hat{X} = -\widehat{a_{Td}^X} = [-\theta_u^X \sigma_X (\widehat{w_u} - \hat{r_d})] < 0$ (AI.10)

Following Caves, Frankel and Jones (2007), we write 'elasticity of marginal product of unskilled labour (*MPU*)' in *A*, *X*, and *M* as:

$$\gamma_u^j = -\left(\widehat{a_u^j} - \widehat{a_h^j}\right) \Big/ \left(\widehat{w_u^j} - \hat{P}_j\right), \text{ where } h = T_o, T_d, K \text{ and } j \in \{A, X, M\} \tag{AI.11}$$

$$\beta_j = \lambda_{uj} \gamma_u^j / \gamma_u \text{ , where } \gamma_u = \sum_j \lambda_{uj} \gamma_u^j, j \in \{A, X, M\} \tag{AI.12}$$

$$\text{Thus, } \widehat{w_u} = \sum_j \beta_j \hat{P}_J - \frac{1}{\gamma_u} \hat{U} \tag{AI.13}$$

For relatively mobile capital between *M* and *Z*, analogously, we get:

$$\hat{r_k} = \sum_j \delta_j \hat{P}_J - \frac{1}{\gamma_k} \hat{K} \tag{AI.14}$$

where $\delta_j = \lambda_{kj}\gamma_k^j / \gamma_k$, where $\gamma_k = \sum_j \lambda_{kj}\gamma_k^j, j \in \{Z, M\}$

Consider equations (AI.11), (AI.12), and (AI.7) to yield:

$$\widehat{a_{To}^{A}} = \theta_u^A \gamma_u^A \left(\widehat{w_u} - \widehat{P_A} \right) \tag{AI.15}$$

$$\widehat{a_{Td}^{X}} = \theta_u^X \gamma_u^X \left(\widehat{w_u} - \widehat{P_X} \right) \tag{AI.16}$$

Therefore, using (AI.15), (AI.16) and (AI.6), we find:

$$\begin{aligned} &\hat{A} - \hat{X} = \widehat{a_{Td}^{X}} - \widehat{a_{To}^{A}} = \delta_s \left(\widehat{P_A} - \widehat{P_X} \right) + \frac{1}{\gamma_u} \left[\theta_u^A \gamma_u^A - \theta_u^X \gamma_u^X \right] \overline{U} \\ &\text{where } \delta_s = \sum_j \beta_j \theta_u^j \gamma_u^j > 0, \ \forall j \in \{A, X\} \end{aligned} \tag{AI.17}$$

Additionally, using (AI.6), (8a), (9a) and (16), derive, as in text:

$$\hat{A} - \hat{X} = \widehat{a_{Td}^{X}} - \widehat{a_{To}^{A}} = (\widehat{w_u} - \hat{r_o}) \left[\theta_u^X \sigma_X - \theta_u^A \sigma_A \right] + \hat{r_p} \theta_u^X \sigma_X \tag{17a}$$

Appendix II: Proof of Proposition I

Case 1—Proof

From equation (13), we can write:

$\theta_u^A.\widehat{w_u} + \theta_{To}^A.\hat{r_o} = \widehat{P_A} \Rightarrow \hat{r_0} = \frac{\widehat{P_A} - \theta_u^A.\widehat{w_u}}{\theta_{T_o}^A} > 0.$ As it is specific factor structure (as T_o is specific factor in A), following Jones (1971), $\hat{r_o} > \widehat{P_A} > \widehat{w_u} \geq 0.$ The acquirer benefits unambiguously and unskilled labour suffers.

If $\widehat{w_u} \cong 0$ (this is highly plausible because, by assumption, X uses more L_u than A or M and thus unemployed surplus might push w_u down to almost negligible increase), this yields: $\hat{r_o} \cong \widehat{P_A} \Big/ \theta_{To}^A > 0$, causing more land to be 'leased' and resulting in $\hat{A} > 0$. This implies for X sector, $\hat{r_d} \leq 0.$

As L_u relocates to A from both X and M sectors, they contract ($\widehat{M} < 0, \hat{X} < 0$). As M (the sector with higher capital's share) contracts, the return to domestic capital falls ($\hat{r_k} \leq 0$), causing K to relocate to sector Z and $\hat{Z} > 0.$ Given $\widehat{P_Z} = 0$, wage of skilled labour has to increase as $\hat{r_k} \leq 0$. That induces $\widehat{w_s} > \widehat{w_u} > 0.$ Squeezing of both these sectors causes adverse effects on domestic industries in the host. Wage inequality might worsen.

