Contract Farming and Cut Flowers:

An Ecuadorian Cut Flower Firm's Response to Dollarization

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Meredith Blumthal and Hamish R. Gow

Department of Agricultural and Consumer Economics

University of Illinois at Urbana-Champaign

326 Mumford Hall

1301 West Gregory Drive

Urbana, IL 61801

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1. Introduction

As a response to globalization, the agri-food system over the past decade or so has made a significant shift towards the use of contract farming as a mechanism to support the production of high value-added agricultural products (World Bank, 2003; USAID, 2004). The initiation of contract farming often evolves from the need to assure a reliable supply at the right quality and times (Minot 1986). Additionally, the production of crops that are delicate and highly perishable involves a high level of labor inputs and a low level of mechanization, and that needs a high level of coordination, technology inputs, and tight quality specificity, which is often better suited to contract farming involving small farmers (Kirsten and Sartorius 2002). Although contract farming has been in existence for many years as a means of organizing commercial agricultural production of both large-scale and small scale farmers (Eaton and Shepherd 2001), it use is still highly debated in the development literature as economic uncertainties, market volatility, weak enforcement mechanisms and a general lack of profitability often result in contractual breaches (Eaton and Shepard 2001; Key and Runsten 1999).

Recent empirical results indicates that contract farming can produce substantial positive direct and indirect economic benefits and horizontal and vertical spillovers when a stable macroeconomic and legal environment is established and coupled with positive FDI inflows (Key and Runsten, 1999; Gow et al, 2000; Gow and Swinnen, 2001; Dries and Swinnen, 2005). Researchers have however been unable to determine whether it is FDI or a stable international market linkage that is the critical catalyst to the successful initiation of these contractual innovations. Recognizing this the Ecuadorian export cut flower industry provides a unique natural experiment for analyzing and evaluating the driving forces behind the initiation of the contractual innovation, its diffusion, and the economic responses of small farmers to the diffusion of contractual innovations.

During the 1990's the Ecuadorian export cut flower industry expanded rapidly by exploiting a unique financial arbitrage opportunity provided by the combination of a US dollar denominated export market, a rapidly depreciating local currency, Sucre, and an inelastic labor market. This

combination of factors provided exporters with the opportunity to delay the collection of accounts receivable in the international flower market while concurrently using the regulatory system to delay the adjustments of wages in the domestic labor market to extremely high inflationary pressures. Exporters have thereby been able to profitably exploit the increasing exchange rate spread between the US dollar and Sucre. Recognizing that the Sucre was depreciating at approximately 50 percent per annum by the end of the 1990's, input costs, especially labor, quickly became insignificant. Hence most of the industry was highly inefficient. The unanticipated dollarization of the Ecuadorian economy in January 2000 however removed this arbitrage and confronted producers with not only US dollar denominated product markets but also US denominated factor markets. Many inefficient firms exited the industry while those who remained were forced to dramatically change their production practices and business models in light of the dramatic change in real input prices. The result was a substantial period of organizational and institutional innovation as firms attempted to identify and develop more efficient business models that provided sustainable international competitive advantages within a high labor cost environment. One of the critical innovations related to the establishment and diffusion of a symbiotic cut flower contract production relationship between a few medium sized cut flower producer/exporters and the surrounding small scale vegetable farmers.

This paper empirically evaluates the factors that contributed to the introduction, diffusion and impact of a contract production model implemented by medium sized cut flower grower/exporters with small vegetable farmers in Ecuador. The specific contractual innovation analyzed relates to a particular cut flower species that is highly demanded in the US market but increasing labor and chemical costs caused by dollarization made it unprofitable to produce in the traditional manner. Hence a new business model was required. Drawing upon an extensive empirical data base constructed from structured and semi-structured interviews and participant observation the paper analyzes and evaluates the structure and impact of the diffusion of the contractual innovation. We ascertain that the effects of the increased real labor costs brought about by the dollarization have caused various levels of innovation: provision of technology, agronomical and management support, seeds, transplants, and credit. These innovations have had a substantial positive benefit on small local producers who were otherwise excluded from the international marketplace. There have also been a number of vertical and horizontal spillovers.

The paper is organized into eight sections. The first section presents our research methodology. The following sections present an overview of the Ecuadorian cut flower industry, an overview of the initial conditions our case firm was facing. We continue with a discussion on the impact of dollarization on the industry and our firm and follow with the description of the contracting model, its impacts and end with a discussion.

2. Methodology

In this research we implement a grounded theory approach (Strauss and Corbin, 1994) to the analysis of organizational innovation in the Ecuadorian export cut flower industry following the 2000 dollarization of the Ecuadorian Sucre. In particular we are interested in gaining a greater theoretical and empirical understanding of the critical processes involved in the instigation, diffusion and impact of contractual farming within this industry. This industry and the recent organizational innovations that have occurred are of importance because of the exogenous nature of the shock and how firms have endogenously responded. It is this combination that makes this an instrumental[1] research case study requiring further in-depth analysis (Stake, 1995).

In 2004 the research team became intrinsically interested in understanding how the Ecuadorian cut flower industry responded to dollarization. During the process of conducting our initial research and evaluation of the macro and industry level impact assessments of dollarization (Blumthal and Gow, 2005), it became obvious that a number of unexplained innovations were occurring at the firm and within the firm levels that the developing dollarization and international development literature had not yet addressed, theoretically or empirically. Consequently, we initiated a grounded theory approach to the systematic gathering and analysis of data surrounding a series of case studies to develop a theoretical model to explain the observed innovations (Strauss and Corbin, 1994).

