Exploring the Dynamics of Full Information Product Pricing Networks: Fair Trade Coffee in Mexico

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Abstract:

This poster describes research in progress undertaken by the Research Group on Comparative and Transnational Digital Government in North America, which is supported by the National Science Foundation Digital Government Research Program as well as by institutions in Canada, Mexico, and the United States. This research explores distribution networks that attach non-price information to products as a differentiation mechanism. Often this non-price information is transmitted through trusting networks or certifiable labels such as "Organic" or "Fair Trade." We call such networks Full Information Product Pricing (FIPP) Networks. Major objectives of the research are to explore how government policies and investment in information and communication technology can be used to promote FIPP networks and to assess what impacts on economic and local development will result. The first fair trade FIPP network selected for simulation is a coffee cooperative in Mexico, Tosepan Titataniske. Current modeling efforts are aimed at eliciting dynamic insights from the case by the application of established system dynamics knowledge related to commodity models and supply chains.

Introduction

Most products consumed within the NAFTA trading zone are produced and distributed through cost-effective distribution networks that typically do not reveal certain types of information to end consumers. This information asymmetry makes it difficult for the consumer to assess the quality of the products, offering producers incentives to offer low quality products (Akerlof, 1970).

However, a growing number of consumers and producers are increasingly paying attention to information about where, when, how, and by whom our goods are produced. In these cases, producers strive to attach non-price information, thereby reducing information asymmetry and adding value to their products. Often this non-price information is transmitted from producers to consumers through relationship-based networks or under certifiable labels such as “organic” or “Fair Trade.” We are calling such networks of relationships among consumers, producers, and distributors “Full Information Product Pricing (FIPP) Networks”.

FIPP production and distribution networks can sustain networks of small producers, enable SME creation in rural or under-developed areas, and in general fuel region-wide economic development (Bacon, 2005; Penttila, 2006; Petkova, 2006). However, FIPP benefits to producers vary on particular contexts (Pirotte, *et al.*, 2006). Moreover, some analysts pose important questions about the real benefits or the long-term sustainability of FIPP networks (Bastian, 2006; Weber, 2007; Wilson, 2006).

Initial explorations of FIPP systems in Canada, United States, and Latin America suggest that system dynamics knowledge on commodity markets and supply chains has the potential to provide dynamic insights that contribute to better understand the benefits and key feedback processes involved in the promotion of sustainable FIPP systems. In this way, building on Sterman’s commodity model (2000), the purpose of this paper is to examine long range market dynamics on FIPP networks.

To accomplish this purpose, the paper is organized in six more sections after this brief introduction. The following section provides the “big picture” of this research project, as it relates to the North American Digital Government Working Group. The third section includes a brief review of the literature on Fair Trade, particularly referring to the case of Coffee. In the fourth section we describe the research methods used for gathering data and our modeling approach. The fifth section contains a description of the cases that we will use in the modeling project. The next section is a description of the model structure and some policy experiments. We conclude the paper providing some grounded dynamic hypotheses resulting from this initial effort.

Full Information Product Pricing (FIPP) Network and the North American Digital Government Working Group

We are carrying out this research project under the auspices of the North American Digital Government Working Group (NADGWG). This unique consortium of research organizations and individuals, containing members in all countries in the NAFTA trading region, offers a number of distinct features to support this research project. First, having researchers home-based in Canada, Mexico, and the United States will allow the group to explore simultaneously both government policies and FIPP networks throughout the NAFTA region. Additionally, the research team assembled within NADGWG has a breadth of methodological and substantive research skills that will allow a problem of this complexity to be explored from many points of view. Moreover, the affiliated research centers within NADGWG contain leading expertise in digital government applications in Canada, Mexico, and the United States. Indeed, this shared focus on E-government has been a driving force for the creations and initial funding of the NADGWG network.

Figure 1 is intended to illustrate the intended scope of the overall research project. As shown in the Figure, we envision three major components to this research project: (1) Research to understand the structure and dynamics of FIPP production and distribution networks, (2) Design of public policies and investment strategies (especially digital government policies) to support economic development by promoting FIPP practices, and (3) Achieving long term project goals by providing practical tools and prototypes to support public policies to support FIPP practices.

We begin our research with case investigations of these successful innovations, searching for patterns of success and diversity in strategies (Zhang, *et al.*, 2008). The flow of products and non-price product information from producers to consumers is facilitated by various types of social networks that supplement usual economic arrangements.

A second component of the research program involves the design of public policies and investment strategies (especially digital government policies) to support economic development by promoting FIPP practices. A minority of the existing FIPP networks now involve active involvement by government agencies. An exception in our case sample is *Agri-Traçabilité* in Quebec. Our second phase of research will seek public policy avenues, especially those related to digital government supporting an information-rich society, which can enhance and accelerate the creation if FIPP practices. We expect that this phase of the research will involve the creation and exploration of prototype systems modeled after social network software (such as FaceBook) or on-line market and transaction systems (such as E-Bay).

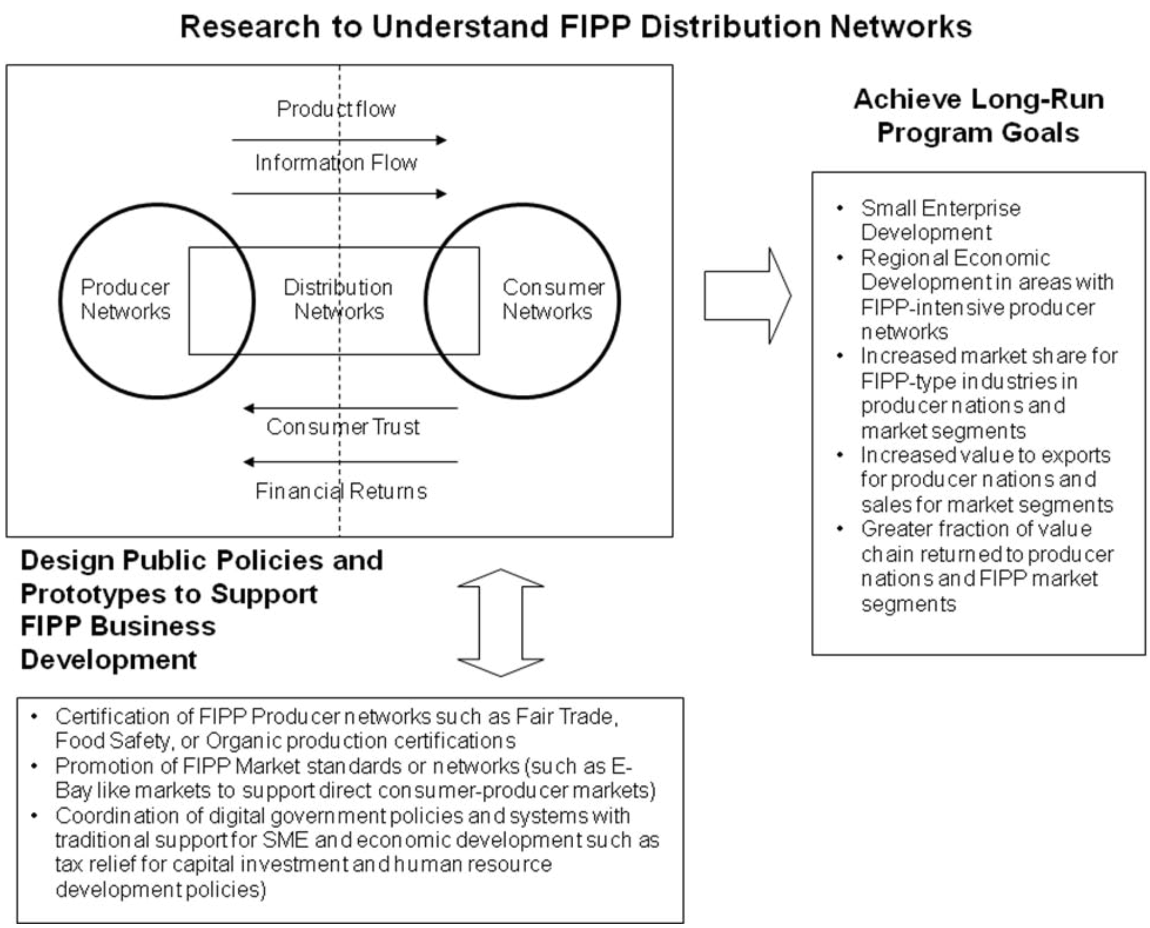


Figure 1: Understanding Hypothesized Dynamics of Fair Trade Coffee in a Commodity Market Structure

