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FDI and Supply Chains in Horticulture: Diversifying Exports and Reducing Poverty in Africa, Latin America, and other Developing Economies[#]

Theodore H. Moran[*]
School of Foreign Service, Georgetown University, United States.

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Abstract

Developing countries that manage to diversify their exports grow more rapidly and enjoy greater welfare benefits than those who do not. Most prior studies of export diversification have focused on manufactured exports. This study turns to the exports of processed fruits, packaged vegetables, and cut flowers. As in diversification of manufactures, foreign investors play a central role. When successful, the outcome often includes externalities for local workers and firms, with prominent gender implications as women form a key part of the workforce. Thailand and other countries in South East Asia can be major beneficiaries of this process.

Keywords: FDI, Supply Chains, Export Diversification
JEL Classifications: F23, F13, O54, O55

[#] Invited paper from *Thailand and the World Economy* (*TWE*)

[*] Professor and the Marcus Wallenberg Chair in the International Business and Finance at School of Foreign Service, Georgetown University and Nonresident Senior Fellow, Center for Global Development, Washington DC. This analysis has relied upon able research assistance from Zhiyao (Lucy) Lu, Peterson Institute for International Economics. Address: 3700 O St., N.W.Washington, D.C. 20057, United States. Email: Morant@geogetown.edu. Note that this is an invited paper so that the revision was made only in terms of formatting the paper.

1. Introduction

Developing countries that manage to upgrade and diversify their export base experience faster growth and enjoy greater welfare gains than those that do not (Hausmann et.al, 2007).

Some countries manage to change their export profile via the success of indigenous entrepreneurs. In the contemporary period, however, it is much more frequent for developing countries to accomplish this via attracting foreign direct investment into novel sectors. They use foreign investment to hook into global supply chains, and then build backward linkages to local firms and workers in the host economy.

Prior research on foreign investment and supply chains in emerging markets has focused almost exclusively on the creation of international networks in manufacturing and assembly (UNCTAD, 2013). Such research begins with foreign investment and supply chains in low-skill low-wage activities such as garments and footwear. To this has been added foreign investment and supply chain creation in middle-skill and upper-skill manufacturing, asking what kind of host policies might be needed to create export clusters in the auto sector, electronics, industrial equipment, medical devices, and the like (Moran, 2014). This paper aims to extend that research, looking beyond manufacturing into supply chain creation in horticulture – in particular, vegetables, fruits, and flowers, raw, packaged, processed – in Africa, Latin America, and other developing countries.

Alongside traditional exports of coffee, tea, rice, maize, and soybeans, emerging market countries have emerged as major players in global horticulture markets. The World Bank estimates that horticulture exports of fruit and vegetables from developing countries reached $70 billion by 2004 (World Bank, 2014). Since then, multinational investor and retailer-supervised supply chains in the vegetable and fruit business – sorted, graded, washed, and sometimes packaged or processed, shipped ready-to-eat with traceable bar-codes -- have become, alongside cut flowers, multi-billion dollar industries that have transformed the structure of agribusiness exports in Africa, Latin America, and elsewhere.

In Latin America, Chile has grown to become a global powerhouse in horticultural exports, topping $4.3 billion in 2013. The principal export categories include sorted, graded, washed, and sometimes packaged grapes, apples, cranberries, cherries, kiwifruit, avocados, pears, peaches, and plums. Colombia has emerged as the world's second-largest exporter of cut flowers after the Netherlands, exporting $1.35 billion worth of roses, carnations, chrysanthemums, and other specialty flowers in 2013. Horticulture exports from Ecuador exceeded $100 million in the same year. Vegetable exports from Central America grew to more than $300 million by 2012, alongside traditional exports of fruits such as bananas and citrus.

In Africa, horticulture exports from Kenya – both cut flowers and packaged vegetables – amounted to more than one billion dollars in 2015, thereby becoming the country's third largest export industry after tourism and tea. Ethiopia earned some $245 million from cut flower exports in the 2013-2014 fiscal year. Zambia, Tanzania, Uganda, Senegal, and Zimbabwe have also seen rapid growth in horticultural exports, as well as South Africa. Countries across North Africa and into the Middle East have followed suit, including Morocco, Algeria, Egypt, Djibouti, Lebanon, Jordan, and the West Bank.

Given the importance of export diversification for sustained development, how have some developing countries managed to break into the ranks horticultural exporters,

while others have not? What are the obstacles to entering international supply chains for horticultural exports?

Do foreign investors play the same lead role in launching emerging market economies into international horticulture markets, as in manufacturing and assembly? What are the barriers to the entry of indigenous entrepreneurs?

What has been the impact of external retailers and external standards on the structure of local production?

What does the rise of horticultural exports mean for local workers and communities? What are the benefits, and the hazards? Where is there evidence of spillovers and externalities?

This paper looks first at the role of foreign investors in launching the export of processed fruits, packaged vegetables, and cut flowers, examining the similarities and differences with the spread of supply chains in manufacturing and assembly. The paper then turns to the role of retailers, and examines the impact of international standards on the consolidation of horticultural production. This leads to a broader investigation of positive and negative impacts on workers, including spillovers to indigenous firms and externalities for local communities.

The paper concludes with an investigation of policy implications for developing country governments, for the World Bank and regional financial institutions, and for other providers of external assistance. Of particular note, the policies required to generate supply chains in horticulture constitute a *race-to-the-top* among countries in improving national doing-business indicators, in upgrading local infrastructure, in establishing effective investment promotion procedures, and in launching public-private vocational-training partnerships in farming and agribusiness.

2. The Creation of Supply Chains in Horticulture in Comparison to the Creation of Supply Chains in Manufacturing

Our understanding of how developing countries penetrate international markets on a large scale in novel sectors is changing dramatically. Recent research by Caroline Freund and Denisse Pierola shows that success in entering new international markets comes from fielding export superstars that are born big, start out as highly productive firms, and grow fast (Freund and Pierola, 2015). Among the 32 emerging market countries they study, the top firm on average accounts for 14% of a country's total (nonoil) exports, and the top five firms make up 30%. Variation in exports from the top firm in a country explains about one-third of the changes in sectoral exports relative to income across countries, and variation in exports from the top five firms explains nearly half.

These superstars are different from the mass of other smaller traditional exporters in the domestic economy, most of which never grow large. Their success explains most of the export growth and diversification found across emerging market economies.

What are the origins of these top-five superstar export firms in developing economies? Freund and Pierola find that two-thirds are foreign-owned (Freund and Pierola, 2016).

Limitations in using customs data, which record information on exports but no other firm characteristics, hinder the exploration of precisely how foreign investment can be harnessed to the process of export diversification. To remedy this, a prior paper examined case studies of how one or a small handful of multinational investors in

manufacturing and assembly have supplied the capital, technology, quality control, and marketing expertise needed to penetrate international markets (Freund and Moran, 2017). This research shows that these small numbers of foreign investors have been able to transform the revealed comparative advantage of the host economy in very short periods of time.

This previous investigation of supply chain expansion in manufacturing and assembly relies on country case studies, industry case studies, and issue case studies, backed in some instances by econometric analysis. The investigation of supply chain expansion in horticulture in this paper is based on even more of a patchwork of evidence from the same array of sources, including country-wide and industry-wide survey materials, again backed in some instances by econometric analysis. The results are clear enough, however, to identify similarities and differences between supply chains in manufacturing and in horticulture, and to come to reasonably useful policy conclusions.

2.1 The Role of Foreign Investors and Foreign Entrepreneurs as First Movers in Horticultural Exports

Is this foreign investor export-superstar phenomenon replicated in horticulture? Are foreign investors necessary to launch emerging market economies into international horticulture markets, as in manufacturing and assembly? What are the barriers to the entry of indigenous entrepreneurs?