One of those nested case studies is described and analyzed in this paper. Case studies are the appropriate research tool for theory development and evaluating the dynamics of a phenomena present within a single outlier event (Eisenhardt, 1989) and within firms and industries that are in

[1] In instrumental case studies the researcher has a research question or need for general understanding that they feel a particular case may fulfill (Stake, 1998). The case is of secondary interest, it plays a supportive role in facilitating our understanding of something larger, a specific issue that needs greater understanding or a theory that requires refinement (Stake, 1998).

transition were sufficient historical data in unavailable for use of traditional statistical methods (Westgren and Zering, 1998).

Within the ground theory methodology, theory is developed during the actual research process by the constant iterative interplay between data collection and analysis (Strauss and Corbin, 1994). The process uses triangulation combining quantitative and qualitative data collection techniques to ensure the legitimacy and validity of the interpretations of the findings (Westgren and Zering, 1998).

The field methodology employed centered on the collection of qualitative and quantitative data from various sources over the summers of 2004 and 2005, using a range of different techniques.[2] First, key informant interviews were conducted with the farm owner, farm manager, and project technician. These informants provided information on the project and its inception. Second, the researcher made direct observations of the contract farming project by visiting all of the contract farms. During this process, the researcher conducted semi-structured interviews with men and women who were currently participating or were former participants in the contract farming program. This step provided information on access to basic services, types of farming activities, presence of crops, agricultural production patterns and factors driving contract, innovation, and technology adoption. Third, the researchers correlated the relevant information to estimate the costs and benefits of contracting. Finally, this was supported and verified through interviews with various public and private industry experts and government data sources

3. The Ecuadorian Export Cut Flower Industry

Ecuador's cut flower industry is the third largest export behind crude oil and bananas (Expoflores). Cut flower production is primarily centered outside the capital Quito, in the province of Pichincha, but additional production is now found in Cotopaxi, Ambato, and Cuenca. The Quito region is a perfect location for cut flower production because:

- The Andean mountains provide high light intensity, constant temperatures year round[3], rich volcanic soils, and fertile flat valleys,

[2] Transcripts of the interviews are available on request from the authors.
[3]Average day and night temperatures in Quito are 19ºC and 13ºC, respectively, year round (climatezone.com).

- There is an abundant and cheap inelastic labor supply, and
- The production area is within easy access to the international airport.

Cut flower production in Ecuador is divided into two sub sectors: roses and summer flowers[4]. Roses are the largest of the two sub sectors and generally grown at higher elevations in greenhouses. Summer flowers are generally grown at lower elevations in open fields as the climate is sufficiently mild for outside production. Most summer flowers and roses are destined for the US market, as the European market is dominated by cheaper African production.

A convergence of factors fueled the growth of the Ecuadorian cut flower industry during the 1980s and 1990s: Ecuador's ideal climate; abundance of cheap labor; close location to export markets; favorable exchange rates; and low advantageous tariff rates[5]. During the 1980s, growth was fueled by the high Russian prices and proximity to the USA. Passage of the Andean Trade Preference Act provided further impetus with duty free access to the US market. Finally, the Ecuadorian export cut flower industry boomed during the late 1990's by exploiting a unique financial arbitrage opportunity provided by the combination of a US dollar denominated export market, a rapidly depreciating Sucre and an inelastic domestic labor market (Figure 1). This provided exporters the opportunity to delay the collection of accounts receivable in the international flower market by extending terms of credit up to 90 days or more to US buyers, while concurrently paying domestic labor slightly above the government established Sucre dominated minimum wage rates., The government adjusted the minimum wage rate once per year every January, by 50 to 60 percent. This was far less than the prevailing inflation rate during this period. Exporters were thereby able to profitably exploit the increasing exchange rate spread between the US dollar denominated sales and Ecuadorian Sucre denominated costs. The Ecuadorian economy reaching near hyperinflationary conditions in the late 1990s allowed firms to be highly labor inefficient. Within this business environment input costs quickly became insignificant, especially labor - the largest production cost for flowers which usually accounted for about 50 percent or the total costs of production: most of the industry was highly inefficient but highly profitable (Blumthal and Gow 2005).

[4] *Summer flowers* is a generalized term that refers to all flowers grown that are not roses. The term was coined as these flowers are typically produced during the US summer months, but year-round in Ecuador.
[5] See Blumthal and Gow (2005) for an extensive discussion of the drivers of growth of the Ecuadorian export cut flower industry.

During the late 1990's the market conditions and business practices were reinforced when the industry experienced two important shocks that placed many firms under financial distress. First, the 1998 Russian financial crisis resulted in a number of Russian firms and banks defaulting on their previous financial commitments to Ecuadorian exporters (Stone, 1998). Second, the 1999 Ecuadorian banking crisis severely constrain credit access, drove up inflation, accelerated the depreciation of the Sucre and resulted in widespread bankruptcies across the economy (Jacome, 2004).

With the country on the brink of economic financial and political collapse, the government technically had few options available to avert the ensuing crisis but to dollarized the economy, but this decision immediately threw the export cut flower industry into turmoil (Blumthal and Gow, 2005).

Many firms were not observant to the fact that dollarization had dramatically changed the industries underlying cost structures and were thus forced into bankruptcy. It was only the firms who recognized this fundamental shift (that labor costs were now effectively tied to output prices in a fixed rather than depreciating cost) and were able and willing to respond that survived. To do that they often had to dramatically change their production practices and business models in light of this realization. The result was a substantial period of organizational and institutional innovation as firms attempted to identify and develop more efficient business models that provided sustainable international competitive advantages within a high labor cost environment.