Finally, the third component involves the development of practical tools and prototypes to support public policies to support FIPP practices. The ultimate success of our research project will rest on whether or not the results of this research can be used to increase small enterprise formation, to increase regional economic development through initiatives such as Mexico's E-Village initiative, and improve the overall quality of life of participants in FIPP production and distribution networks. To move toward these long-term goals, we propose to product practice-oriented toolkits, simulation-based training games, and workshops that can be used to government officials at all levels plus NGOs who are working to create and sustain FIPP production and distribution networks.

Fair Trade Coffee and Commodity Dynamics

From the point of view of this paper, Fair Trade distribution networks are one instance of FIPP Networks, and the model presented in this paper represents the coffee market as a couple of distribution chains. The purpose of this section is to describe Fair trade practices and to link these practices to System Dynamics research on commodity dynamics.

Fair trade is a "commercial partnership, based on dialogue, transparency, and respect, the aim of which is to create greater equity in world trade. It contributes to sustainable development by ensuring better trading conditions and guaranteeing the rights of producers and marginalized workers, particularly in the global South" (Pirotte, *et al.*, 2006).

The idea of fair trade is not new, and fair trade practices can be traced back to the 40s, when the first alternative commerce practices were developed in the United States (CIAT, 2004). The concept was then exported to Europe in the 50s by Oxfam-International in the UK. The term "Fair Trade" was coined at the 1964 UNCTAD conference in Geneva, looking for more equitable commercial relationships between the "North" and the "South."

The first fair trade art craft exports from developing to developed countries took place on 1967 by S.O.S. Wereldhandel. These initial exports were sold by catalog in churches and other social groups. The first fair trade store was founded in April, 1969 in the Netherlands, increasing to 120 stores in only two years.

The first Fair Trade Coffee, produced in Guatemala, was introduced into the export markets in 1973. Product quality improved in the 80s through a series of improvement campaigns, and consumers become more aware of fair trade products in the same decade. More products such as tea, honey, sugar, and nuts have been introduced into the fair trade regime. Towards the end of the 80s, a cooperative in Mexico (UCIRI), introduced the first fair trade brand into the market with the main purpose of increasing its exports. All different fair trade brands and seals were consolidated under a common labeling organization: the Fair Trade Labeling Organizations International (FLO), with headquarters in Bonn Germany. Currently, FLO operates in Europe, Australia, Canada, United States and Japan.

There are two key principles in Fair trade coffee as a FIPP network. In terms of distribution, Fair trade practices promote a reduction of the supply chain connecting consumer and producer. In fact, one of the main objectives is to link directly producer and consumer in a relationship of solidarity. The second key principle consists of assigning a differentiated price to Fair trade products such as coffee. The pricing strategy consists on adding to the market price a social and an ecological premium. The social premium comes from certification of Fair Trade practices, which are related mainly with governance mechanisms. Part of the social premium must be used for social projects in the community where the Fair trade producer organization is established. The ecological premium, on the other hand, is assigned to certified organic products.

Coffee is a commodity market, hence we should be able to look at its dynamics using well-established System Dynamics knowledge in commodity dynamics (Meadows, 1970; Sterman, 2000; Wolstenholme, 1980). The next list encompasses the main assumptions based on this knowledge that guide our modeling work:

1. The Coffee Market is a commodity market
2. The Fair Trade (FT) Coffee Market is a modified commodity market
3. Both markets have three main actors
    a. Producers
    b. Distributors (wholesale, retail, the all "middleman" aggregated)
    c. Customers
4. There are two ideal-type distributors (who practice Fair Trade)
    a. Profit Maximizers (Starbucks)
    b. Fully Altruistic (10,000 Villages)
5. There are two potential pricing structures
    a. Fixed prices (using the social and ecological premiums)
    b. Market-oriented FT prices (product premiums, fair wages, and social benefit premiums enter the cost structure, but market prices can still adjust to inventory coverage pressures).
6. Demand for FT products (as a % of total market) is an exogenous test function (as is the case in the current version of the model)

In this way, we will be able to develop and study at least the four scenarios described in Table 1. We have found a real-world reference case for three of the four conceptual scenarios presented in the table, and we have started to gather data from cases in the two scenarios involving altruistic distributors, a coffee cooperative in Mexico, and a craft cooperative in Central America.

Table 1: Scenarios under study for the modeling project

	Profit Maximizing Distributor (Starbucks)	**Altruistic Distributor (10,000 Villages)**
Fair Trade as Price Fixing	THIS CELL SEEMS VERY UNLIKELY TO OCCUR	Current Situation with FT Coffee program
Fair Trade as Producer Cost and Income Structure	Current situation with Starbucks FT program	Current situation with craft production in Central America

Methods: Grounded Dynamic Hypotheses for FIPP Commodity Markets

The model presented in this paper is a preliminary result from the second stage of a three-stage, multi-method project. As mentioned above, the initial stage consists of the analysis of several FIPP Networks in Canada, United States and Latin America following a case study approach (Stake, 1995; Yin, 2003). We are using the data obtained through the case studies to develop formal simulation models to get a better understanding of FIPP networks (Richardson and Pugh, 1981; Sterman, 2000). Formal models will be used to develop and test hypotheses about effective public policies to promote the development of sustainable FIPP practices. Finally, the objectives of the final stage of the project are the development of practical tools and prototypes to support policy implementations or FIPP practices, based on Smart IT principles and practices (Dawes, *et al.*, 2004).

The initial sample of cases included one case from Canada, one case from the US, one from Mexico and one from Central America. Data gathering for the case studies included document analysis, as well as semi-structured interviews with managers and participants from each case. The interview protocol was developed collaboratively in English by the research team, and then it was translated into Spanish and French to be applied in Canada and Latin America. The interview protocol consisted of two main parts. The first part included 11 questions related to the organizational characteristics of each organization, IT use, government relationships and other institutional factors affecting their activity. The second part of the protocol introduced a policy scenario to explore the reactions of managers from each organization towards some initial ideas related to information policy and systems to support policy.

System Dynamics can be effectively combined with the Case Study and Grounded Theory methods as a tool to develop theories (Kopainsky and Luna-Reyes, Forthcoming 2008). In this way, following the iterative approach consistent with these methods, we will develop a series of theories that we are calling "Grounded Dynamic Hypotheses," that is to say, Dynamic Hypotheses grounded on case data. Figure 2 shows graphically this approach as a learning cycle. Our current modeling effort is grounded in the Fair trade coffee case, but we will develop other simulation models based on the other selected cases in the project. Comparing and contrasting model structures from each case will lead us to create a robust theory to understand FIPP Networks.