To a large degree, the evidence suggests that there are important similarities: the creation of supply chains in agribusiness and horticulture exhibits much of the same launch-via-a-small-handful-of foreign-or-internationally-involved-investors phenomenon as evident in manufacturing.

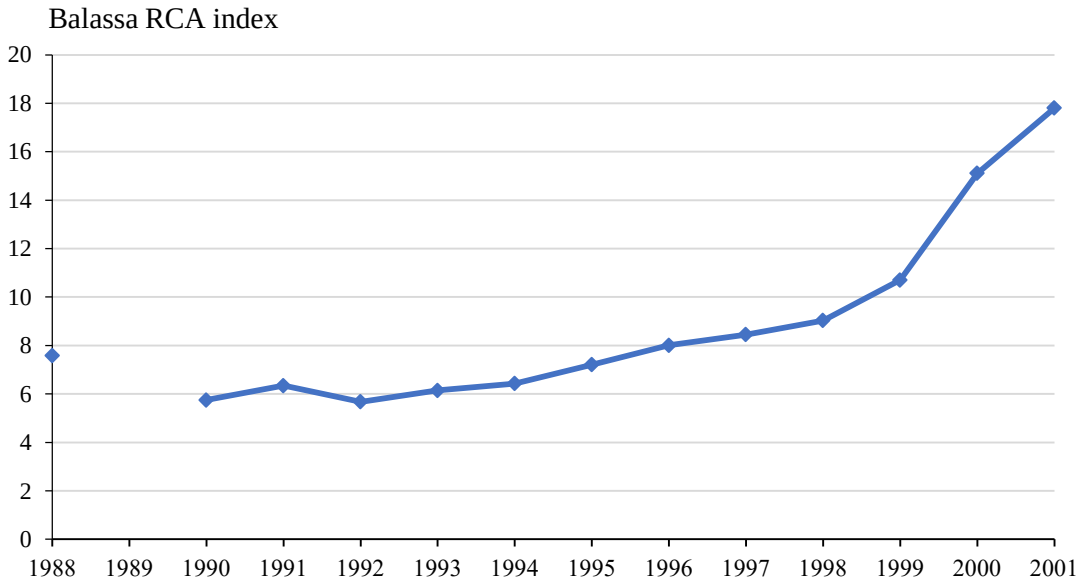
In Kenya, exports of vegetables and cut flowers took off over the course of 1990s, growing five times over in the case of vegetables and six times over in the case of cut-flowers. The penetration of horticulture markets for "ready to eat" convenience fruit and chopped vegetables was dominated by a small group of some dozen indigenous, semi-foreign, and foreign exporters who owned their own farms and packaging installations (Minot and Ngigi, 2004). One of Kenya's most successful horticulture exporters – Vegpro – was founded by an Indian refugee who fled Uganda to settle in Nairobi.[1] Other exporters were also Kenyans of South Asian origin who made use of kin connections to export produce to the UK. These producer-exporters all have large packing facilities within the Kenyan International Airport complex, where output is prepared for delivery to the EU or Middle East within 24-48 hours. They made major investments in air-conditioning and ventilation systems, water purification, blast coolers, and a wide variety of equipment to ensure acceptable hygiene surrounding their slicing and packaging operations.

Vegpro diversified from prepared-vegetables into the cut flower business, and integrated forward into transport by creating a wholly-owned airfreight business. Another of the early leaders in vegetable and cut-flower exports, Homegrown, integrated vertically by buying into distribution facilities in the UK market, incorporated with the Flamingo name, under the direction of its founder, a Brit named Dicky Evans.[2] Other major players in the cut flower export industry include Oserian Farms, founded by a Dutch farmer who married a Kenyan woman and added cut flowers to vegetable exports in 1982 after he

[1] Harvard Business School. Vegpro Group: Growing in Harmony, Case Study HBS 9-508-001.
[2] Flamingo website. Visited January 26, 2017.

moved to Nairobi, and Finlays, a UK company that began to grow flowers in on its tea plantations in Kenya in 1989.[3]

Figure 1: shows how the revealed comparative advantage of Kenya changed in horticulture, particularly from the mid-1990s on.[4]



Note: Revealed comparative advantage is an index used in international economics for calculating the relative advantage of a certain country in a certain class of goods or services as evidenced by trade flows that are larger than the average exports of other countries in that class of goods or service. Refined and popularized by Bela Balassa (1964, with Marcus Noland 1989), the index can be used to show that a country exports more than might be considered a "normal share" of the particular class of goods or services. In this paper, the Belassa index of revealed comparative advantage is useful in showing how a country can grow rapidly in prominence with exports of horticulture products.

SITC = Standard International Trade Classification., Figure shows Balassa index of revealed comparative advantage (RCA) for SITC 05 (vegetables and fruit) and SITC 29271 (cut flowers and buds for ornamental purposes), excluding 0517 (edible nuts, fresh or dried). Kenya trade data for 1989 is not available. Source: UN Comtrade database via wits.worldbank.org and authors' calculations.

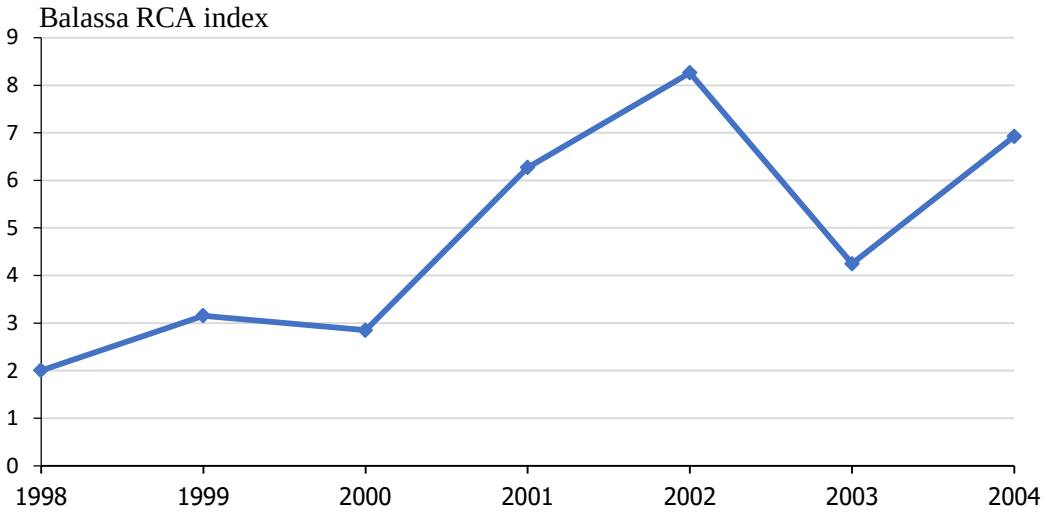
In Ethiopia, the cut flower industry was launched by three farmer-export firms growing roses side-by-side in the Oromia region, about 30 km from Addis Ababa, in 1999. The most successful of these are Golden Rose and Ethio-Dream. Golden Rose was founded by four expatriate Indian entrepreneurs, and started export operations in early 2000 from a farm of seven hectares. Today Golden Rose is the production-arm of an Indian family-firm headquartered in London, employing more than 700 people, about 500 of them women,

[3] Osarian Farms website; Finlays website, visited January 26, 2017.