The instrumental case study analyzed below provides an exemplary firm example of how innovation and change occurred at the firm level as a result of dollarization. In particularly, we analyze the impact of the organizational innovations in relationship to the establishment and diffusion of contract production of a cut flower with the surrounding small scale vegetable farmers.

4. Overview of Ecuadorian Cut Flower Producer/Exporter

The firm of interest is a summer flower producer and exporter located on 26 hectares in a valley near Ambato, in the Tungaragua province. Ambato is a commercial center of about 250,000 residents that supports the nearby rural areas that have traditionally produced a range of fruits and vegetables for domestic consumption. The farm has been operating since 1996 and employs 126 people. The farm produces 19 varieties of summer flowers primarily for the US export

market, of which *Solidago* spp. (Golden Rod), *Consolida* spp. (Larkspur) and *Delphinium* spp. (Delphinium) are their main crops.

Target Market

Approximately 80 percent of production is sold in the US marketplace to importers and wholesalers and importers who primarily supply the US supermarket industry. The remainder is sold in Canada and Europe. The firm specifically targets and tailors their production and sales management systems at the US mass market for cut summer flowers. This is a highly price sensitive commodity market with extremely narrow per unit profit margins. The firms makes their profits from cost effectively producing and selling large volumes of summer flowers that meet the US mass market specifications (not the highest quality) with consistency and timeliness at competitive prices. Recognizing this, the firm's owner is continuously evaluating opportunities to increase productivity and reduce costs of delivery. Over the past few years he has identified five components that affect his ability to be profitable in the US mass market: labor costs; disease and pest control; access to inputs; suitable marketing channels; and production of appropriate crops

Marketing Channels

The firm has traditionally sold their product through a flower broker in Ecuador as reaching the US market customers is often difficult. Once the firm was established however, they moved away from selling all their production to this broker to develop closer relationships with key channel partners and effectively eliminating the broker and extracting higher farm-gate prices. To do this they developed a website, Summerflowers.com[6] to market their flowers. By selling their flowers in this manner they remove market uncertainty and speculation and gain direct access to their end clients and the client's needs. Additionally this increased the ownership of the final market interface and control of the market relationship. Finally by doing this they increased their market knowledge.

[6] The name has been changed to protect the identity of the firm.

Labor Costs

Cut flower production is extremely labor intensive, and even the most sophisticated greenhouse operations still utilize hand labor for harvesting flowers[7]. In Ecuador planting and harvesting as well as chemical applications are all done with hand labor. Therefore, the costs associated with monitoring labor can be high because 11-12 people are traditionally employed per hectare with and average farm size around 15-20 hectares. Additional costs are incurred from lack of worker productivity because when compared to other countries such as Costa Rica, Ecuadorian workers are on average 40-50 percent less productive. Labor shortages can also be a problem because flower farms are located in rural areas where but people tend to move to the city, particularity the capital Quito to look for work. In efforts to solve labor issues some farms violate the law by employing individuals under 18 years of age. This further complicates the debate of child labor even for farms who obey the law.

Pests and Diseases

Cut flower production requires diligent management of pests and disease problems. For the firm's larkspur crop the biggest problem is soil borne diseases which develop as a result of monoculture production on the same piece of land. To combat these disease problems the standard method of control in the industry is fumigation of fields with methyl bromide for soil sterilization in between every crop. This means every 22 weeks the soil is sterilized. The only other method to combat disease build up is crop rotation, however the farm does not use rotation because it poses a large scheduling problem for all the different flower varieties they produce. To further complicate the issue, there is a strong market resistance to chemicals as Ecuador and many other developing nations must phase out the use of methyl bromide by 2015. Currently there is no domestic regulation of chemicals and until the phase-out, and few incentives for firms to try new pest and disease management techniques.

Ownership of Inputs

The farm produces 60 percent of its input plant materials using seeds and vegetative cuttings. They began their own propagation after a supplier failed to meet their demands in time for

[7] Approximately 50-60 percent of the total cost of production in cut flowers is attributed to labors costs. This was also true before dollarization however by the end of the year labor costs had depreciated by at least half that. This information is based on interviews with firms and cut flower growers.

Mother's Day sales in the US, the second largest holiday for cut flower sales. The firm decided that the control of input materials was too important to rely on an outside supplier so they solved the problem by developing their own propagation facilities, including a tissue culture laboratory to maintain clean lines of stock plants for specific flower varieties. This allows the firm to increase their quality control because they are now controlling the quality level of their inputs. This in turn helps reduce loss as well as decreases pest and disease problems. All this translates into overall reduced labor costs to the firm.

Larkspur - The Crop of Interest

The US cut flower market has consistently over the year demanded a regular supply of quality Larkspur (Gill et al 1997). However, Larkspur presents various production complications due to its extreme susceptibility to a range of soil borne disease. Traditional field production control methods for larkspur have required the intensive and frequent application of the chemical methyl bromide for soil sterilization (Gill et al. 1997). This is not only costly, dangerous due to toxicity and labor intensive, but coming under increased environmental regulation due to its harmful effects. Consequently, commercial production is becoming more complex and costly to produce. Regular crop rotation in the long run is likely to be the only viable solution to reduce disease occurrence, as methyl bromide use must be phased out by 2015, however on commercial flower farms rotation is difficult to impossible due to conflicting production needs of other flower varieties. This is particularly true for those flower varieties, such as *Solidago,* that require permanent supplemental lighting structures in the field.