A numerical example will illustrate the case:

$$\hat{r_0} = \frac{\widehat{P_A} - \theta_u^A.\widehat{w_u}}{\theta_{T_o}^A} = \frac{\widehat{P_A}}{\theta_{T_o}^A} - \frac{\theta_u^A}{\theta_{T_o}^A}\widehat{w_u}$$

By assumption, $\theta_u^A < \theta_{T_o}^A \Rightarrow \theta_u^A \Big/ \theta_{T_o}^A \prec 1$. Let θ_u^A=20%, $\theta_{T_o}^A$=80%, $\widehat{P_A}$ = 5% (recently from FAO report on current surge of food price hikes), $\widehat{w_u}$ =4% (higher end of such an increase), then following above derivation, $\hat{r_0} = \frac{5\% - 0.2.4\%}{0.8} = 6.25\% - 1\% = 5.25\% > \widehat{P_A} = 5\% > \widehat{w_u} = 4\%.$

Suppose $\widehat{w_u}$ =1% (i.e., a negligible increase in unskilled wage), then $\hat{r_0} = \frac{5\% - 0.2.1\%}{0.8} = 6.25\% - 0.25\% = 6\% > \widehat{P_A} = 5\% > \widehat{w_u} = 1\%$. Thus, return to the owner of leased land inflates more when the unskilled wage does not increase much, aggravating the income distribution.

Case 2—Proof

We have here $\hat{A} > 0, \hat{Z} > 0, \widehat{M} < 0, \hat{X} < 0.$ Thus, sectors M and X contract, having immiserizing effects. Also, here wage inequality between skilled and unskilled worker aggravates as price of skill-intensive (specific factor) sector Z also goes up; in fact, following Jones (1971), we see that w_s goes up more than P_z.

Consider $\widehat{P_A} > 0 = \widehat{P_X}$, then, $\hat{r_o} > \widehat{w_u} > 0, \hat{A} > 0$.

As $\widehat{P_Z} > \widehat{P_M} > 0$, $\widehat{w_s} > \widehat{P_Z} > \hat{r_K} > \widehat{P_M} > \widehat{w_u}$, returns to the specific factor (skilled) unambiguously improves in sector *Z* whereas L_u suffers and return to the mobile factor *K* is sandwiched.

Next, consider $\widehat{P_A} > \widehat{P_Z}$ so that $\widehat{P_A} = n\widehat{P_Z}, n > 1,$ then we see that $\hat{r_o} > \widehat{P_A} > \widehat{w_s} > \widehat{P_Z} > \hat{r_K} > \widehat{w_u}$.

Also, as usual $\hat{Z} > 0$. Analogously, $\widehat{P_M} > 0 \Rightarrow \widehat{M} > 0$. Thus, $\hat{r_k} > 0$. Returns to domestic entrepreneurs or capital owners increase as both *K*-using sectors (*M* and *Z*) expand following the impetus of a price increase.

Here $\widehat{P_M} > 0,$ while $\widehat{P_Z} > 0$ is valid. Taking the pair of specific factor sectors *M* and *Z*, we derive, following Jones (1965) and Krugman and Obstfeld (2006), in general:

$$\widehat{w_s} - \hat{r_K} = \frac{1}{\theta_s^Z}(\widehat{P_Z} - \hat{r_K}) \quad \text{(AII.1)}$$

$$\widehat{w_u} - \hat{r_K} = \frac{1}{\theta_u^M}(\widehat{P_M} - \hat{r_K}) \quad \text{(AII.2)}$$

$$\hat{r_o} - \widehat{w_u} = \frac{1}{\theta_{To}^A}(\widehat{P_A} - \widehat{w_u}) \quad \text{(AII.3)}$$

Subtracting (AII.2) from (AII.1), and using the relation that: $\widehat{P_Z} > \hat{r_K} > \widehat{P_M}$, we obtain:

$$\widehat{w_s} - \widehat{w_u} = [\frac{1}{\theta_s^Z}(\widehat{P_Z} - \hat{r_K}) + \frac{1}{\theta_u^M}(\hat{r_K} - \widehat{P_M})] > 0 \quad \text{(AII.4)}$$

(QED.)