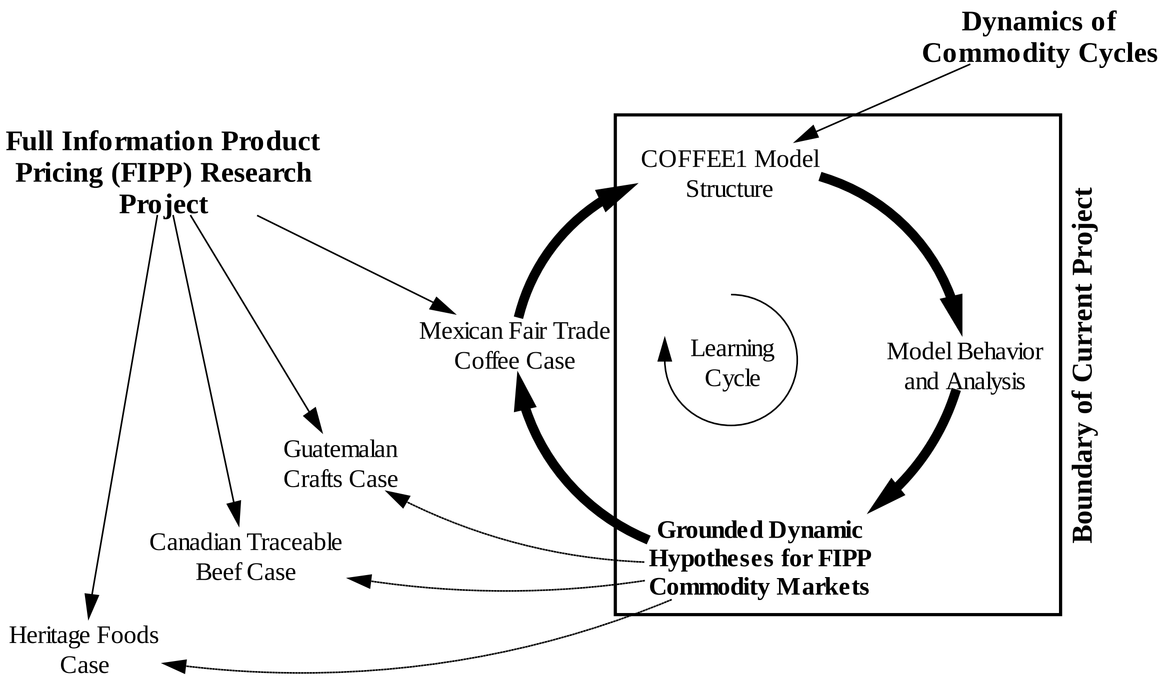


Figure 2: Understanding Hypothesized Dynamics of Fair Trade Coffee in a Commodity Market Structure

Full Information Product Pricing (FIPP) Case Examples

In this section of the paper we briefly describe each of the initial four FIPP Systems under study.

<u>Tosepan Titataniske (Together we win)</u>

As a response to the coffee market crisis of the 90's, coffee producers in Mexico adopted the concept of fair trade. The concept of fair trade involves a series of quality, organic and social standards devised to differentiate coffee produced under these norms, increasing sales price and reducing risks of price fluctuations. *Tosepan Titataniske* is a cooperative in the northern mountains of the State of Puebla in Mexico, which produces and exports organic and fair-trade coffee to the US, Japan and Europe. The *Tosepan* cooperative groups about 1400 small producers from about 70 communities in the mountains. *Tosepan* is organized as a network of local cooperatives, which collaborate to sell coffee through a central warehouse at *Cuetzalan*, the main city in the area.

Tosepan is certified as an organic/fair-trade coffee producer by Fair Trade Mexico, Certimex, Ocia International and by the Fair Trade Labeling Organization (FLO). The certifying process involves certification of local small producers by visiting their lands and establishing production quotas for each of them. The total amount of organic or fair-trade coffee that *Tosepan* can sell/export is the sum of each small producer quota.

Tosepan has a manual traceability system to control individual quotas. Although they use the Internet (e-mail) and some basic productivity applications (spreadsheets and word processing), information technologies have the potential to facilitate certification and traceability of coffee in the network of producers. However, one of the interviewees showed cautious about the use of a traceability system. His reaction was "we like systems to have traceability and transparency, but when a system is big, it can be heavy as a rock and it need to be carried [..] if the system is too rigid, it can leave out many possibilities to producers."

Moreover, and according to *Tosepan's* interviewee, Fair-trade exports could benefit from having clearer government standards and regulations, which are much more developed for organic products. However, *Tosepan* relationships with government have been limited, and difficult. As the informant expressed "Today government is interested in organic and fair trade because of the market, and not the philosophy. They realized after 6 or 7 years that conventional producers are out of business. They did not believe all people who approach them before. Our relations with government have been complicated [..] Although there are government officials that show a lot of interest in their work, there is a huge bureaucracy that makes hard for us to see government as our partner."

Central American Fair Trade Craft Cooperative

The hub of this FIPP network is a women-owned and operated cooperative located in Central America that produces non-traditional crafts using traditional fabrics. The women of the cooperative use the proceeds from the sales of their products to pay themselves a just wage and then to provide a broad array of social services for their children and community including schools, a medical clinic, and new business development opportunities.

The coop is certified as a fair trade producer by the Fair Trade Federation (FTF). It works directly with a number of fair trade distributors, the largest of which are SERRV International, Ten Thousand Villages, Oxfam, and Mayan Hands. These distributors sell the coop's products in the United States, Canada, Europe, New Zealand, and Australia. However, they account for a relatively small percentage of the coop's sales. Approximately 80% of the coop´s products are sold through *UPAVIM Crafts*—a small US business that sells exclusively for the coop. *UPAVIM Crafts* distributes to more than 300 shops in the US and Canada. Many of these shops have personal relationships with the coop, its members, and the owner of *UPAVIM Crafts*.

While the organization does use the Internet to manage its order flow and it does have an on-line URL, it does not yet have a well-developed strategy to use ICT to connect to its customer base. The coop is skeptical about the future possible role of government intervention to support its business out of a belief that governments help larger organizations, not small producers such as themselves.

Certification, Traceability and Québec's Food Exports

The information that businesses outside a given country have to gather and communicate in order to get the right to export their goods to that country or earn these goods a leading national certification should get more complex in the coming years. For example, the recent *Action Plan for Import Safety: A Roadmap for Continual Improvement* submitted to the American president by the Interagency Working Group on Import Safety contains 14 recommendations to complement the "variety of actions and plans [..] already underway to improve import safety" in the United States (Interagency Working Group on Import Safety, 2007).

Beef and sheep production is a $ 1.1 billion business in Québec. For farmers who raise these animals, the adoption of stricter safety measures poses a major challenge that they have started to address in 2000. With the support of *Agri-Traçabilité,* an autonomous non-profit organization subsidized by the Québec government, producers have had to install traceability systems in their farms since the adoption of Québec's *Regulation respecting the identification and traceability of certain animals*.

According to *Agri-Traçabilité*, Québec's permanent identification and traceability system rests on three main characteristics: industry and government agencies manage a single multi-species database; farmers must identify each animal a few days after its birth; and animal movements are recorded in the database.

By making it possible to rapidly identify Québécois farms affected by major animal health problems such as the hoof-and-mouth disease or the mad cow disease, *Agri-Traçabilité's* traceability system helps prevent propagation from one site to another and, therefore, reduces the risk that consumers lose confidence in Québécois beef or sheep meat.