[4] Scott French shows that the use of Balassa measurements of revealed comparative advantage is more appropriate in some contexts than in others. When there are shifts in technology within an economy – as represented by the introduction of foreign investment here – the Balassa index can be useful. Where there are subtle shifts in trade policy, the Balassa index may be less helpful. Scott French. Revealed comparative advantage: What is it good for?. *Journal of International Economics*, 74 (2), 264–277.

producing 80,000 roses per day. Supervisors are local graduates from Alemaya, Ambo and Jimma Agricultural Colleges, alongside expatriates from Kenya, India and Israel. Ethio-Dream was launched by a Saudi entrepreneur, H.E. Sheik Mohammed Hussein Ali AL-Amoud, son of a Saudi father and an Ethiopian mother, as one of five companies in Addis Ababa in 2000 whose ranks by 2016 had grown to sixty firms in diverse sectors of the Ethiopian economy.

Figure 2: Ethiopia: Change in Revealed Comparative Advantage for Horticulture, 1998 - 2004



Note: SITC = Standard International Trade Classification, Figure shows Balassa index of revealed comparative advantage (RCA) for SITC 05 (vegetables and fruit) and SITC 29271 (cut flowers and buds for ornamental purposes), excluding 0517 (edible nuts, fresh or dried). Trade data on SITC 0517 is only available for 2001 - 2003.
Source: UN Comtrade database via wits.worldbank.org and authors' calculations.

The largest cut-flower exporter in Ethiopia today is Afriflora, founded by flower farmers from the Netherlands who followed the path of earlier investors in 2005 with help from the International Finance Corporation of the World Bank Group.[5] Modern facilities and operations allow the company to export 900 million Fairtrade-certified roses to Europe each year. Greenhouses are built in blocks of nine hectares in the small town of Ziway, with each block containing cold storage, a packing area, employee lockers and a canteen. Every night, the roses depart for Addis Ababa in refrigerated trucks, then onto Brussels by plane. From Brussels, the flowers are driven to the Netherlands for distribution.

2.2 Barriers to Entry in Horticulture for Export

What were the barriers that have hindered indigenous entrepreneurs from entering the industry?

The international market basics have been highly favorable, especially for cut flowers, with markups for roses, carnations and chrysanthemums that ranged from 100% to 500% even after including transportation costs from Nairobi or Addis Ababa. Participation in vegetable and fruit supply chains for export allowed farmers to treble farm income. But

[5] IFC website, visited November 2016.

substantial up-front capital and technical expertise are needed to launch horticultural exports into world markets.

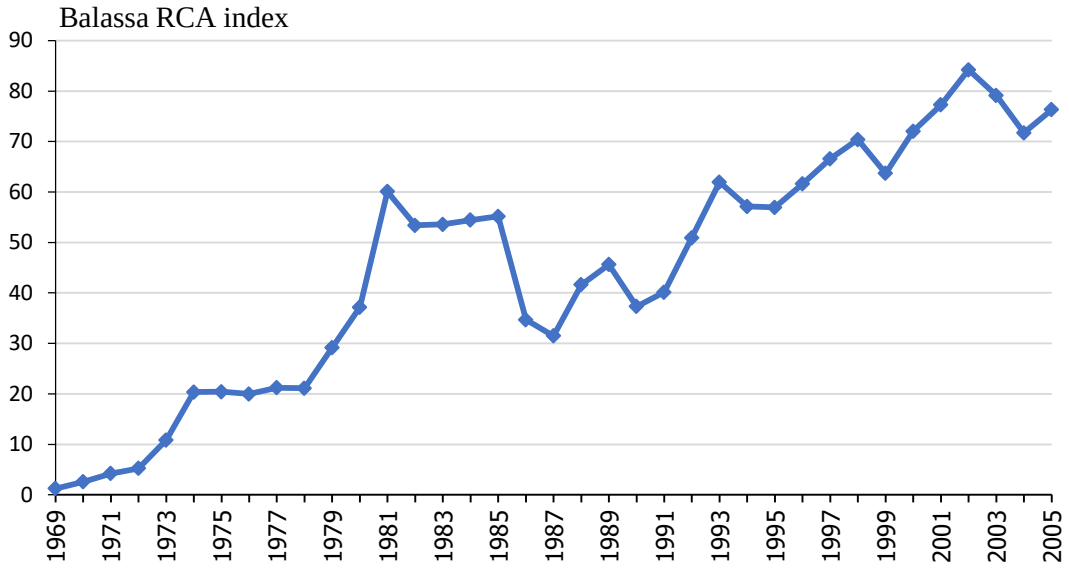
For cut flowers, pre-harvest investment is needed to create green houses with delicate seedling beds, overhead drip irrigation systems, and careful temperature controls. The green houses must be backed by expenditures on reservoirs and pump stations for irrigation, on electricity (often back-up generators), and on agricultural equipment. Post-harvest expenditures require investment in warehouses, cold rooms, packing units, storage buildings, refrigerated trucks, and road maintenance. Looking at capital expenditures alone, World Bank audits of rose exporters in Ethiopia recorded fixed costs of at least $2.4 million required at start-up for each export farm in 2003 (World Bank, 2004b).

These large capital expenditures must be directed with considerable technical expertise. This begins with original selection and subsequent trials of varieties, propagation of varieties, planting cuttings in greenhouse, application of chemical inputs and irrigation, disease control, and harvesting in the greenhouse. In the logistics/post-harvest component, there is initial cooling at 4 degrees centigrade, then grading, sorting, and bunching, a second cooling at 2 degrees centigrade, then packing in specialized cartons, loading to refrigerated truck, and delivery to the airport. At this point rapid customs clearance, airport handling, and air shipment are indispensable, leading to a tightly-constrained three-day or four-day period from harvest to arrival in the destination market abroad.

The challenges are hardly less arduous in planting, harvesting, transporting, and packaging "ready to eat" convenience fruit and chopped vegetables (Fernandez-Stark et.al, 2011). As discussed in the next section, the spread of international standards for traceability to determine pesticide and insecticide use, hygiene in processing and packaging, and other quality-control measures complicates the management of the farm-to-overseas-market chain.

Confirming the importance of production expertise as well as capital as barriers to entry into horticultural exports, the evolution of the cut-flower industry in Colombia is the exception that proves the rule. The cut-flower export industry in Colombia was launched by four American entrepreneurs who founded a company called Floramerica in 1969 as a virtual monopolist in the industry (Jose, 1993). This single company created export links from Bogota to wholesale flower markets in the United States where the four Americans had extensive prior working relationships. But -- unlike African flower production that emerged later -- growing conditions were so favorable year-round near Bogota, spreading to Medellin in the north and Cali in the south, that special irrigation and greenhouse facilities were not needed, imitation was easy, and large-sized indigenous farmers soon grew up to account for two-thirds of Colombian exports. But these easy growing conditions, with low barriers to entry once export markets have been established, are rare to find.

Figure 3: Colombia: Change in Revealed Comparative Advantage for Cut-Flowers, 1969 - 2005



Note: SITC = Standard International Trade Classification, Figure shows Balassa index of revealed comparative advantage (RCA) for SITC 29271 (cut flowers and buds for ornamental purposes).
Source: UN Comtrade database via wits.worldbank.org and authors' calculations.

This brief look at the dynamics of penetration international markets in horticulture reveals strong parallels with supply chain development in manufacturing and assembly – a small handful of pioneer firms with capital and knowhow are those that lead the process. They come predominantly, but not always, from the ranks of international companies or local firms founded by expatriate entrepreneurs, grow fast, and hold the potential to change the revealed comparative advantage of the domestic economy in a relatively short burst of time.

To anticipate a conclusion that emerges from the analysis of supply chain growth in manufacturing, the most successful government policies to launch the domestic economy into international horticulture markets are those which attract and support large international firms and expatriate entrepreneurs. Improving local doing-business conditions in the domestic economy is a necessary but not a sufficient condition for success. Promoting indigenous entrepreneurship is not likely to be strong enough to propel domestic output into international markets, except as efficient qualified suppliers to larger international firms.