On the contrary, considering the system of equations (12), (13) and (15), we see from (12) that ***iff*** $\widehat{w_u} = 0$, then $\theta_K^M \hat{r_K} = 0,$ implying $\hat{r_K} = 0$. This yields:

$\widehat{w_s} = \frac{\widehat{P_Z}}{\theta_K^Z} = \widehat{P_A} / n\theta_s^Z > 1,$ which in turn gives: $\widehat{P_A} > \widehat{w_s} > \widehat{P_Z}$.[47]

As before, we construct a numerical example following the direction of causal changes in the variables in *Case 3* so that:

Consider following the examples constructed in *Case 1* above with following configurations of parameters:

$$\theta_{T_o}^A = 0.8, \theta_u^A = 0.2; \theta_u^X = 0.4, \theta_{Td}^X = 0.6; \theta_u^M = 0.4, \theta_K^M = 0.6; \theta_S^Z = 0.6, \theta_K^Z = 0.4.$$

Based on the above derivations, exogenous price shocks and changes in factor returns are constructed as follows: $\widehat{P_A} = 5\%, \widehat{P_Z} = 4.5\%, \hat{r_K} = 4\%, \widehat{w_u} = 1\%.$

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47 In case of P_z rising more than P_A or P_M, the result changes as modifications in these variables have the directionality as *Z*-output increases, and consequently, $w_s > r_0 > r_d$, and $r_d < 0$, $w_u > o$. As *K* moves to sector *Z*, sector *M* might contract. As $w_s > w_u > 0 > r_d$, inequality worsens here, too. But skilled labour does not suffer compared to T_o owners.

Thus, share-weighted average yields, $\widehat{P_M} = 2.8\% = 0.6 \times 4\% + 0.4 \times 1\%.$

Using (AII.1-AII.4), we can see that:

$$\widehat{w_s} - \widehat{r_K} = {}^{1}\!/_{0.6}(4.5\% - 4\%) = 0.83\% > 0 \Rightarrow \widehat{w_s} = 4.83\%$$

$$\widehat{w_u} - \widehat{r_K} = {}^{1}\!/_{0.4}(2.8\% - 4\%) = -3\% \Rightarrow \widehat{w_u} = 4\% - 3\% = 1\%$$

$$\widehat{r_o} - \widehat{w_u} = {}^{1}\!/_{0.8}(5\% - 1\%) = 5\% \Rightarrow \widehat{r_o} = 6\% \succ \widehat{P_A}.$$

And, thus $\widehat{r_o} = 6\% \succ \widehat{P_A} = 5\% \succ \widehat{w_s} = 4.83\% \succ \widehat{r_K} = 4\% \succ \widehat{w_u} = 1\%.$

Appendix III–Proof of Proposition II

Specific to this scenario, considering equation (16), we rewrite equation system (12)-(14) as:

$$\theta_u^M \widehat{w_u} + \theta_k^M \widehat{r_k} = 0 \tag{AIII.1}$$

$$\theta_u^A \widehat{w_u} + \theta_{To}^A (\widehat{r_p} + \widehat{r_d}) = \widehat{P_A} \tag{AIII.2}$$

$$\theta_u^X \widehat{w_u} + \theta_{Td}^X \widehat{r_d} = 0 \tag{AIII.3}$$

$$\theta_s^Z \widehat{w_s} + \theta_k^Z \widehat{r_k} = 0 \tag{AIII.4}$$

Using (13c) and (14) and applying Cramer's rule, we obtain:

$$\begin{pmatrix} \theta_u^A & \theta_{To}^A \\ \theta_u^X & \theta_{Td}^X \end{pmatrix} \begin{pmatrix} \widehat{w_u} \\ \widehat{r_d} \end{pmatrix} = \begin{pmatrix} \widehat{P_A} - \theta_{To}^A \widehat{r_p} \\ 0 \end{pmatrix} \tag{AIII.5}$$