Québec's traceability system is robust and powerful, but it only covers certain types of animals, it does not cover other kinds of food products (e.g. lettuce), it cannot help determine if a contaminated *product* (e.g. a sick cow) has been in contact with other products during transport and it cannot track a product outside the borders of Québec. Moreover, many producers dislike the system (or resist its introduction in new areas) because they don't see how much value, if any, it adds (or would add) to their products.

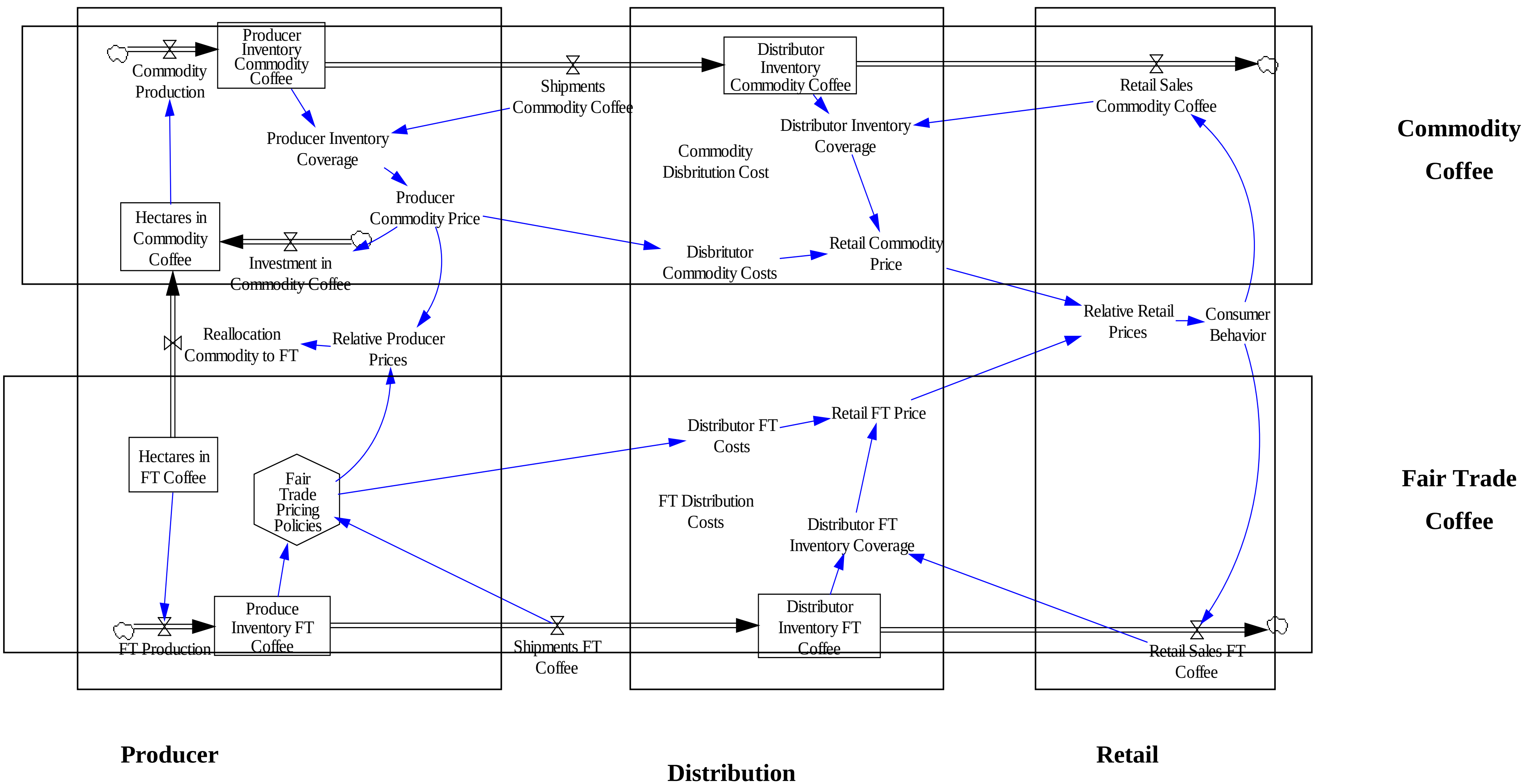
Internet-Enabled Sales of Traceable Foods from Specialty "Heritage" Producers

This case centers of an Internet-enabled network of specialty food producers who market heritage foods directly to consumers. A key feature of their sales approach is an information system that allows consumers to trace and document the source of their food products. Producers in this network sell a wide variety of products (plant and animal) having a "heritage" nature, such as Turkey. The producers are located within the United States and market themselves to a US market. The Internet allows this network of producers to reach out directly to its customers and to provide online food traceability information. There is no government regulation or oversight of this distribution channel above and beyond usual FDA and Department of Agriculture regulations that apply to all food producers in the United States.

The COFFEE1 Simulation Model

The first case selected for simulation is the Mexican coffee cooperative, *Tosepan Titataniske.* The model consists of two commodities, coffee and fair trade coffee, across three sectors: the producer sector, the distributor sector and the retailer sector. The model uses as a base Sterman's (2000) established models of commodities, supply chains and market growth. These models are modified to reflect characteristics specific to fair trade commodities and are connected together by means of a decision mechanism that is responsible for the reallocation of production capital, coffee plants in this case, between fair trade and market coffee. Figure 3 presents a high level overview of model structure.

Figure 3: Overview of Major Sectors in the COFFEE1 Model



Overview of the Structure and Key Feedback Loops of the COFFEE1 Model

Figure 3 illustrates that, at the producer level, the amount of resources (hectacres of coffee plants) dedicated to the production of Fair Trade and market coffee is determined by the relative profitability of each type of coffee. As one type of coffee becomes more profitable over the other, resources (plantings of new coffee plants) will be shifted from the less profitable kind of coffee to the more profitable kind of coffee.

More explicitly, the relative price spread between the two types of coffee is responsible for determining the demand for the two types of coffee. For example, if the price of market coffee rises relative to the price of Fair Trade coffee, thereby reducing the price spread and making Fair Trade coffee more affordable relative to market coffee, then the demand for Fair Trade coffee will increase and the demand for market coffee will fall (see Figure 4). The assumption implicit in this formulation is that consumers have a natural preference for Fair Trade coffee over market coffee. The reasoning is that if price were equal, or nearly equal, consumers would choose Fair Trade coffee since it is presumably of higher quality due to a more stringent set of production requirements and it confers greater monetary and social benefits to the producers than market coffee does.

Changes in the price of each type of coffee alter the price spread which adjusts demand for the respective coffee types. As the demand for a specific type of coffee increases, the inventory coverage for that kind of coffee falls. A reduction in inventory coverage results in an increase in price (demand is exceeding supply), which in turn reduces demand resulting in a balancing loop, see Figure 4 loops “Supply and demand interaction on FT price” and “Supply and demand interaction on market price”.

Likewise, as the price of one type of coffee increases, the expected profitability of producing that kind of coffee increases as well. The consequence of this is an increase in the desired number of coffee plants (production capital) of that type. To respond to these pressures, farmers will begin to convert coffee plants from one kind to another. For example, if Fair Trade plants are producing greater per unit returns, farmers will begin the process of certifying some of their market coffee plants as Fair Trade in order to reap the greater financial rewards. In addition, those farmers already producing Fair Trade coffee will increase the number of plants they are planting. As a result, the quantity of the more profitable plants will increase which will increase inventory coverage and reduce price which will in turn reduce demand. Thus, there is another balancing loop that governs the interaction of capital investment and demand, see Figure 4 loops “Effects of change in supply on FT price” and “Effects of change in supply on market price”.