5. Impact of Dollarization

The most critical impact of the January 2000 dollarization of the Ecuadorian economy for cut flower producers was that it dramatically increased the effective real wage price and thus cost of labor. With labor accounting for approximately 50 percent of their production costs, this represented a significant shift to the cost function and forced the firm to seriously review and reflect on their fundamental business model and practices. The firm recognized that for them to remain internationally competitive in their target US mass market, they needed to make cost efficiency their number one priority. To achieve this, they focused on increasing efficiency by decreasing their labor force per hectare and increasing planting densities to increase profits per hectare. Because they targeted the mass market and control input quality they had the ability to

increase their planting densities without affecting the already lower quality standards required by the US mass market. However, when they evaluated their larkspur crop they realized that their current production model was unprofitable and something significantly different had to be done. After the dollarization labor costs associated with the frequent applications of methyl bromide became too high, making the crop nearly unprofitable, and to maintain the profitable production larkspur. Thus the flower farm was forced to look outside the box at alternative production models that would allow them to cost effectively supply the US mass market.

6. Business Model Innovation: Contract Farming with Small Scale Vegetable Growers

After reflection and identification of their core competencies, the critical components of the crops production cycle, possible disease control methods, and potential business models they identified a possible solution to their problem with larkspur production. Larkspur has a relatively short cropping cycle, 18-22 weeks depending on temperature, and requires low tacit knowledge and technology for production but high tacit knowledge for event control, such as pesticide timing and harvesting. Additionally, because of the short cropping schedule coupled with the internet sales they had a quick feed back loop to adjust production needs. Finally, they realized that their technicians; possessed strong technical and problem solving skills. They knew that crop rotation was an alternative management option for larkspur production but it was not a viable alternative on the farm because of all the conflicting requirements for the flower varieties they grew.

An observant technician identified that vegetable growers in the nearby areas produced quality products (mainly broccoli, cauliflower, tomatoes, and potatoes) using rotation methods for the domestic market. This observation spurred the technician to suggest that they try and develop a rotational contract farming model with these local vegetable farmers to produce larkspur.

The flower farm agreed that they had the key resources to develop a new business model base on contract farming for their larkspur production. So the flower farm developed a implementation plan which the technician presented to individual farms as he walked door to door to each farmer’s house.

Farmers were at first reluctant to become contract growers because they had no experience producing cut flowers or for an export market, especially since the export market typically required stricter quality standards than domestic markets. It was only when the technical and flower farm were successful in securing the willingness of Pablo Nachez[8], a very well known and respected farmer for over 20 years, to becoming the first contract producer that other farmers began to take interest in the program. Mr. Nachez was the key to get others to participate because he served as the business leader who communicated to the other farmers about his financial success with larkspur. After four months the project was fully operational.

The Contracting Model

Over four months the flower farm initiated an informal contract model with twenty small vegetable growers who together produce five hectares of larkspur for the flower farm. The contract is seasonal with farmers rotating larkspur into their production schedule. With this arrangement they are not required to stop production of any of their own crop . The farmer is not allowed to replant larkspur on the same plot of land until at least five other crops have been rotated through the plot. This prevents the build up of soil borne diseases and fits the vegetable farmers' current low technology and rotation based vegetable production methods.

The contract farmers typically grow on small plots (> 800m^2) and produce larkspur alongside their vegetable crops at various times in the season. The flower farm provides contract farmers with the required plant inputs[9] on credit but the farmers are responsible for purchasing any necessary fertilizer or pesticides. This is because the farm has no way to enforce the use of fertilizer or chemicals[10]. The costs of the seeds or plant inputs are then discounted from their payments.

The farm institutes a strict set of quality standards that the contract farmers must meet in order to produce to export standards. The flower farm facilitates the successful production of larkspur by providing a technician to help farmers learn larkspur production. The technician visits and monitors the farmers twice a week to make recommendations, including when to apply fertilizer, pesticides, and also when to harvest. The contract farmers are responsible for transporting their

[8] Names have been changed to protect the farmer's identity.
[9] The farm provides either seed or plugs for transplant to the field. The farmer produces the plugs for the vegetable farmers in their propagation facilities.
[10] See Gow et al (2000) for an extensive discussion of this.

larkspur to the flower farm. When the flower farm receives the larkspur, they perform the main post-harvest tasks: bunching, grading, boxing, and transportation to the airport.

To ensure proper payments, the farm has instituted a traceability system. Each farmer is assigned an individual number which allows the larkspur to be tracked from the flower farm to the US market client. The contract farmers receive their payments 30 days after the larkspur is exported. This payment structure allows for the feedback from US customers on final market quality of the larkspur, due to damaged or diseased materials. Botrytis blight, caused by several different *Botrytis* spp. fungi, can occur on cut flowers but goes unnoticed at harvest because there are no visible symptoms. The cold chain for cut flower however can provide the ideal climate for the fungus to develop, cool temperatures and moisture accumulation on plastic packaging as a result of transpiration. Therefore, gray to brown discoloration, water soaking, and a fuzzy whitish gray to tan mold symptoms (University of Illinois Extension 2000) often only present themselves upon delivery to the final customer.

It is a standard industry practice to ask for a credit on damaged or inferior goods therefore if the quality of the flower received is unacceptable the customer will receive a credit. This information is transmitted back to the contract farmer as a non-payment for those stems. *Botrytis* infections occur in the field and therefore this payment structure is necessary to ensure they are diligent in their preventative management practices for *Botrytis*.