Solving for $\widehat{w_u}$ and $\widehat{r_d}$, from (AIII.5) we find:

$$\widehat{w_u} = \frac{(\widehat{P_A} - \theta_{To}^A \widehat{r_p})\theta_{Td}^X}{|\theta|}, \text{ where } |\theta| = \theta_u^A \theta_{Td}^X - \theta_u^X \theta_{To}^A \tag{AIII.6}$$

$|\theta| = \theta_u^X - \theta_u^A$ is the difference between land to unskilled labour shares between sectors *X* and *A*. As *A* is specific factor T_o-intensive and *X* is relatively L_u-intensive compared to *A*, $|\theta|$>0, thus, with $\widehat{P_A} > 0$ and $\widehat{r_p} > 0$ we get from (AIII.6):

$$\widehat{w_u} = \frac{(\widehat{P_A} - \theta_{To}^A \widehat{r_p})\theta_{Td}^X}{|\theta|} > 0 \tag{AIII.7}$$

$$\text{and also, } \widehat{r_d} = \frac{-(\widehat{P_A} - \theta_{To}^A \widehat{r_p})\theta_u^X}{|\theta|} < 0. \tag{AIII.8}$$

Using equation (12) and (AIII.7), we get:

$$\widehat{r_K} = \frac{-\theta_u^M \widehat{w_u}}{\theta_K^M} < 0 \tag{AIII.9}$$

From (15) using (AIII.8), we derive: $\widehat{w_s} = \frac{\theta_K^Z \theta_u^M}{\theta_s^Z \theta_K^M} . \widehat{w_u}$.

Thus, on simplification we write:[48]

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48 As sectors *Z* and *M* use intersectorally mobile *capital*, it is convenient to mathematically express them in terms of common mobile factor.

$$\widehat{w_s} - \widehat{w_u} = \widehat{w_s}\left[1 - \frac{\theta_K^M}{1-\theta_K^M}.\frac{1-\theta_K^Z}{\theta_K^Z}\right] \qquad \text{(AIII.10)}$$

Given $\widehat{w_S} \neq 0$, inferences are:

$$\widehat{w_s} - \widehat{w_U} \prec 0, \; iff \; [1 - \frac{\theta_K^M}{1-\theta_K^M}.\frac{1-\theta_K^Z}{\theta_K^Z}] \prec 0 \Rightarrow \theta_K^Z(1-\theta_K^M) \prec \theta_K^M(1-\theta_K^Z) \Rightarrow iff \; \theta_K^Z \prec \theta_K^M.$$

It is important to note that both $\theta_K^Z \prec \theta_K^M$ and $\theta_K^Z \succ \theta_K^M$ cannot hold true simultaneously. The intuition is that if $\theta_K^Z \succ \theta_K^M$, then, based on the previous explanation, inequality will definitely aggravate; otherwise with $\theta_K^Z \prec \theta_K^M$, the wage gap is reduced (as unskilled wage increases more than the skilled wage owing to the fact that unskilled emigration happens in the sector under land deals with foreign investment. However, as the share terms show, by assumption of factor-intensity and following Proposition I, we observe that $\theta_K^Z \succ \theta_K^M$ and hence, $\widehat{w_s} > \widehat{w_u}$; that is, wage inequality worsens as the rise in skilled wage is more than that in unskilled returns. As *A* is T_o-intensive, following an increase in the premium, r_o increases ($\widehat{r_o} > \widehat{r_d}$). (QED).

Appendix IV: Proof of Proposition III

(i) Let technical change be confined only to A so that $\widehat{a_{To}^{A}} = -\mathrm{T}, \mathrm{T} > 0,$ whereas $\widehat{a_{i}^{j}} = 0, \forall j, i \neq T_o$. Now, using equations (2) and (13) and envelope condition (Jones 1965) we can write: $-\mathrm{T} = \widehat{P_A} \Big/ \theta_{To}^{A} \Rightarrow \widehat{P_A} < 0$.