Before coming to more detailed conclusions about backward linkages to qualified local suppliers, however, it is important to look at the role of external retailers and external standards in shaping international horticulture markets. This is considered next.

2.3 The Importance of External Retail Demand and International Standards

In middle-skill and higher-skill manufacturing in the automotive sector, electronics, industrial products, and medical devices, international investors alone dictate the distribution of new production sites in developing countries. For lower-skilled manufacturing in sectors such as garments and footwear, in contrast, international retailers like Walmart, Costco, and Carrefour joined with multinational investors in determining

where new production might originate in emerging markets.

In horticulture, demand-side procurement on the part of international retailers from the US, Europe, and the Middle East, as well as standards set by importing authorities, have played a particularly important role in the evolution of international supply chains, with important impacts on the structure of production as considered later.

Cut-flower exports from emerging markets combined export-push and demand-pull. As late as the early 1980s, small flower shops predominated in developed countries as retail outlets to meet consumer demand; exports from emerging markets were just beginning. The growth to prominence of Colombia as a reliable source of year-round high quality flowers available on short order was a major factor in transforming the structure of the industry, inducing major supermarket chains to create floral departments, without worry about holding large inventories. By 1986, seven hundred and sixty of Kroger's 1351 stores featured floral counters (Jose, 1993). Alongside Kroger, more than a thousand Safeway outlets offered cut-flowers for sale. As noted above, four US investors in a single company launched the cut-flower export boom of roses, carnations, chrysanthemums, and other specialty flowers from Colombia, reaching $50 million in sales from their firm in 1986. But indigenous Colombian producers and American retail buyers had already followed them by hooking up in Bogota and Miami to supply supermarkets in the US, UK and Europe. Colombia became the second largest flower exporter in the world, after the Netherlands. Export-push from foreign investors in Kenya, Ethiopia, and Senegal and demand-pull from retailers in Europe and the Middle East joined forces in Africa in the 1990s.

The spread of supply chains in the fruit and vegetables sector exhibited even stronger buyer-driven forces, given the importance of meeting safety and quality standards. Supermarket buyers such as Marks and Spencer, Sainsbury's, and Tesco in the UK, and Carrefour in Europe, along with Safeway and Giant in the US, helped to supervise the entire value chain with careful attention to how fruit and vegetables are produced, harvested, transported, processed, stored, and shipped.

In Europe, fresh produce importers and retailers created GlobalGAP standards to govern pesticide and chemical use in developing country export farms in 1997 (Jaffee, 2005). These standards have come to govern quality, size, pesticide-use, residue limits, as well as hygiene requirements for post-harvest handling, all requiring precise traceability. GlobalGap also began to certify national GAP programs -- such as KenyaGAP and ChileGAP -- that supervise local production for export. Retailers in the United States adopted the GlobalGAP standard for fresh produce, along with HACCP (Hazard Analysis and Critical Control Point) regulations promulgated by the US Department of Agriculture and the US Food and Drug Administration, to ensure hygienic procedures and safe products.

The Chilean penetration of international horticulture markets has been more the result of exporter-push rather than importer-pull (Fernandez-Stark et.al, 2011). Fruit exporters include major foreign investors such as Dole, Del Monte, and Unifrutti as well as large indigenous companies such as Rio Blanco, David del Curto, and Frusan. International companies that are vertically integrated from farm producer through exports to retail outlets account for approximately fifty percent of exports, with the remaining fifty percent coming from indigenous exporter firms that buy their inputs from local farmers (Fernandez-Stark et.al, 2011, p.22). Exporters from Chile ship out both own-name brand products and private-label products for foreign supermarkets.

The expansion of international supply chains in horticulture, with increasingly stringent standards for production and handling, has had a major impact on the structure of domestic farm ownership.

2.4 International Standard-Setting and Commercial Farm Consolidation

The requirement to provide consistent high-quality supply, offer traceability, and meet demanding public and private standards for production and storage typically forces consolidation of certified suppliers. In 2004 smallholder producers accounted for approximately 60 percent of Kenya's fruit and vegetable exports. As EU and UK import standards became more rigorous over the ensuring years, the smallholder share was reduced to less than 30 percent of exports (Fernandez-Stark et.al, 2011). World Bank estimates show that the cost of certification for international food safety standards adds up to 49 percent of annual costs for a small-scale farmer, but only12 percent for a large-scale farmer (World Bank, 2013b).

Similarly, in Senegal, increasingly stringent export standards after 2000 propelled a shift from small-holder contract farming to large-scale integrated estate production. The incidence of contract farming declined from 23 percent of those producing horticultural products for exports to 10 percent, while employment in estate farms increased from 10 percent of those producing horticultural products for export to 34 percent (World Bank, 2008).

In Ethiopia, the dramatic expansion of horticultural exports from almost nothing in 1998 to $243 million in 2014 – including forty-five exporters of fruits and vegetables, but more prominently eighty-three exporters of cut flowers -- also witnessed a steady increase in the average size of exporters. In cut flowers the proportion of firms selling more than $5 million reached 59% in 2012 (World Bank, 2014). The rising concentration of exports among larger firms cannot be traced entirely to the challenges of meeting higher international standards, however. The difficulty of smaller producers in gaining access to capital has been a major factor in the exit of smaller firms and the low rates of new entrants into the booming industry.

As in Africa, the introduction of international standards led to the consolidation of the fruit-export industry in Chile in the mid-1990s (Fernandez-Stark et.al, 2011). Many small-scale farmers sold their land to large fruit-exporting companies, or to larger and more sophisticated local farmers. The Chilean government worked with foreign and indigenous private sector actors to meet the standards of external buyers and regulators. In 2003, ChileGAP was created as a private GAP certification program that harmonized the most widely accepted requirements of the international market and offered Chilean growers and exporters the tools to implement these GAP requirements at the lowest possible cost. ChileGAP was recognized and accredited by GlobalGAP in 2008. During this period the Chilean government promoted rural infrastructure improvement as well as agro-industrial parks near airports to facilitate efficient transportation, cold storage, packaging and processing, and rapid export.

2.5 The Domestic Supermarket Revolution as a Training Ground for Local Producers to Upgrade Standards

This paper focuses on the development strategy of creating international supply chains in horticulture so as to diversify the production and export base of the domestic economy. It is important to recognize the parallel expansion of internal horticulture supply

chains in domestic markets as many developing countries have experienced their own supermarket revolution. By the early 2000s, retail food sales in local supermarkets exceeded 50 percent of total retail food sales in many countries in Latin America and in major urban centers in Africa and South Asia (World Bank, 2008). A large segment of this expansion came about through regional investments across borders, either as standalone entities or as joint ventures with local retailers. In Africa, for example, South African chains (Shoprite, Pick n Pay) and retailers like Kenya's Nakumatt branched out, left home, and spread across the continent. By 2016 Shoprite operates in fifteen African countries, including Mauritius; Pick n Pay operates in seven. Besides its presence in Kenya, Nakumatt has retail supermarkets in Uganda, Ruanda, and Tanzania.

These supermarket chains have fostered their own domestic supply chains for processed and packaged fruits, vegetables, and flowers, as well as raw produce. Across the spectrum of agricultural output, this domestic supermarket revolution has offered a training ground for local producers to upgrade their procedures to meet stiffer retail standards.

3. Supply Chains, Backward Linkages, Impact on Workers and Communities

The expansion of international supply chains in horticulture, along with increasing consolidation of production to meet with global standards for production and handling, has transformed opportunities and challenges facing domestic farmers, both as farm owners and as farm workers. It has introduced a new level of jobs associated with cleaning, sorting, and packing activities, with significant gender implications. The result has been a changing mix of benefits in the form of local and regional poverty reduction, while exposing some workers to insecurity, exploitation, and hazardous working conditions.