The payment structure for larkspur is illustrated in Table 2 and is presented to the farmers from the beginning. The farmers have the option of delivering the larkspur with or without the foliage removed from the stem. The pricing structure is set up to encourage farmers to remove foliage, as that reduces pos-harvest labor requirements for the farm. The flower farm pays $0.105 per stem for larkspur stems that are 70-100cm in length with the foliage removed. Higher prices are paid for longer stems because the flower farm received higher prices for longer stems (Table 4).Foliage removal from the individual stems of larkspur is the only post-harvest activities the farmers perform. Stems of 60-70cm or stems with foliage receive a lesser price, $0.0805 per stem. The firm does not purchase anything below 60-70cm as this does not meet the minimum export quality standards.

Once the larkspur is delivered to the firm they perform the post harvest tasks of grading the stems for length, bunching them and packaging them for shipment. The firm transports flowers

to the airport in Quito on a daily basis. The costs associated with the post harvest activities and the technician's salary adds an additional $0.06 per stem to the total cost of production for larkspur for the firm.

7. Impact of Contract Farming

Contract farming offers many benefits to farmers who choose to pursue it and well managed contract farming can be an effective way to coordinate and promote production in agriculture (Eaton and Shepherd 2001). Market access to export markets is especially important because they are often dominated by higher value horticulture crops, allowing farmers to take advantages of higher market prices and increasing their income (Glover 1994). Additionally, contract farming can incorporate low income farmers into the modern sector by providing them with new technologies and production techniques to improve their yields (Key and Runsten 1999). In the following section we present the key impacts of the contract farming model implemented by the cut flower farm, highlight impacts for both the flower farm and the contract growers.

Profitability per Hectare

Several factors influence small farmers' ability to increase their income by producing larkspur on contract with the cut flower farm. The first factor is that larkspur prices are set ($0.105/stem) and on average higher then vegetable prices per meter square. This is party influenced by planting densities; larkspur is planted at a higher density per square meter than other vegetables[11]. Therefore the yields per hectare go because of planting densities and because quality inputs supplied by the flower farm are also likely to be more productive and require less pest and disease management which all reduce costs and increase profits. The second factor is the low price of vegetables in the domestic market. The low prices of vegetables are due to current market conditions. As the owner of the flower farmed explained, "One reason why the inflation in Ecuador is so low at the moment is because food prices have gone down terribly. They pay $2 to someone to dig a sack of potatoes and the market price for a sack of potatoes is $2." For example, the amount of money earned for larkspur, if compared to the same size area as another vegetable crop earns them three times more money. The third factor that affects profitability is

[11] Larkspur is an upright flower where as other crops such as broccoli or cauliflower would be a larger plant and the individual plant takes up more space than an individual larkspur plant.

that as farmers become more efficient their costs are reduced (Table 3). Farmers are allowed to become more efficient and respond to the needed changes quickly because they have immediate access to technical support from the technician which minimizes the overall loss. Furthermore, even farmers operating at the margin can earn a profit; even if they are only able to successfully harvest 50 percent of their larkspur they will still break even.

The final factor that affects the profitability for the vegetable farmers is that adding larkspur to their rotation schedule causes minimal changes to their current production practices. They do not require any new investments in equipment and the same fertilizers and chemical can be applied to both larkspur and vegetables with the same application systems.

Larkspur offers a profitable alternative to the vegetable farmers' current cropping schedule and some farmers are having so much success they are willing to rent extra land, if they are constrained, for larkspur production.

The flower farm is increasing their larkspur profits by increasing their margins because their total costs are reduced. By producing larkspur off the farm, they no longer incur the extra labor and chemicals costs. The flower farm is contracting the necessary amounts of larkspur to meet their market demands. The crops is now profitable because they only employ one technician to supervise the all the production. If they were to produce it on their own flower farm they would have to employ 11 people per hectare. The farm still incurs some additional labor costs associated with post-harvest activities and the technician's salary which together add $0.06 to each stem. Therefore the total cost of production for the flower farm is $0.165 per stem. The margins for the flower farm increase as the contract farmers' quality increases, specifically related to stem length. The firm receives higher market prices for longer stems. For example a 60cm stem sells for $0.18 while 90-100 cm stems sell for $0.24 per stem (Table 4).

Technology Spillovers

The technician serves to transmit information about larkspur production and help deal with insect and disease problems. He works with the individual farmers twice a week giving production and disease and pest management recommendations. On the first visit to the farm he evaluates the individual farmer's needs and makes recommendations. On the next visit he checks to see if the contract farmers have followed his instructions and handles any new questions or problems. The technician's recommendations include methods to develop better irrigation techniques or

seeding/transplanting methods for larkspur as well as the best pesticides available to manage pests and diseases.

Contract farmers have little information available to them on pest and disease management and new production methods. The education the technician provides is not only critical to the success of their larkspur crop and at no cost to the contract farmers, and it is also applicable to their vegetable crops. Furthermore because the contract farmers produce their vegetable crops alongside the larkspur the technician can also serve as a resource for growing vegetables. Better management of vegetable production is important because insect pests on vegetables could easily move to larkspur. As an example, the technician will demonstrate how to properly and safely apply pesticides. Because Ecuador has no regulation of chemicals this information is not readily available to small farmers.

Positive spillover effects often include improved production of traditional crops through knowledge gained from producing under a contract (Warning and Key 2002). Although larkspur requires higher standards of quality than their vegetables, still many of the same insect pests which are problems for larkspur are problems for the vegetable crops. Furthermore, Ecuador has no pesticide regulation or training programs. The proper application and timing of pesticides may help the contract farmers reduce production costs for their vegetables as well. Proper timing can save money by reducing the number of applications necessary and prevents crop damage, increasing their overall harvest.