We also see, $\widehat{r_o} = \widehat{P_A} \Big/ \theta_{To}^{A} = -T < 0$ and $\widehat{w_u} > 0, \widehat{w_s} = 0, \widehat{r_K} = \widehat{r_d} = 0.$

(ii) Consider uniform all primary-factor augmenting technical progress occurring in both sectors A and X at the same rate so that:

$$\widehat{a_{To}^{A}} = \widehat{a_{Td}^{X}} = \widehat{a_{u}^{X}} = \widehat{a_{u}^{A}} = -\mathrm{T}, \mathrm{T} > 0 \tag{18}$$

As before, the output of both A and X expands ($\widehat{A} > 0, \widehat{X} > 0$). As sector Z does not experience (by assumption) technological change and does not employ L_u, T_o, and T_d, we set aside this sector in the present consideration and being immune to productivity change w_s and r_k are unaffected. Employing the envelope theorem and using equations (12)–(14) and (1)–(4) we write:

$$\theta_{u}^{A} \widehat{w_u} + \theta_{To}^{A} \widehat{r_o} = \mathrm{T} \tag{AIV.1}$$

$$\theta_{u}^{X} \widehat{w_u} + \theta_{Td}^{X} \widehat{r_d} = \mathrm{T} \tag{AIV.2}$$

$$\theta_{u}^{M} \widehat{w_u} + \theta_{k}^{M} \widehat{r_k} = 0 \tag{AIV.3}$$

$$\theta_{s}^{Z} \widehat{w_s} + \theta_{k}^{Z} \widehat{r_k} = 0 \tag{AIV.4}$$

Using equation (16), (AIV.1) can be recast as:

$$\theta_{u}^{A} \widehat{w_u} + \theta_{To}^{A} \widehat{r_d} = \mathrm{T} - \theta_{To}^{A} \widehat{r_p} \tag{AIV.5}$$

Solving (AIV.5) with (AIV.2), by applying Cramer's rule yields:

$$\begin{pmatrix} \theta_{u}^{A} & \theta_{To}^{A} \\ \theta_{u}^{X} & \theta_{Td}^{X} \end{pmatrix} \begin{pmatrix} \widehat{w_u} \\ \widehat{r_d} \end{pmatrix} = \begin{pmatrix} \mathrm{T} - \theta_{To}^{A} \widehat{r_p} \\ \mathrm{T} \end{pmatrix} \tag{AIV.6}$$

Therefore, we find that:

$$\widehat{w_u} = \frac{(\mathrm{T} - \theta_{To}^{A} \widehat{r_p}) \theta_{Td}^{X} - \mathrm{T} \theta_{To}^{A}}{|D|} \tag{AIV.7}$$

where $|D| = \theta_{u}^{A} \theta_{Td}^{X} - \theta_{u}^{X} \theta_{To}^{A} = \theta_{u}^{A} - \theta_{u}^{X}$; thus, from the previous discussion (see derivation), we infer that $|D| \equiv |\Delta < 0|$.

On simplification, (AIV.7) gives:

$$\widehat{w_u} = \mathrm{T} - \widehat{r_p} \frac{\theta_{To}^{A} \theta_{Td}^{X}}{|D|} \tag{AIV.8}$$

From (AIV.8), we can easily show that with $\hat{r}_p > 0$, $\hat{w}_u$ >0 because the second term is preceded by a negative sign (for $\hat{r}_p = 0, \hat{w}_u = \mathrm{T}$).

Similarly, we derive:

$$\hat{r}_d = \mathrm{T} + \frac{\theta_u^X \theta_{To}^A \hat{r}_p}{|D|} \tag{AIV.9}$$

and $$\hat{r}_o = \mathrm{T} + \frac{\hat{r}_p}{|D|} \theta_u^A \theta_{Td}^X \tag{AIV.10}$$

Thus, $\hat{w}_u - \hat{r}_d = \frac{\hat{r}_p}{|D|}(\theta_{Td}^X - \theta_u^X) > 0$, which via (9a) implies that $\hat{X} > 0$.

Also, simplifying we find:

$\hat{w}_u - \hat{r}_o = -\frac{\hat{r}_p}{|D|}\theta_{Td}^X > 0$, which via (8a) implies that $\hat{A} < 0$.