The producer sector also interacts with the distributor and retailer sector as illustrated in Figure 3 and in more detail in Figure 5. The coffee produced by the farmers (both market and Fair Trade) is shipped as raw coffee to a distributor. The distributor bags the coffee and ships it to the retailer who sells it to consumers. The number of store purchases of coffee is used by retailers to gauge how much coffee they should order from the distributor. The distributor in turn uses the number of orders from the retailer to determine how much coffee should be ordered from the producer. When the producer receives the order from the distributor, capacity utilization is adjusted to account for the current level of inventory coverage and the appropriate production rate is set. These dynamics form a reinforcing loop, see Figure 5 loop “Market growth”, where purchases drive orders and production.

However, it is obviously the case that coffee ordering and production cannot grow indefinitely. For example, if orders from the retail sector rise faster than a distributor's ability to fulfill them then a delivery delay can result. This delivery delay reduces demand for coffee and thus store purchases. The slowing of store purchases will then cause retailers to order less coffee from the distributor and thus reduce the delivery delay. This balancing loop, see Figure 5 loop "Product availability and reordering", acts as a check on the positive growth of the "Market growth" loop. Furthermore, demand plays a balancing role in the expansion of the coffee markets. In the scenario just described, if orders from the retail sector rise faster than a distributor's ability to fulfill them, inventory coverage would fall which would increase price and reduce demand thereby store purchases and orders from the retail sector.

Figure 4: Overview and Key Feedback Loops of the Producer Sector

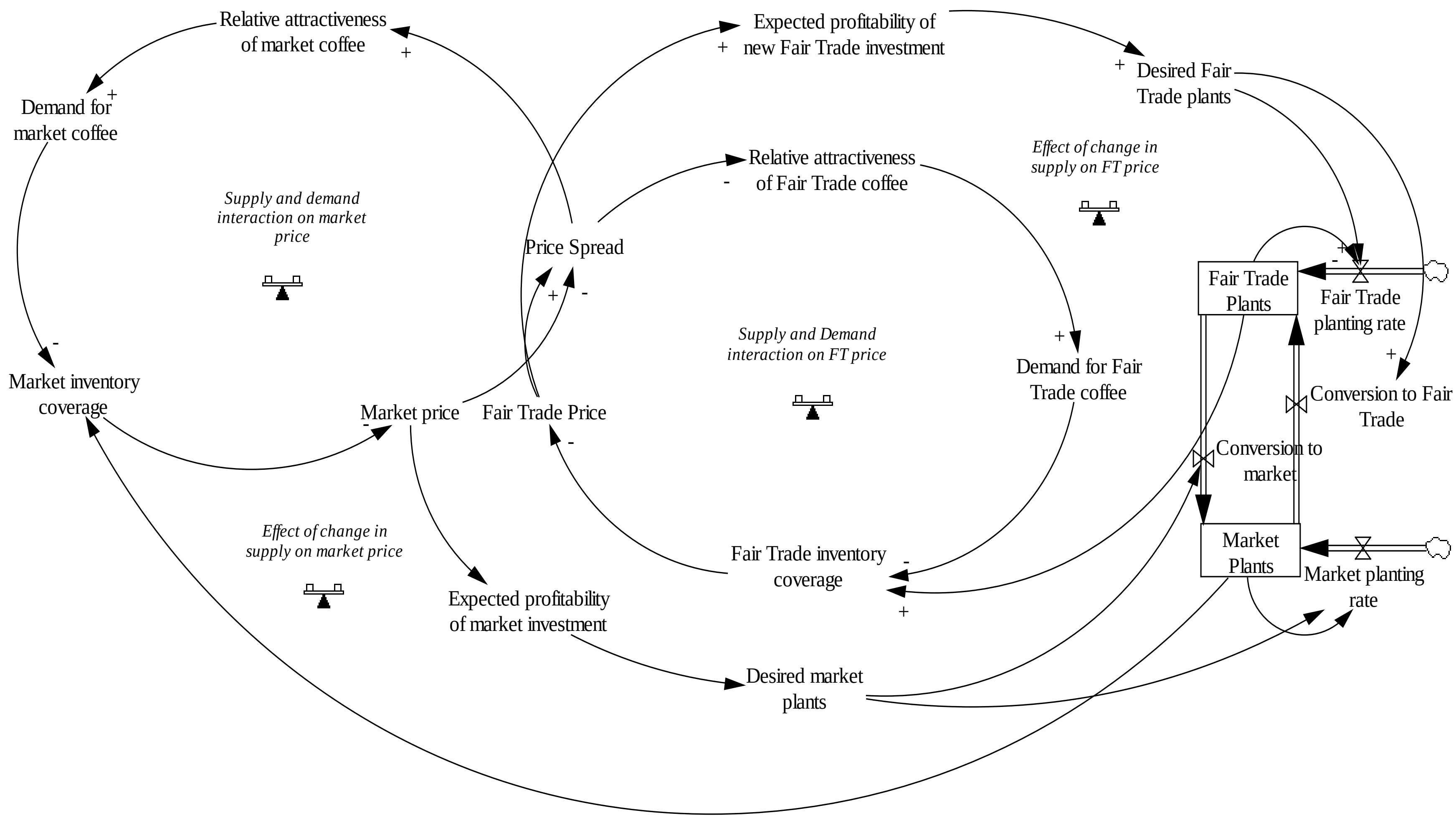
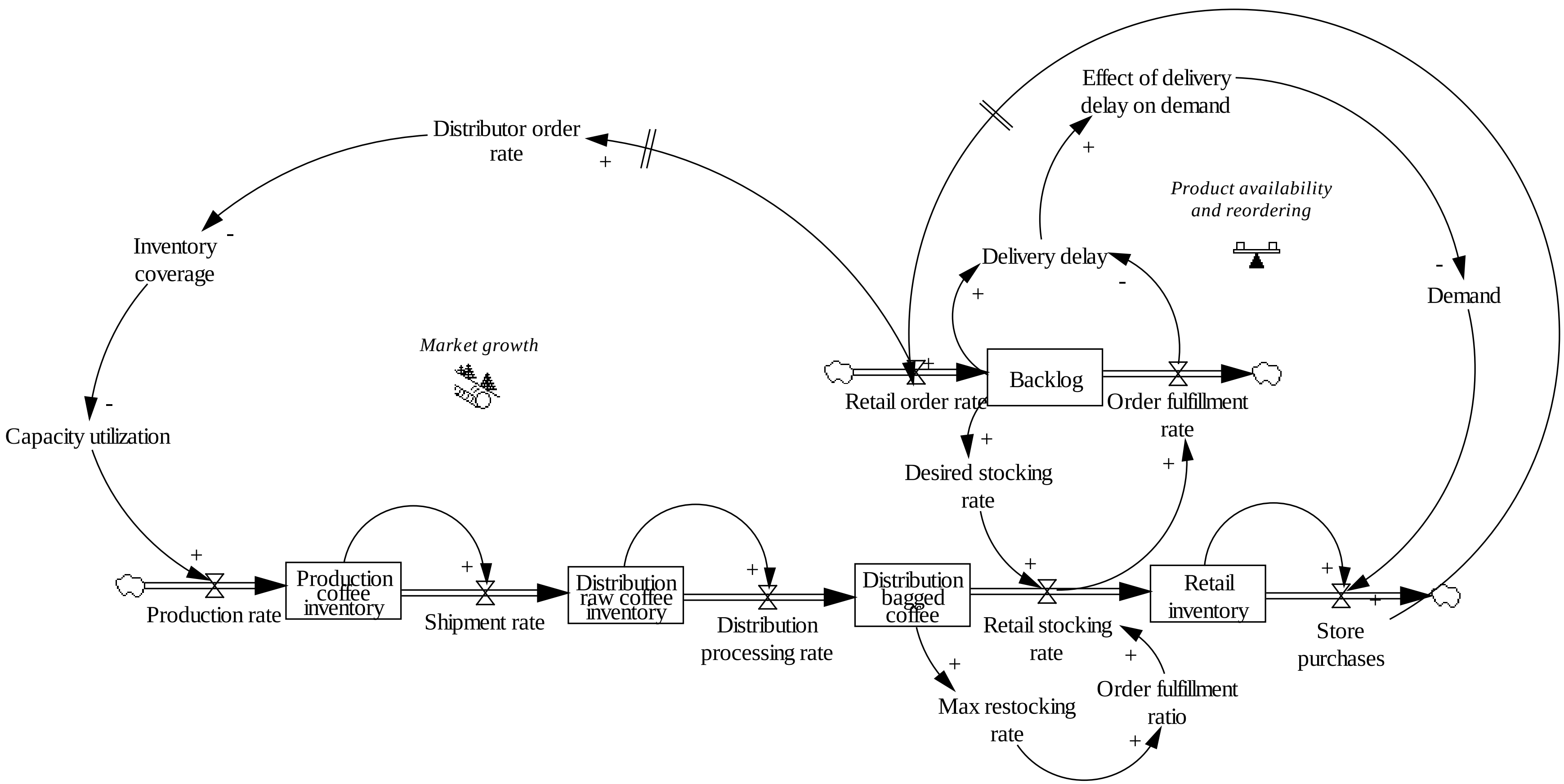