Self Enforcing Contracts

The flower farm has implemented a contracting agreement that only requires verbal agreements because the incentives for both parties make the relationship self-enforcing[12].Profitability for the vegetable farmers increases with increased quality, quantity and efficiency of larkspur production.. For example, the flower farm will pay $0.085/stem for a 60cm stem but for anything from 70-100cm the farm will pay $0.105/stem. The number of high quality stems per hectare is solely determined by the farmers' management systems. Free technical for larkspur translates into support for vegetable crops because the same problems that affect larkspur affect the other crops at the same time. This means there is a large spillover benefit that helps to enforce the

[12] See Gow and Swinnen (1998) for a discussion of self-enforcing contracts.

contractual arrangement. Additionally, the contract farmers purchase the plant inputs, grown by the farm for larkspur from the flower farm on credit further securing the contractual agreement.

The flower farm has effective monopsony purchasing power because there are fewer other larkspur growers in region who might buy the larkspur from the vegetable farmers. Most farms are located to the north, in the Pichincha province near Quito. Therefore there is little risk of the contract farmers shirking on their agreement and selling to someone else. The firm has additional incentives to help farmers increase quality because the firm has no other larkspur production, and their profits are directly related to the quality levels of the vegetable farmers' larkspur crop. As stem length increases the prices in the wholesale market for the flower farm increase (Table 4). Therefore the incentive structure for the firm is aligned to allow for a self-enforcing contractual agreement. Properly aligned incentives for both parties have allowed for a self-enforcing contractual agreement.

Market Access

Small farmers are often excluded from high dollar export markets (Minot 1986; Eaton and Shepherd 2001). Commercial flower production requires large capital investments in land and labor, and technology that can operate as barriers to entry for small farmers. However, buy utilizing a contract farming arrangement the flower farm is breaking this cycle of exclusion and offering these small farmers access to the country's third largest export market, and the most important export market for the Andean region of the country. The results are that farmers will receive higher prices because cut flowers are a higher valued horticulture export than domestic vegetable production. Additionally, because these farmers are very small, without the proper organization and coordination efforts with others they would not have the land area necessary for export volumes. The flower farm provides this needed coordination and market access that allows these vegetable farmers to be successful at increasing their profitability with larkspur.

Supply Assurance and Flexibility

The biggest demands for larkspur occur at Valentines' Day and Mother's day in the US and demand is relatively steady the rest of the year except for June, July and August, as cheaper Californian production floods the market. The flower farm can work with the contract farmers to both increase their production levels for these sales events and decrease production at other times more easily then they could before. The contract farmers are willing to work with the seasonal

demands because larkspur increases their profits and easily fits into their current production model. The credibility of the flower farm couple with this offers the firm flexibility.

Additionally, this model self selects the best farmers because those that do not make. This model also allows the farm to select the best contract farmers, and these farmers are the ones who will have the opportunity to produce year round for the firm. This contract farming model is so popular within the local community that even if someone was to dropout there would be another farmer ready to join. This means the flower farm has supply assurance for land availability even if farmers exit the program. Additionally, the vegetable farmers have been able to produce a reliable supply of export quality product to meet the market demands. This contracting arrangement now also offers the flower farm increased flexibility with their supply of larkspur.

Labor and Land

The contract farming relationship has allowed the flower farm to eliminate extraneous labor costs, paying only the technician and post harvest labor. Another added benefit is that labor dependency costs are eliminated because their payment schedule is based on piecework providing the needed incentives for contract farmers to be productive and dependable. The flower farm also does not have to purchase new land for larkspur production which brings not only the cost of the land itself but also new labor expenses and concerns with the supply of a dependable labor force.

Secondary Spillover Effects

Positive multiplier effects are occurring because larkspur requires more labor and inputs. The contract farmers typically hire more laborers than needed for vegetable production to help with the planting, harvesting and transportation because larkspur is planted at increased densities than their vegetable crops. This translates into increased on-farm opportunities for people in the area and this can lead to additional spillovers and linkages with the local economy (Glover 1994; Key and Runsten 1999).

Additionally, most farmers do not own trucks or tractors and therefore rent these items when needed. The addition of larkspur into their crop rotation schedule means they will have to rent a truck an additional time to transport larkspur to the flower farm, and the local rental agency benefits from the increased business.

7. Discussion

Contract farming has long been implemented in developing countries through foreign direct investment (FDI), most often in the form of foreign-owned agro-processing firms (source). When FDI initiates contract farming the success is often because FDI provides provisions: access to inputs on credit, technical assistance, market development, access, and stability even when there is macroeconomic instability within the region (Gow and Swinnen 1998; Eaton and Shepherd 2001). The case study we present is that of a domestic firm in a developing country that is an "agro-processor," grower, and exporter of larkspur. Dollarization has acted as a catalyst for this firm to initiate a contract farming business model that is typically implemented by FDI. In this case, the flower farm is providing the same essential elements for contract farming that FDI typically provides, to local vegetable farmers. This relationship has been able to develop because in a stable macroeconomic environment the provisions necessary for contract farming can be developed by the market and firms within a given market Reference.

Furthermore FDI is widely recognized as producing additional technological spillovers both direct and indirect in nature, including advanced technologies (Kohpaiboon 2006). Our case study is illustrating such effects. Domestic firms can produce substantial positive direct and indirect economic benefits and horizontal and vertical spillovers when a stable macroeconomic and legal environment is established (Key and Runsten, 1999; Gow et al, 2000; Gow and Swinnen, 2001; Dries and Swinnen, 2005).

Before dollarization and the country experienced macroeconomic instability that prevented local firms from developing and maintaining stable and enforceable inter-firm relationships. Clearly our case provides and example of a domestic flower farm establishing these forms of inter-firm linkages under a new environment of macroeconomic stability.