Also, from above we write:

$\hat{w}_u > \hat{r}_o > \hat{r}_d > 0, \hat{r}_p > 0.$

Also, we can verify using (AIV.9) and (AIV.10) that:

$\hat{r}_d - \hat{r}_o = \frac{\hat{r}_p}{|D|}\left[\theta_u^X - \theta_u^A\right] < 0, \theta_u^X > \theta_u^A \Rightarrow \hat{r}_d < \hat{r}_o.$

As T_o and T_d are specific immobile factors, technical progress does not lead to accrual of productivity gains much in terms of sectoral readjustment of land. From (AIII.4), we get:

$$\hat{w}_s = -\frac{\theta_K^Z}{\theta_s^Z}\hat{r}_K = 0 \tag{AIV.11}$$

Using these relations, we get the magnitude of relative changes in wages between skilled and unskilled labour as $\hat{w}_u > \hat{w}_s$, with $\hat{r}_p = 0, \hat{w}_u = \hat{r}_o = \hat{r}_d = \mathrm{T} > \hat{w}_s > \hat{r}_K$. There is no incentive for investment in foreign land acquisitions. As wage inequality improves and both sectors expand, the skewed effects are absent and the immiserizing effect dissipates. Capital's share in *M* and *Z* drives $\widehat{w_s/w_u}$. Thus, the immiserization effect fades via the retrograding effect induced by the primary-factor augmenting technological progress. However, these countries experience emigration or mobility of talent, often adversely affecting skill-transfer.

Appendix V: Proof of Proposition IV

For changes in full employment or market-clearing conditions, we write:

From (5E): $\lambda_u^M \widehat{M} + \lambda_u^A \widehat{A} + \lambda_u^X \widehat{X} + \lambda_u^S \widehat{S} = \widehat{U} - [\lambda_u^M \widehat{a_u^M} + \lambda_u^A \widehat{a_u^A} + \lambda_u^X \widehat{a_u^X} + \lambda_u^S \widehat{a_u^S}]$ (5E.1)

From (6E): $\lambda_S^Z \hat{Z} + \lambda_S^L \hat{L} = \hat{S} - [\lambda_S^Z \hat{a}_S^Z + \lambda_S^L \hat{a}_S^L]$ (6E.1)

From (3E), analogously $\lambda_G^L \hat{L} + \lambda_G^S \hat{S} = \hat{G} - [\lambda_G^L \hat{a}_G^L + \lambda_G^S \hat{a}_G^S]$ (E3.1)

Using (6a) and (E6) in (6E.1), with $\hat{r}_G^* = 0$, we get after simplification:

$$\lambda_S^L \hat{L} = \hat{S} + \lambda_S^Z \sigma_Z \theta_K^Z (\widehat{w}_S - \hat{r}_K) + \lambda_S^L \sigma_L \theta_G^L \widehat{w}_S - \lambda_S^Z \hat{Z} \quad \text{(E8)}$$

On further simplification, (E8) in the text yields:

$$\hat{L} = \hat{S} \Big/ \lambda_S^L + \frac{\lambda_S^Z}{\lambda_S^L} \sigma_Z \theta_K^Z (\widehat{w}_S - \hat{r}_K) + \sigma_L \theta_G^L \widehat{w}_S - \frac{\lambda_S^Z}{\lambda_S^L} \hat{Z} \quad \text{(E8.1)}$$

Collecting terms from above, we write that:

$$\hat{L} = [\hat{S} \Big/ \lambda_S^L + \sigma_L \theta_G^L \widehat{w}_S] - \frac{\lambda_S^Z}{\lambda_S^L} [\hat{Z} - \sigma_Z \theta_K^Z (\widehat{w}_S - \hat{r}_K)]$$

As before, from (E3.1), (E6), and (E7) we write:

$$\begin{aligned} &\lambda_G^L \hat{L} = \hat{G} - \lambda_G^S . \hat{S} - \lambda_G^L \theta_S^L \sigma_L \widehat{w}_S - \lambda_G^S \theta_u^S \sigma_S \widehat{w}_u \quad \text{assuming } (\hat{r}_G^* = 0). \\ &\Rightarrow \hat{L} = \frac{\hat{G}}{\lambda_G^L} - \frac{\lambda_G^S}{\lambda_G^L} \hat{S} - \theta_S^L \sigma_L \widehat{w}_S - \frac{\lambda_G^S}{\lambda_G^L} \theta_u^S \sigma_S \widehat{w}_u \end{aligned} \quad \text{(E9)}$$