The broad evolution in the farm economy meanwhile has generated externalities that affect agricultural communities in diverse ways.

3.1 Poverty Reduction versus Exploitation of Workers and Exposure to Harm

Case studies and survey research show that the spread of horticultural supply chains can play a major role in local and regional poverty reduction. But there can be negative consequences as well.

Horticulture smallholders engaged in fruit and vegetable farming in Kenya are significantly better off than non-horticulture smallholders: net farm incomes among smallholder farmers that produced horticultural products for export have been four to five times higher per family member compared to similar small holders that did not grow horticultural products (Weinberger and Lumpkin, 2007). The ratio of net farm income per family member in horticulture versus non-horticultural smallholder farms ranged, in one calculation, from Kenya (497%), to Laos (380%), South Vietnam (189%), and Cambodia (117%) (Weinberger and Lumpkin, 2007). Data from countries across North Africa and into the Middle East – from Morocco, Algeria, Egypt, the West Bank, Jordan, and Lebanon – show that even small acreage dedicated to commercial fruit or vegetable production may be expected to double the value of total farm output and more than treble the income of the typical small-farm family (IFAD, 2008).

The consolidation of export-oriented production into larger farms reduced the number of small farm participants but expanded farm employment on the larger farms themselves. These larger farms oriented toward export markets pull members of family-

farm workers into jobs that often place them for the first time in the formal economy. While these jobs are low-wage, they allow workers to supplement their previous subsistence employment. Farm level surveys carried out by the World Bank in Kenya show that a medium-scale farm of about 10 hectares dedicated to vegetable exports can employ 38– 50 women a day to weed, pick, and grade output, along with about 17 men to spray and irrigate the fields, transport produce from the farm to the grading shed or cooler, and load output into vehicles for delivery to exporters' factories or collection centers (World Bank, 2004a). Survey data indicate that most of these workers are paid a wage that is greater than the government-mandated minimum agricultural wage. Because competing employment opportunities often do not exist in rural areas, such wages that may be considered extremely low by international standards may nonetheless rise well above the level of earnings from alternative farming activities.

When the tightening of export standards in Senegal resulted in a decline in small-farmer contracting and a rise in larger-scale estate production, increased employment in farm work on the latter nonetheless reduced regional poverty by 12 percentage points and extreme poverty by half (World Bank, 2008).

Expansion of horticulture for export has had a favorable impact on gender employment (Maertens and Swinnen, 2009). Workforce surveys in 2002 showed that employment in the Kenyan flower export industry included 75% female employees. Similar employment surveys in 2002-2003 in the Zambian vegetable export sector included 65% female employees, and 35% female employees in the flower export sector. Vegpro employed 7,000 workers in Kenya in 2015, 75 percent of whom were women. Afliflor employed 11,000 workers in Ethiopia in 2015, 80 percent of whom were women.

Focusing specifically on packing house jobs related to sorting, grading, cleaning, cutting, packaging, and shipping of fruits and vegetables, data from Latin America as well as Africa – Chile, Ecuador, Guatemala, and Mexico, as well as Kenya, Zimbabwe, and South Africa -- show that more than 50 percent of the workers in post-harvest jobs are women (Dolan and Sorby, 2003). Jobs here are usually compensated at levels above the minimum wage. To meet international standards for quality and hygiene, supervisors and quality control staff have perforce to provide training for unskilled workers (Fernandez-Stark et.al, 2011, p.32). Employees are often taught to perform multiple operations, including grading, washing, trimming, packing, and barcoding, so that they can easily be moved across job functions to meet fluctuating needs.

For Kenya, researchers at the Center on Globalization, Governance and Competitiveness at Duke University report that labor hiring at processing facilities began to move from predominantly temporary labor to a contract basis, so as to allow firms to capture the returns of such on-the-job training by locking in employees for longer durations (Fernandez-Stark et.al, 2011, p.32). As of 2010, several major exporters changed practices so as to attract women to return to work after maternity leave. Members of the Fresh Produce Exporters Association of Kenya (FPEAK) adopted a voluntary labor code to combat labor mistreatment and sexual or physical abuse that might otherwise plague the industry.[6]

The results from the spread of commercial supply chains in horticulture are not all upbeat and positive, however, particularly with regard to contract and migrant workers. These workers are more likely to experience precarious working relationships, including

[6] FPEAK website. FPEAK Code of Conduct. Visited February, 2017.

seasonal, casual, and short contract jobs. The NGO Decent Work and Labour observes "this means that such workers are reluctant to stand up for their rights, and may well not even be aware of any rights in the workplace at all" (Bell and Newitt, 2010). Contract and migrant women are also likely to work with no maternity leave or easy access to childcare. Contract and migrant workers often live in "squalid conditions" in farm quarters or rural towns (Barrientos and Kritzinger, 2004). It is not clear, however, that individuals who become contract and migrant workers are less well-off than they were in the absence of commercial supply chains.

Serious health and safety issues may result from improper pesticide use. A survey of 120 households in Senegal reported that 90% of those employed in horticulture farming did not use gloves, nose masks, eye shields, boots, or even long trousers (Kuiseu, 2006). After spraying pesticides, only 78% said they washed their hands, only 20% took a shower.

3.2 Spillovers and externalities at the local and regional levels

The broad evolution in the farm economy resulting from horticulture production also generates externalities that affect rural agricultural communities in diverse ways.

Participation in export-oriented supply chains sometimes allows local farms to receive training and assistance. Survey data from Kenya, Ghana, and Mozambique show that both foreign investors and foreign agricultural suppliers provide some level of assistance to firms in their supplier networks (World Bank, 2013a). The most common types of assistance are worker training, quality-control assistance, access to agricultural inputs such as fertilizers, and advanced payments on contracts.

Another channel for spillovers from foreign firms comes from movement of workers, supervisors, and managers into domestic companies, although foreign companies remain attractive for employees to stay on due to high salaries, job security, and potential for career progression (World Bank, 2013a).

More broadly, there is evidence that part of the earnings from horticulture exports ends up being invested in the family farm, resulting in larger farm sizes, higher farm expenditures, and increased farm incomes. Household survey data from Senegal show increased off-farm employment for rural households in export-oriented horticulture helps alleviate liquidity constraints on families, thereby increasing household farm production (Maertens, 2008). Similar results were found for Ethiopia and Honduras (Van Den Berg and Ruben, 2001). These results alleviate fears that off-farm employment might substitute for food farming, or lead to declining family farm productivity.

Finally, the spread of horticulture supply chains has a multiplier effect that comes from injecting income into rural communities, raising demand in sectors that produce goods and services purchased by those engaged in exports. As the incomes of horticultural farmers rise, this can translate into tangible improvement in rural standards of living, such as being able to pay for school fees and purchase land (Minot and Ngigi, 2004). In Kenya, a smallholder farmer with several vegetable beds generates enough income to pay school fees for two children (Freidberg, 2003).

Accompanying these direct and indirect impacts on the local economy, there may be diverse externalities of other kinds as well. The production of vegetables and fruits for export can help diversity local diets while increasing consumption of fiber, antioxidants, and other micronutrients (Parrot et.al, 2008). Vertically integrated farms and firms that engage in horticultural exports may introduce medical knowledge and HIV/AIDs

awareness programs to ensure the health of their workforce that raise consciousness more broadly throughout local communities (Auret et.al, 2004).