Eaton and Shepherd (2001) point out that the key to successful contract farming is the development of the necessary forward and backward linkages for contract farming. These linkages are both reliable and cost-efficient inputs such as extension advice, mechanization services, seeds, fertilizers and credit, and guaranteed and profitable markets for their output. But what is also important is the sequencing, monitoring, and reinforcement of the mutual commitment on both sides for the success of the project. Additionally larkspur is suited to

contract farming because its extremely perishable nature means that coordination by the firm is essential (Minot 1986) and it requires post-harvest facilities and activities that are not feasible for the vegetable farmers to invest in (Kirsten and Sartorius 2002).

In the next section we outline the forward and backward linkages and components that are critical to the success of our case study.

1. *The decision to use contract farming was commercial.*

The contract farming business model was developed as a response to an internal economical and financial need of the business. The firm needed larkspur production, hence they were willing to implement a contracting business model that ensured their success and that of the contract farmers. There is no competition between the firm and contract farmers' larkspur. The project only involves 10 farmers who are the sole producers of larkspur. The firm does not produce any larkspur so it is solely depending on these contract farmers. The values is shared across the relationship with strong incentives to excel, providing the firm with flexibility.. This creates a mutually beneficial environment allowing co-creation of profit because the flower farm needs and sought out credible partners, the contract farmers, and the contract farmers need ways to increase their incomes due to the current low prices of vegetables.

2. *The farm offers extension and technology to the farmers.*

The flower farm provides technology and extension services via a technician to the contract farmers because they have a direct economic interest in improving farmers' quality level (Eaton and Shepherd 2001). Once again these incentives are reinforcing through the payment schedule in place for the flower farm and the contract farmers. In this case, the flower farm provides the plant inputs on credit, which the contract farmers pay for as a deduction of their harvested crop payment. This allows the flower farm and contract farmers the assurance of quality inputs because the flower farm produces the inputs, and provides and technician monitor for quality and to see that these inputs reach fruition, and in turn increases the productivity of the contract farmers. Additionally, larkspur and vegetable crops suffer from the same pest and disease problems which the technician can help with. The effect is that small farmers receive free technical advice not only for larkspur but for their vegetables as well.

The technician also conducts field test with farmers who are willing to try new production methods. These tests help the farmers and the technician trial new irrigation or transplanting methods with observable results in the real environment. Farmers who participate get instant feedback on the success or failures of techniques and they also receive additional compensation, as a reduction of input prices, for their willingness to work with the technician and try new methods. The technician's relationship reinforces the mutual commitment between both parties.

3. Production Risk

Larkspur is easy to grow and has good prices and demand in the US market. These attributes coupled with its short production cycle (18-22 weeks) allow the project to be successful for both parties. Contract farming is low risk for the vegetable farmers because it maps into their current production model, using rotation and furrow irrigation methods. The firm provides the contract farmers have technical and problem solving skills from the technician which further reduces the production risk. Furthermore catastrophic risk is low; they can lose 50 percent of their production and still break even.

For the flower farm, the risk is low because they are not investing in additional land and labor resources which tie up much needed capital, as the Ecuadorian bank have classified the flower industry as a "high risk" industry and are reluctant to give out loans as a result of the numerous bankruptcies that occurred in 1999 and 2000. The only labor cost incurred is that of the technician and post-harvest activities performed at the farm such as grading, bunching, boxing and transportation to the airport. The farm is only paying one technician to supervise 10 contract farmers, reducing the overall cost to the farm Reduced costs for the farm translate into a total cost of production of $0.165 per stem, which is much less than they could produce it for .

4. Transparent Costs and Prices.

Well defined criteria for payments are based on quality attributes associated with stem length and foliage (Table 2). The contracting relationship is self enforcing because the incentive structure for prices are properly aligned and the costs are transparent. The system provides farmers with incentive to increase their profits by increasing their quality. Additionally, as farmers become more efficient their costs decrease from $.08/stem total costs at 40 percent of their plants are harvestable to $.06/stem when 60 percent of plants are harvestable (Table 3).

Farmers receive payments 30 days from when their product is sold which allows external quality and assurance decisions to take place. Contract farmers do not receive payment if a customer in the US requests a credit for damaged or diseased materials as a result of a low quality stem[13] and because the flower farm has established a traceability system they can track this occurrence as well as proper payments.

5. Location Specificity and Rotation

Contract farmers are located within 20km of the flower farm. This allows for better quality and assurance for several reasons. First, the technician can easily reach the farmers to monitor production activities. The close proximity to the firm reduces monitoring costs for the firm and allows the technician to be easily accessible to the contract farmers. The contract farmers' transportation costs are reduced because they do not have to travel far to deliver their flowers and any further losses due to transportation are reduced. Roads and transportation methods are quite rudimentary; contract farmers transport their larkspur in plastic buckets with potato sacks covering the flowers in a pick-up truck. The less distance the flowers are transported the chances for damage decrease.

Rotation is the critical production element for this relationship because it is a source of needed mutual benefits and is part of the self-enforcing mechanisms. Farmers are required to rotate through five additional crops before they can replant larkspur in the same area. This is strictly monitored and enforced by the technician because as soon as farmers begin to rotate fewer crops the chances for disease problems increase not only for larkspur but for the other vegetable crops. The farmers are growing a variety of vegetable which allows them to meet this rotation standard. Some farmers use the option of renting land if they are constrained either in size or available lands (in a rotation schedule) to produce larkspur because of the better profits they receive from larkspur than vegetables.