Figure 5: Overview and Key Feedback Loops of the Distributor and Retailer Sector



This section has overviewed the structure of the model and presented a set of key feedback loops. As a pure commodity, market coffee was represented by Sterman's (2000) commodity model parameterized to represent coffee. Fair Trade coffee was represented by a modified version of Sterman's commodity model. For more detailed model diagrams of the modified Fair Trade coffee sectors, please see Appendix: Key Sector Diagrams. For complete sector diagrams of the commodity, supply chain and market growth models, please see Sterman (2000).

Dynamic Behavior of the COFFEE1 Simulation

The model begins in equilibrium with a stable number of Fair Trade and market coffee plants. There is no incentive to change the system as everything is in balance. This situation is given to represent the environment in the coffee industry before the implementation of policies like the use of information technology to increase demand for Fair Trade products. In reality, no market could be in a state of equilibrium for long due to unforeseen and unpredictable occurrences and events, or "noise" from a systems perspective. Thus, noise has been withheld from the model for the purpose of more clearly isolating and illustrating the effects of policies.

The base run of the model shown in Figure 6 demonstrates this initial equilibrium with a constant number and distribution of each type of coffee plant.

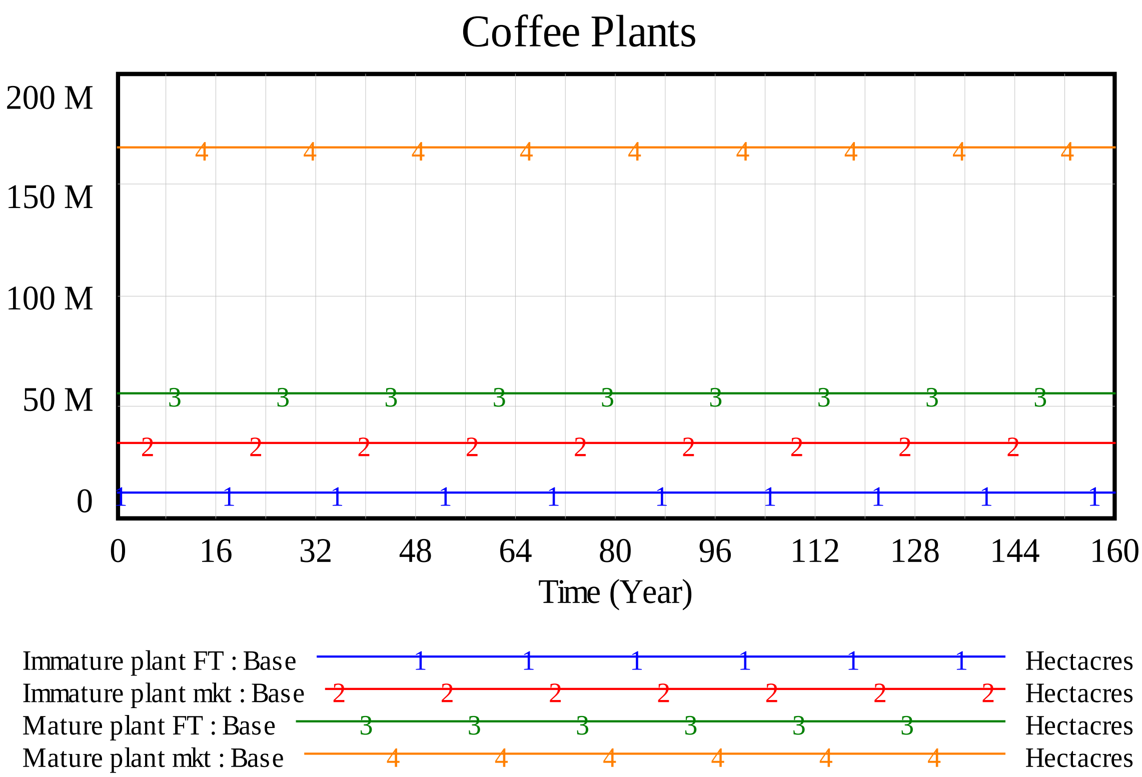


Figure 6: Base behavior of the Coffee Model

Next, a series of policy experiments will be conducted to evaluate the behavior of the model under differing exogenously determined conditions.

Policy Runs

Policy 1: Exogenously increase demand for Fair Trade coffee to represent an initiative such as the use of information technology to stimulate demand for FIPP products.

After increasing demand for Fair Trade (FT) coffee from 25% to 30% of the total coffee market and correspondingly reducing the demand for market (mkt) coffee from 75% to

70% of the total market (in order to keep total demand for coffee constant) the proportions of the two kinds of coffee grown readjust in favor of Fair Trade coffee until demand is again saturated (see Figure 7).