4. Policy Implications

The investigation of supply chain creation in horticulture – like the investigation of supply chain creation in manufacturing and assembly – is changing the way policymakers must think about development strategy. Strategies for export-led growth have largely (but not entirely) replaced strategies of import substitution. Strategies for export-led growth have now been complemented with strategies to upgrade and diversify the developing country production and export base. Strategies to upgrade and diversify the developing country production and export base have become strategies to attract foreign direct investors and retailers, and link into global supplier networks.

This investigation of supply chain creation in horticulture – like previous investigation of supply chain creation in manufacturing and assembly -- highlights the importance of individual first-mover investors and retailers, or small numbers of first-mover investors and retailers, in industries with significant barriers to entry, whose activities offer the possibility to change the production structure and transform the revealed comparative advantage of the domestic economy.

Trade liberalization and trade facilitation remain important components of development strategy. But these supply-chain investigations highlight the importance of policies that attract multinational investors and retailers and link them to production and export opportunities in the host economy. *Trade-and-investment policies can have large effects if they alter the behavior of even one or a small number of international companies*.

Similarly, developing country policies to promote entrepreneurship remain important. But success from promoting domestic entrepreneurship emerges not so much in propelling small indigenous companies into international markets as in qualifying and certifying indigenous companies to become suppliers to multinational investors and retailers.

For supply chain generation in horticulture, like supply chain generation in manufacturing and assembly, improving domestic doing-business indicators is a necessary but not a sufficient condition for success. Developing country governments must go beyond improvement in domestic doing-business indicators to launch a pro-active effort to attract international investors and retailers, featuring efficient infrastructure that speeds farm output to packing-houses or processing-facilities and thence to export hubs. Investment promotion must be backed by trade agreements that allow favorable-market access for horticulture.

As with supply chain creation in manufacturing and assembly, *public-private partnerships for skill-building in farming and agribusiness constitute a strong magnet to attract foreign investors in horticulture,* a dimension sometimes neglected by developing countries that are more focused on educating urban populations for industries in urban areas.

Finally, authorities in the developing world will want to grapple with traditional, customary, and communal land-use practices that may allow local farmers to be denied access to land bought or leased by foreign investors, on the one hand, or that may deprive foreign investors of the certainty they need to make long-term expenditures in production and processing for export, on the other.

4.1 Favorable doing-business environment, corruption free exports, and reliable infrastructure

Studies of foreign investment and supply chain development in manufacturing and assembly universally begin discussion of policy with an exhortation that host governments should improve their microeconomic doing-business environment within a sound macroeconomic framework.

Nowhere could this exhortation be more important than for the creation of supply chains in horticulture because of the risks inherent in shipping highly perishable commodities like cut flowers, packaged vegetables, and processed fruits. Central to the local doing-business environment must be efficient and corruption-free export procedures. Vertically integrated producers with a valuable but short-lived product have virtually no bargaining power vis-à-vis corrupt customs or airport officials. They cannot survive if shipments are regularly delayed or blocked on the way to international markets.

The analysis of foreign investment and supply chain development in manufacturing and assembly show that potential investors must be assured that local production can be integrated seamlessly into their global distribution networks. The assessment of horticultural exports presented here repeatedly highlights the tight turnaround times from farm to sorting/packing plants to export facilities alongside international airports.

4.2 Effective Investment Promotion and Trade Agreements for Market Access

The creation of international supply chains in horticulture derives from a combination of foreign investors and external retail chains setting up vertical farm-to-plant-to-airport export platforms in emerging market countries.

How can these foreign investors and external retail chains be attracted to novel potential locations in emerging markets?

The study of supply chain development in manufacturing shows that developing country governments cannot simply improve their doing business indicators, and then sit passively by waiting for international markets to work. Rather they must launch customized investment promotion initiatives to overcome imperfections in information markets and place their economies on the radar screen of potential investors. The same is true for supply chain development in cut flowers, packaged vegetables, and processed fruits.

In the contemporary era the presence of investment promotion agencies (IPAs) is widespread: the majority of developing country governments already feature IPAs at the national and sometimes regional levels. But surveys carried out by the International Financial Corporation of the World Bank group show that many such IPAs do not answer their phones or respond to email, or that when they do the IPA officials often can do no more than repeat what is on the IPA website (World Bank Group Advisory Services , 2009). Thus most IPAs are almost wholly ineffective in attracting investors, especially investors to untried sectors of the host economy.

The payoff to overcoming such obstacles and creating efficient and knowledgeable IPAs, however, is quite large. Econometric analysis shows a statistically significant positive relationship between FDI inflows and superior World Bank ratings of IPA website materials and staff responsiveness (Harding and Javorcik, 2011). As in the case of using FDI to create export clusters in manufacturing and assembly, host governments must train teams of IPA executives to respond to the specialized needs of horticultural investors and retail chains, to ensure that local production of vegetables, fruits, and flowers can be

integrated rapidly and effectively into their global networks, with appropriate quality control and certification. A particularly important issue is to facilitate visas for those kinds of foreign experts – from the United States, Canada, Holland, Israel and other countries – that have been shown to be so important for horticultural operations.

In manufacturing and assembly, host country measures to assure smooth incorporation of local production into the external networks upon which the competitive position of the parent investor or retailer depends have much *more impact in attracting investment than merely offering tax breaks* or other incentives; and the latter cannot substitute for the former. The same is true for the creation of international supply chains in cut-flowers and processed fruits and vegetables. Alongside providing appropriate information, IPAs must be shown how to achieve what has now become the buzz-word status of serving as a *one-stop-shop* in securing permits, permissions, and appropriate regulatory treatment for horticultural investors that want to launch a new operation. In practice, IPAs often become a *one-more-stop-shop* in an approval process beset by turf-wars among ministries.

In addition to marketing the country and attracting initial investors, Investment Promotion Agencies must recognize the importance of after-investment care for agribusiness investment. IPA attention to following-up with initial investors can generate significant reinvested earnings, can generate testimonies from satisfied-investors that are crucial for attracting follow-on investors, and can generate interrelated clusters as producers of packing materials and other peripheral services follow the prime investors into the host economy.

Finally, studies of supply chain development in manufacturing and assembly highlight the intimate connection between investment promotion and trade agreements to ensure market access. Regional free trade agreements have a role to play. Penetrating developed country markets via free trade agreements is particularly important (Mattoo and Subramanian, 2010). Favorable market access agreements are all the more important for international expansion of horticulture exports given widespread protectionism in agriculture.

4.3 A Special Role for Public Private Partnerships in Vocational Training in Agribusiness

To climb the development ladder, a fundamental objective for any nation is to improve elementary and high school education all across the country, and to refocus institutions of higher education toward equipping students with practical skills to participate in an increasing complex economy. Access to well-trained workers, technicians, and managers has special value as a powerful magnet in attracting increasingly sophisticated foreign investors.

But achieving educational improvement across an entire nation is invariably slow and expensive. Fortunately, however, there is no need to wait for such a ponderous accomplishment to attract foreign investors to new and more skill-intensive sectors. Emerging market countries can design programs to provide a skilled labor pool available to meet the needs of new investors without waiting for the entire national workforce to acquire higher levels of skills.

To attract sophisticated manufacturing multinationals, electronics power-houses like Singapore, Mexico, and Malaysia, for example, relied upon public-private partnerships between community vocational institutions and universities, on the one hand, and leading

foreign corporations that look to employ the graduates (Freund and Moran, 2017). Host authorities and international companies co-design curricula, often with inputs from labor groups and unions, to ensure that the training is relevant, and upgraded to keep pace with current employment needs.

The same has been true in the success stories of international horticultural investment. While many emerging market governments have ignored agricultural education in favor of vocational training for industry, those countries that have launched competitive supply chains in processed agribusiness have found a high return to public-private partnerships in this sector as well.