6. Business Leader

The farm secured Mr. Nachez as one of their first contract farmers. He provides the firm with social capital and sees the value in the contract farming proposition. His participation early on

[13] The most common occurrence for asking for credit relates to the formation of Botrytis on stem while in transit. This bacterial infection can be present without notice in the field, but develops into a gray mold during shipping. The other occurrence would be for flowers that shatter.

has been critical to the success of the program because farmers are very reluctant to try new crops, especially ones they are not at all familiar with. Essentially he was the alliance functionary and took the first mover advantage in contract farming. He saw the value in the project and because he has been farming for over 20 years understood that sometimes farmers must take risks. By communicating his success to others in the community he increased the participation level in the contract farming proposition. His role has been another critical component to this project.

7. Community Social Capital.

The owner of the flower farm is originally from Ambato and does not want to damage his social capital within the community. Many of the firm employees are from Ambato or nearby. Hence, the farm has had an established presence in the community since 1996. The firm believes their new business model of contract farming not only solves their current production problems and increases their profits, but that it is also helps solve the problems of farmers in the region by offering them a chance to increase their incomes. Small farmers are often excluded from high value export markets because of lack of knowledge and access to marketing channels. By using contract farming the flower farm is providing these small vegetable farmers access to the country's third largest export market which typically has large capital investments as a barrier to entry.

8. Technology Spillovers

As farmers gain increased production knowledge from their interactions with the technician their skills at vegetable production also improve. This is a result of whole farming systems approach they take to pest and disease control. The technology spillover occurs because there is mutual benefit for both parties to manage the disease and pest of vegetables; these same disease and pests can be transmitted to the larkspur. Better management practices for vegetables increases yields and improves the overall quality levels allowing the contract farmers to negotiate higher prices with their buyers. Other benefits include the ability to develop better accounting and planning skills. This is difficult for farmers to do now because vegetable prices are subject to prevailing market prices as dictated by supply and demand. Larkspur however has a set price which allows for better planning..

Conclusions

The premise of this case study research was to identify how individual firms in the Ecuadorian export cut flower industry have responded to dollarization which provides information that is lacking in the literature. Here we present a successful business model of contract farming that was commercially driven by dollarization. By no means is this firm the only example of a successful development of a business model which offers a sustainable competitive advantage, but it is a legitimate example of the success experienced by a firm as a result of developing solutions outside the firm. The success of this model is based on the mutually reinforcing incentive structures for both parties. The success is further strengthen by the appropriateness of the crop, and the production knowledge of the firm, based on years of their own experiences producing larkspur that allows them to help the contract farmers become successful. Dollarization and its effects at the macroeconomic level have been extensively studied; however continued research efforts at the microeconomic level need.

Table 1. Flower Farm Costs for Larkspur

Larkspur Production Costs	
Larkspur stem	0.105
Post Harvest	0.06
Total Cost	**0.165**

Source: Authors calculations

Table 2. Prices Paid to Vegetable Growers for Larkspur

Stem length	**Foliage removed**	**Price**
70-100 cm	**yes**	0.105
70-100 cm	**no**	0.085
60cm	**yes**	0.05
60cm	**no**	0

Source: Authors calculations

Table 3. Vegetable Farmer Costs for Larkspur

Larkspur Production Costs	
Transplant	0.015
Labor/Chemicals	0.065
Total Cost	0.08

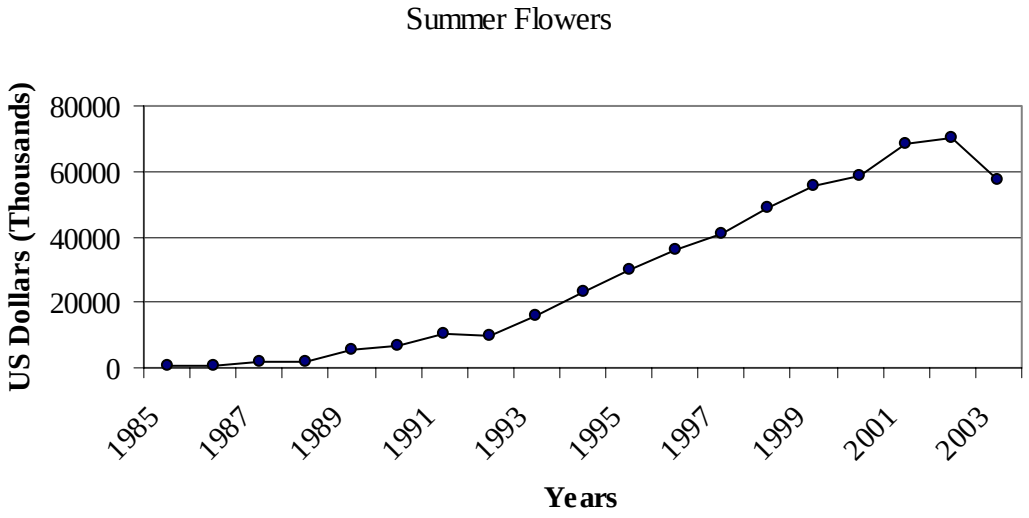
Source: Authors calculations

Table 4. Market Prices and Flower Farm Revenues for Larkspur

Stem Length	**Market Prices**	**Flower Farm Costs**	**Revenue**
60cm	0.18	0.0165	0.015
70cm	0.2	0.0165	0.035
80cm	0.22	0.0165	0.055
90-100cm	0.24	0.0165	0.075

Source: Authors calculations

Figure 1. Growth of Summer Flowers Based on US Dollar Value Freight on Board (FOB)



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