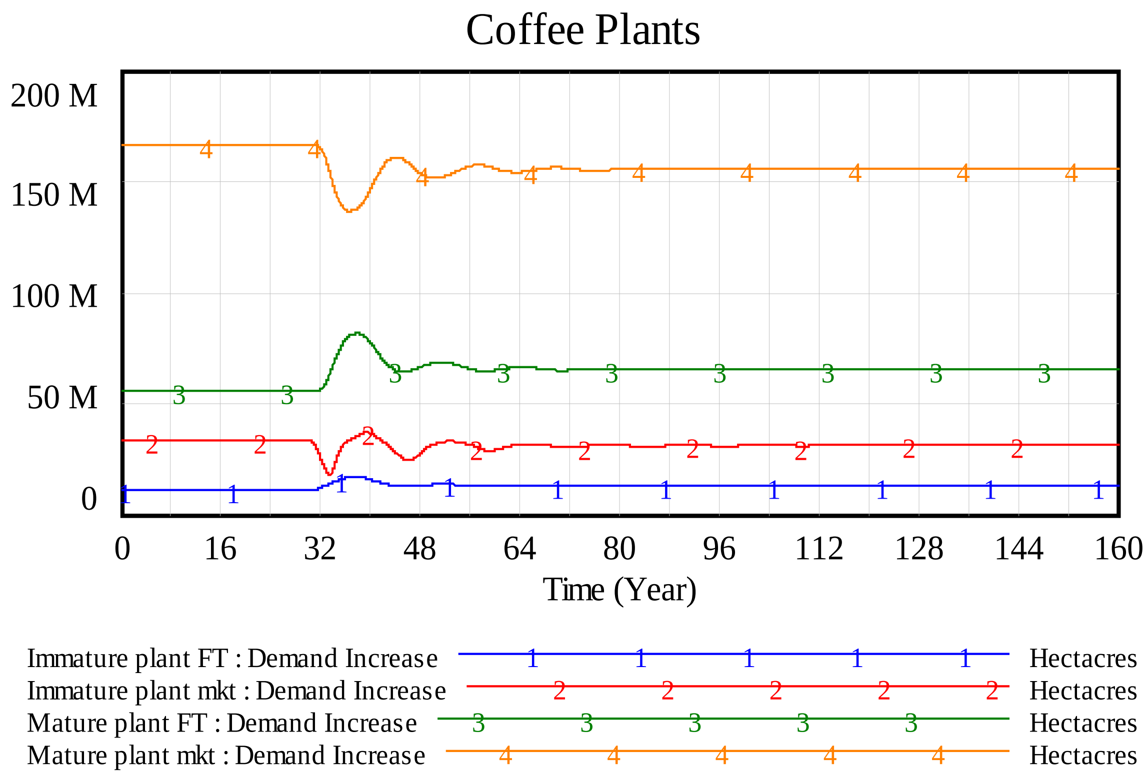


Figure 7: Market response to increases in FT Coffee demand

However, if the growth in demand in sufficiently large relative to the production capacity that currently exists for Fair Trade coffee then demand can overwhelm supply and result in delivery delays that can reduce the demand of retail Fair Trade coffee consumers. Thus, it is possible that in the absence of adequate production capacity attempts to increase demand for Fair Trade Coffee through FIPP networks have the potential of creating shortages and delivery delays which will form a balancing loop and reduce the demand for Fair Trade coffee (see Figure 8).

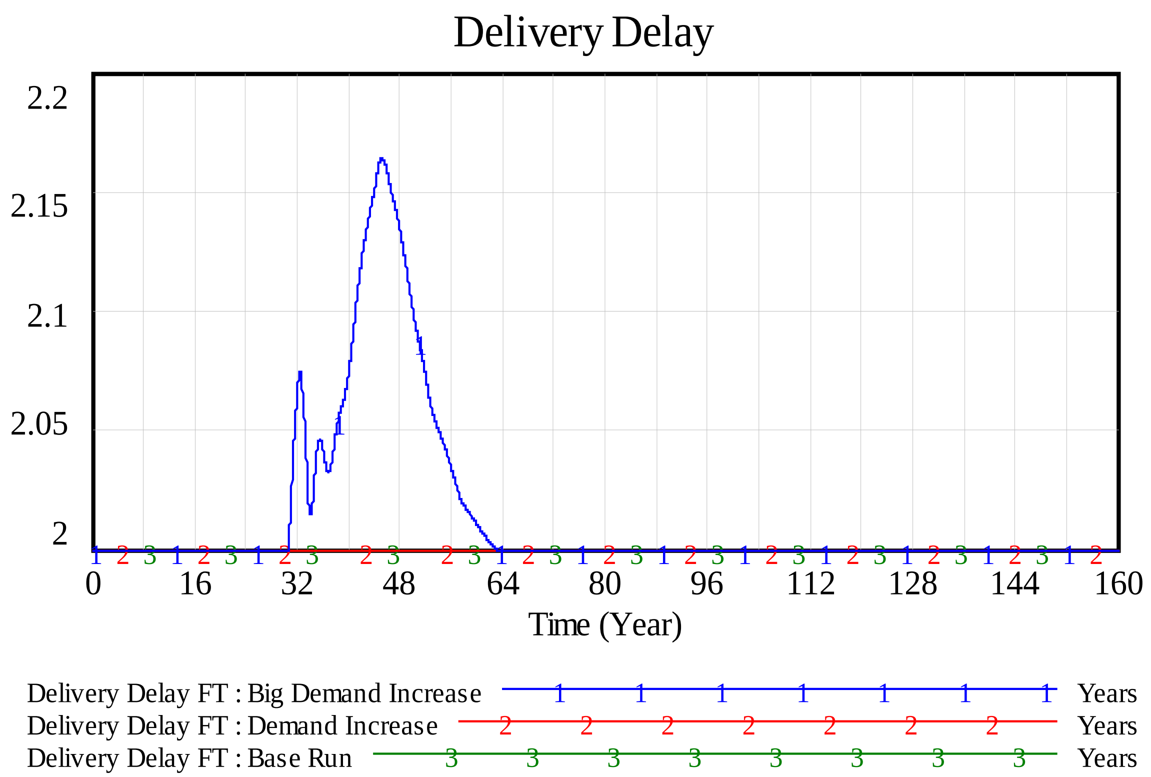


Figure 8: Delivery delays with big increases in FT Coffee Demand

Policy 2: Facilitate market expansion through cost-based pricing instead of a price floor

Fair Trade coffee prices are currently bounded by a price floor, or a guaranteed minimum price that producers will receive for their product. If the price of market coffee rises above the price floor, then Fair Trade producers will receive the market price for their coffee. This policy makes Fair Trade coffee presumably less profitable in this scenario because FT Coffee implies higher costs. One alternative pricing strategy for Fair Trade coffee is to set a cost markup on to the price of market coffee. Thus, the price of Fair Trade coffee would be able to move with the price of market coffee albeit above it by the amount of the markup.

In an environment where commodity dynamics force market prices to record high levels, the impact on Fair Trade Market share will indeed depend on the pricing structure (see Figure 9).