In Kenya, workforce development has traditionally been focused mainly on increasing productivity on farms. The introduction of global quality and safety standards in the mid-2000s, however, led to a widespread increase in training in the pack-house segment of the value chain to fortify Kenya's competitiveness in international markets. Much of this training was carried out or financed by foreign governments and NGOs in conjunction with external experts. The same kinds of entrepreneurs and technicians from Holland, US, Canada, and Israel that played prominent roles in launching Kenyan export companies also helped in setting up training facilities for dry soil farming, drip-irrigation, greenhouse cultivation, packaging and labeling. They worked with the Baraka and Bukura Agricultural Colleges, and with the Kilifi Institute of Agriculture, to prepare technical workers and managers for both cut flower and cut-vegetable industries. As the horticulture industry evolved, the Jomo Kenyatta University of Agriculture and Technology shifted focus from sole concentration on farming activity to new degree and diploma programs in post-harvest management and export operations.

In contrast to many developing countries, Chile has targeted vocational and management training in horticulture prominently as a national priority (Fernandez-Stark et.al, 2011). The National Agricultural Service (Servicio Agricola y Ganadero, or SAG) provides training to meet protocols of the USDA and Global Gap for processing and packaging, storage, and transportation, as well as offering certifications for pack-house workers. The SAG also provides training in the administrative work required to track the movement of fruit and vegetables from the farm to the final destination. Chilean universities graduate thousands of undergraduate and master-level students in agronomy per year to enter the agro-export market as supervisors and managers.

4.4 Race-to-the-top versus race-to-the-bottom

The dynamics of creating supply chains in low-wage low-skill manufacturing and assembly, such as garments and footwear, sometime lend themselves to a *race-to-the-bottom* in working standards and compensation. In contrast, the most important ingredients in creating successful supply chains in horticulture contribute to a *race-to-the-top* among potential host countries in the developing world – a race-to-the-top in improving doing-business indicators, in upgrading infrastructure, in establishing effective investment promotion procedures, and in launching public-private partnerships for skill-building in farming and agribusiness.

4.5 Special problems related to land tenure

Special problems related to land tenure plague both local farmers and international investors in many developing countries, especially in Africa. Indigenous farmers often have traditional, customary, informal, hereditary land-use rights without formal title or

legal possession of the land. Foreign investors may approach national authorities to secure access to such land, either through purchase or lease. The result can lead to an abrupt exclusion of local farmers from working land they have long been accustomed to using, on the one hand, and/or to uncertainty about title for new investors that hinders them from making long-term capital commitments to production and processing for export.

The situation may be complicated by non-transparent land sales or leases on the part of government authorities, sometimes involving corruption. Foreign investors that want to be more open and certain about their rights, meanwhile, may try to negotiate land use practices with traditional leaders who may or may not represent community interests.

A solution that benefits all parties may be found in formalizing property rights at the individual and/or group level. Traditional survey methods have been quite expensive, reaching $20-$60 dollars per parcel. But advances in technology – particularly the widespread availability of satellite imagery and handheld global positioning system (GPS) devices have combined to reduce the cost and the time required to establish land titles. The World Bank reports that between 2003-2013 Ethiopia has successfully provided titles that recognize inheritable use-rights by both husband and wife to millions of farmers at a cost of US$ 1–2 per plot, leading to effective land rental markets at the local and regional level (World Bank, 2013b). Similar efforts are underway in other emerging market countries. The increasing use of drones for rural mapping may reduce costs of land-titling even further.

4.6 External Assistance in Export Coaching and Business Development

Multilateral financial institutions and NGOs have played major roles in helping developing country governments to link into international supply chains in manufacturing and assembly, and to generate backward linkages to indigenous firms and workers. On a smaller but still significant basis, multilateral financial institutions and NGOs are providing export coaching and business support for horticulture supply chains. There is a growing recognition that the potential for poverty reduction via high-value commercial agriculture, for export and for domestic supermarket sales, is large and significant.

The International Finance Corporation of the World Bank Group (IFC), for example, provides investment and advisory services to the agribusiness sector along the full value chain directly to companies, and indirectly through intermediaries. Over the course of the 2016 fiscal year IFC invested $3.4 billion across the agribusiness supply chain – from farm to retail —to help boost production, increase liquidity, improve logistics and distribution, and expand access to credit for small farmers, with the IFCs entire agribusiness portfolio reaching $5.6 billion.[7] IFC provided a $7 million loan to Vegpro in Kenya, for example, to support the company's expansion into Ghana. In Ethiopia, IFC is helping Afriflora, the country's largest cut flower exporter to expand production by 60 percent, install water-recycling systems, and create 5000 new jobs. Afriflora aims to increase sales by tapping into new technologies, such as an automated web platform to directly reach wholesalers.

In the UK, the Department for International Development (DFID) supports CDC Group, the UK's development finance institution.[8] The first investment made by CDC's equity investment team was made in 2012 when CDC provided $ 32.5 million to the

[7] IFC website, visited February 2017.
[8] DFID website, visited February 2017.

Export Trading Group (ETG), an African agribusiness with operations in crop buying, warehousing, distribution and merchandising. Headquartered in Dar Es Salaam CDC operates all over Africa, purchasing agricultural and horticultural crops for sale from smallholder families.

CBI, the Centre for the Promotion of Imports from developing countries, is part of the Netherlands Enterprise Agency and is funded by the Dutch Ministry of Foreign Affairs. Its purpose is to contribute to sustainable economic development in developing countries through the expansion of exports from these countries. Agribusiness is a particular focus of CBI attention, by offering market information and export coaching programs.[9]

The Gates Foundation, meanwhile, helps farmers improve their use of seeds and fertilizers, meet quality demands, and link up with buyers, processors, and farmers' organizations.[10]

This paper demonstrates that expansion of international investment in horticultural supply chains offers significant potential for export diversification and poverty reduction in economies all across the developing world. Multilateral development banks and national aid donors might want to assign high priority therefore to investment promotion in horticulture, backed by the infrastructure upgrades needed to ensure success.

[9] CBI *Annual Report* 2015.
[10] Gates Foundation. *Annual Report* 2015.