We recast (5E.1) to:

$$\hat{S} = -[\frac{\lambda_u^M}{\lambda_u^S} \widehat{M} + \frac{\lambda_u^A}{\lambda_u^S} \hat{A} + \frac{\lambda_u^X}{\lambda_u^S} \hat{X}] + \frac{\lambda_u^M}{\lambda_u^S} \theta_k^M \sigma_M (\widehat{w}_u - \hat{r}_k) + \frac{\lambda_u^A}{\lambda_u^S} \theta_{T_o}^A \sigma_A (\widehat{w}_u - \hat{r}_o) + \frac{\lambda_u^X}{\lambda_u^S} \theta_{Td}^X \sigma_X (\widehat{w}_u - \hat{r}_d) + \theta_G^S \sigma_S (\widehat{w}_u - \hat{r}_c^*)$$

(E10)

With $\underline{S} = S(U, G)$, from either (E8.1) or (E3.1), $\hat{L} > 0$ and hence, $\widehat{X} > 0$.

Now, considering the *P=AC* equation in sector *X*, we can modify equation (3) and hence, (14) to:

$$a_u^X w_u + a_{Td}^X r_d + a_L^X w_L = P_X \quad \text{(3E)}$$

$$\Rightarrow \theta_u^X \widehat{w_u} + \theta_{Td}^X \widehat{r_d} + \theta_L^X \widehat{w}_L = \widehat{P_X} \quad \text{(14E)}$$

Using envelope condition, we write:

$$\theta_u^X \widehat{a_u^X} + \theta_{Td}^X \widehat{a_{T_d}^X} + \theta_L^X \widehat{a_L^X} = 0 \text{, where } \theta_u^X + \theta_{Td}^X + \theta_L^X = 1$$

$$\Rightarrow \hat{a}_L^X = (\theta_u^X + \theta_{Td}^X)\hat{a}_L^X - (\theta_u^X \widehat{a_u^X} + \theta_{Td}^X \widehat{a_{T_d}^X}) \tag{14E.1}$$

$$\Rightarrow \hat{a}_L^X = \theta_{Td}^X (\hat{a}_L^X - \widehat{a_{T_d}^X}) + \theta_u^X (\hat{a}_L^X - \widehat{a_u^X})$$

Exploiting previously developed relationships in terms of isoquant and its properties (alike equations AI.1–AI.4), we can also derive that:

$$\hat{a}_L^X = -\theta_{Td}^X \sigma_{LTd}(\widehat{w}_L - \hat{r}_d) - \theta_u^X \sigma_{LU}(\widehat{w}_L - \widehat{w}_u)$$

$$\Rightarrow \hat{a}_L^X = -[\theta_{Td}^X \sigma_{LTd}(\widehat{w}_L - \hat{r}_d) + \theta_u^X \sigma_{LU}(\widehat{w}_L - \widehat{w}_u)] \tag{E4.4}$$

$$\Rightarrow \hat{X} = [\theta_{Td}^X \sigma_{LTd}(\widehat{w}_L - \hat{r}_d) + \theta_u^X \sigma_{LU}(\widehat{w}_L - \widehat{w}_u)] > 0, \text{ when } \widehat{w}_L > \widehat{w}_u \text{ and } \widehat{w}_L > \hat{r}_d.$$

Appendix VI: Proof of Proposition V

Here $\hat{a}_G^S = \hat{a}_u^S = -g_S (g_S > 0)$. Then, following derivations in Appendix V, we get:

$$\theta_G^S \hat{a}_G^S + \theta_u^S \hat{a}_u^S + \theta_u^S \widehat{w}_u + \theta_G^S \hat{r}_G^* = \widehat{w}_S$$

$$\Rightarrow -g_S + \theta_u^S \widehat{w}_u = \widehat{w}_S \Rightarrow \theta_u^S \widehat{w}_u = \widehat{w}_S + g_S \tag{E13}$$

and $\theta_S^L \widehat{w}_S = \widehat{w}_L$ (E14)

From (E3.1), $\lambda_G^S . \hat{S} = \widehat{G} + \lambda_G^S g_S - \lambda_G^L \hat{L} \Rightarrow \hat{S} = g_S - \frac{\lambda_G^L}{\lambda_G^S} \hat{L}$ ($if\ \widehat{G} = 0$).