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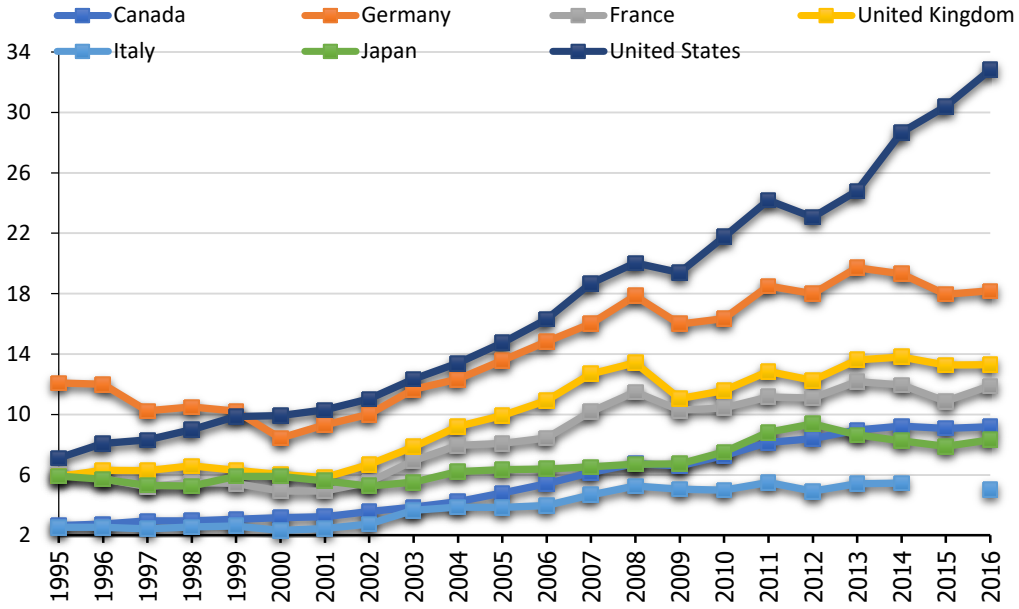
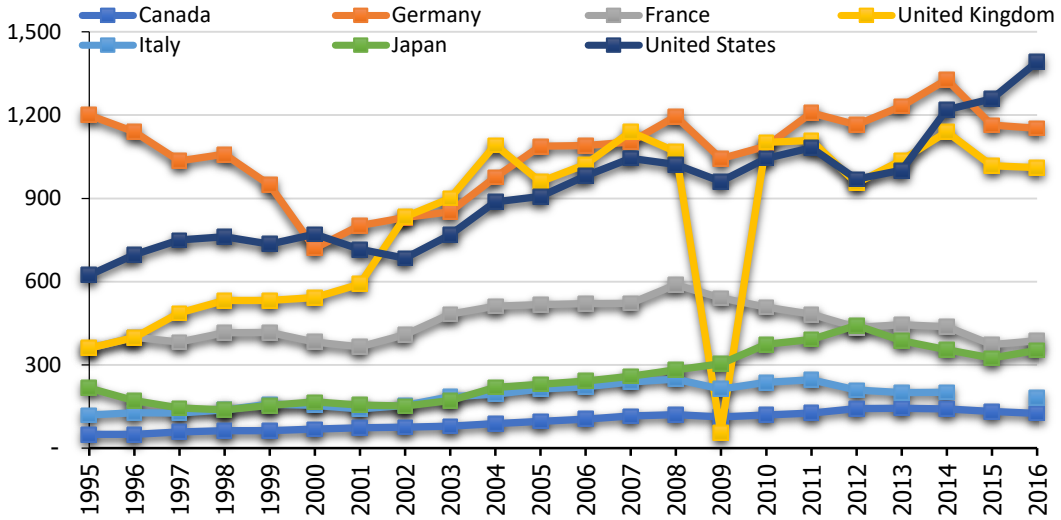
Appendix

Figure A1: Imports of vegetables and fruits, G-7 countries, 1995 - 2016, billion US dollars



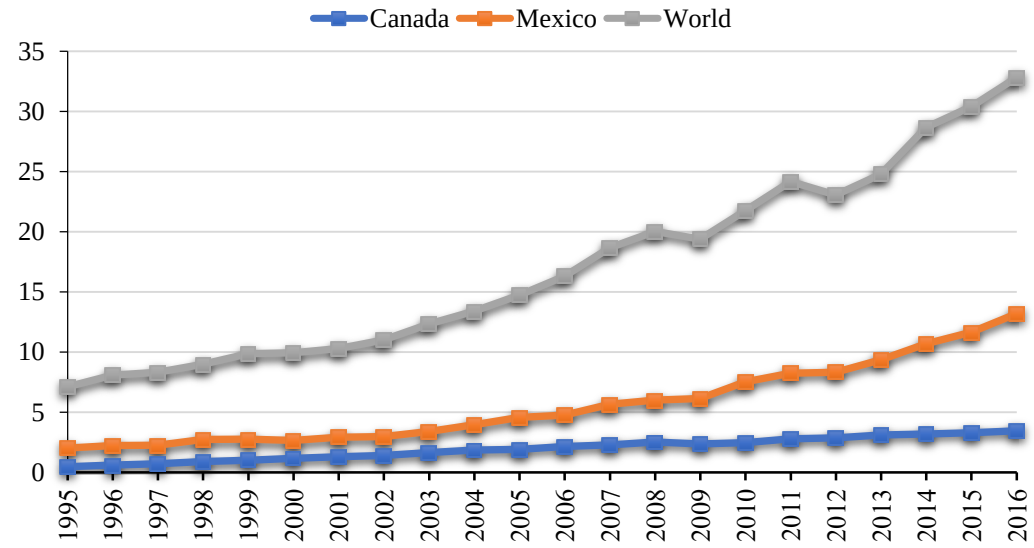
Note: SITC = Standard International Trade Classification,Figure shows imports of SITC 05 (vegetables and fruit), excluding 0517 (edible nuts, fresh or dried). Data is not available for Italy in 2015.
Source: UN Comtrade database via wits.worldbank.org and authors' calculations.

Figure A2: Imports of cut-flowers, G-7 countries, 1995 - 2016, million US dollars



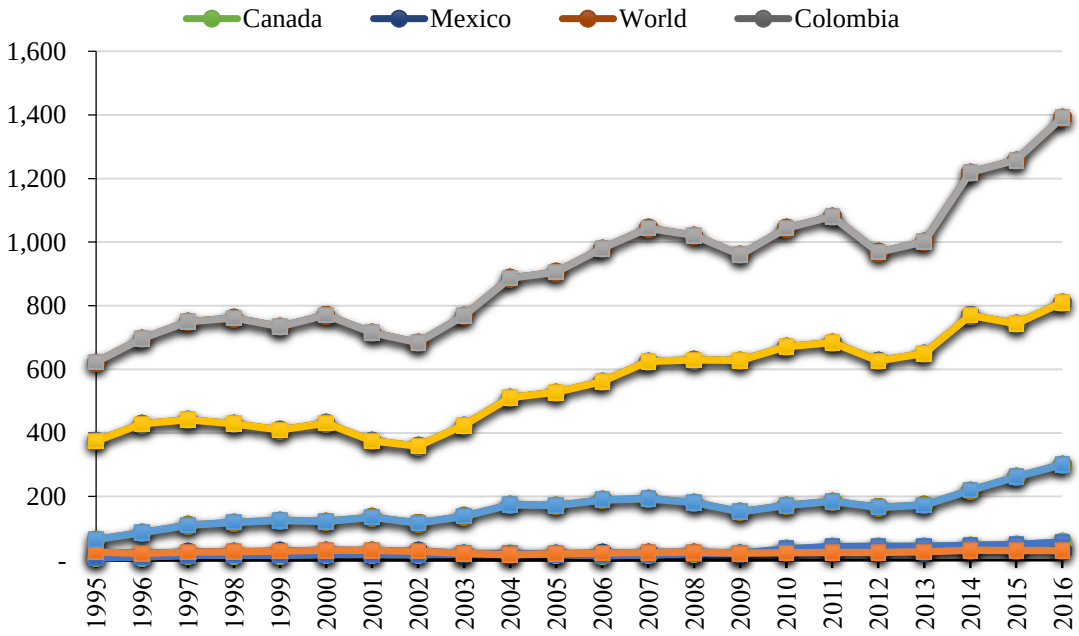
Note: SITC = Standard International Trade Classification, Figure shows imports of SITC 29271 (cut flowers and buds for ornamental purposes). Data is not available for Italy in 2015.
Source: UN Comtrade database via wits.worldbank.org and authors' calculations.

Figure A3: US imports of vegetables and fruits from Canada and Mexico, 1995 - 2016, billion US dollars



SITC = Standard International Trade Classification
Note: Figure shows imports of SITC 05 (vegetables and fruit), excluding 0517 (edible nuts, fresh or dried).
Source: UN Comtrade database via wits.worldbank.org and authors' calculations.

Figure A4: US imports of cut-flowers, 1995 - 2016, million US dollars



Note: SITC = Standard International Trade Classification, Figure shows imports of SITC 29271 (cut flowers and buds for ornamental purposes).
Source: UN Comtrade database via wits.worldbank.org and authors' calculations