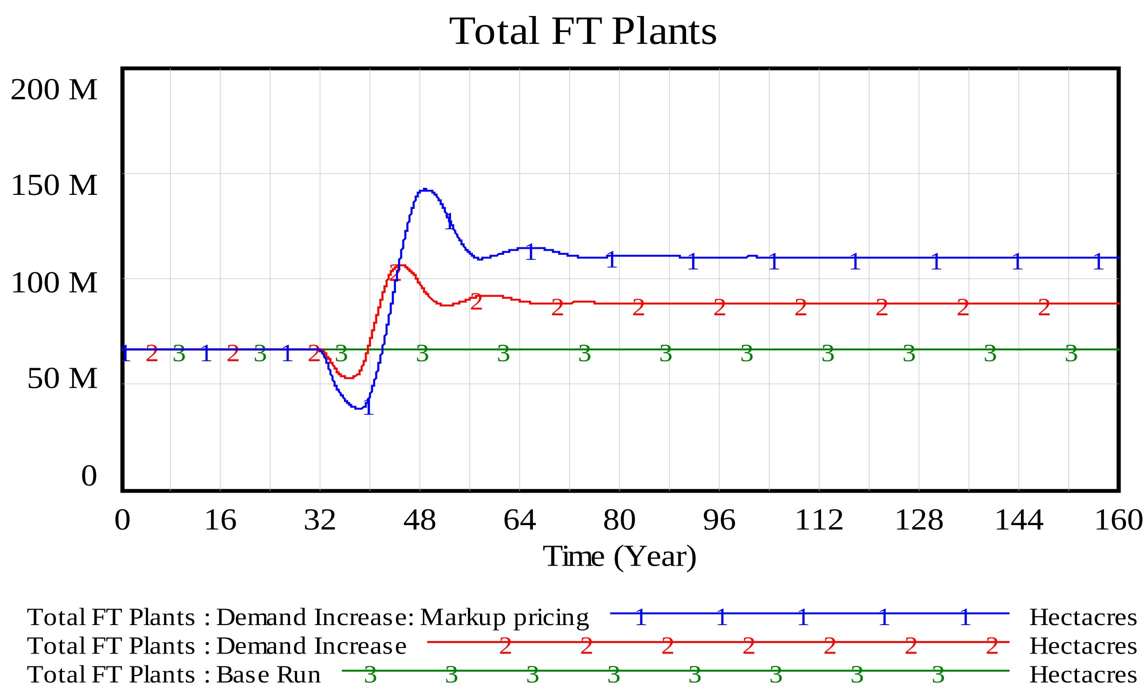


Figure 9: Comparing the effects of pricing strategies on FT Plants response to FT Coffee Demand increases

Cost-based pricing increases the market share for Fair Trade goods, but results in instability in prices and estimates of profitability (see Figure 10).

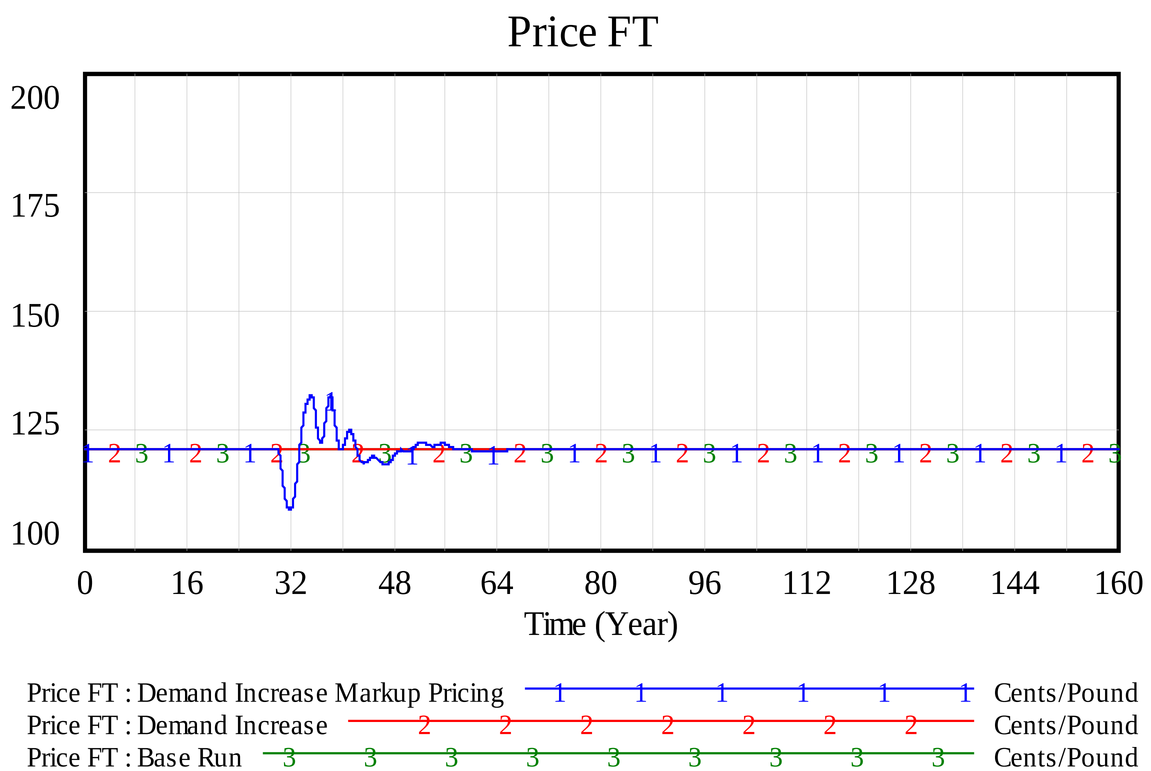


Figure 10: Comparing the effects of pricing strategies on FT Coffee price response to FT Coffee Demand increases

Finally, although market share increases, farmers experience on average lower per unit returns (see Figure 11).

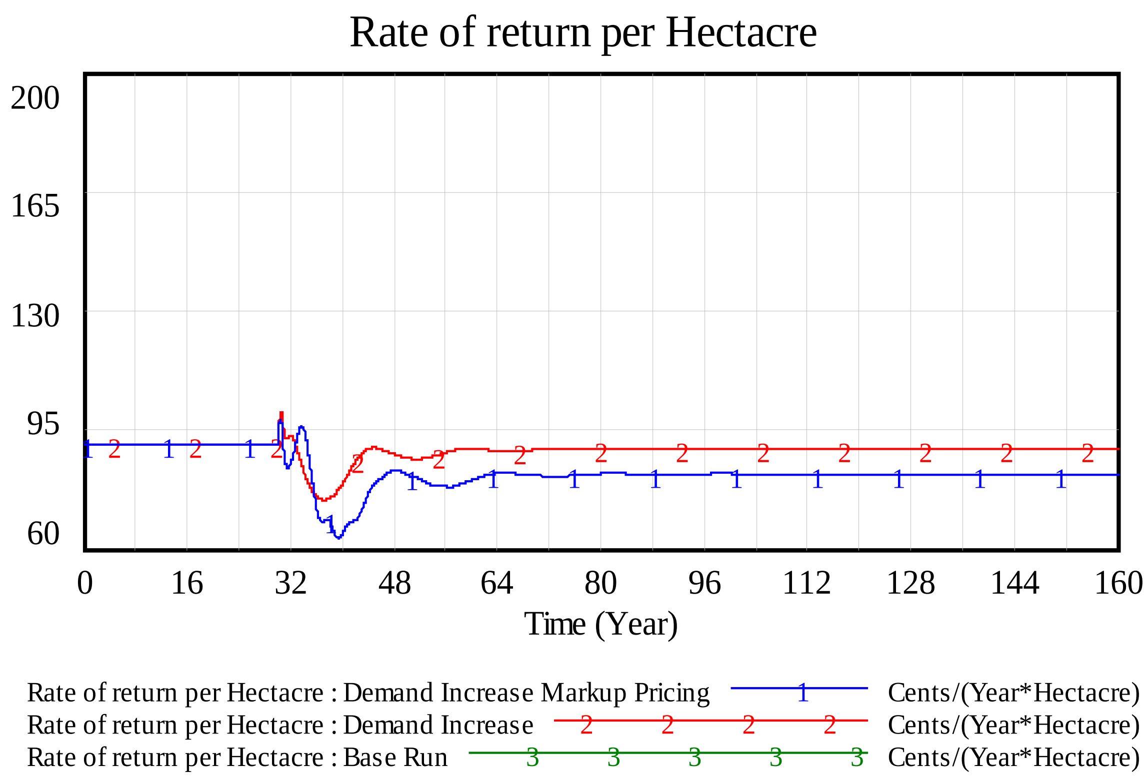


Figure 11: Comparing the effects of pricing strategies on rate of return response to FT Coffee Demand increases

These lower rates of return result because markup pricing results in greater market expansion (more hectacres of production) for a given long run demand. This overproduction of Fair Trade coffee is caused by the delays associated with the planting of new Fair Trade coffee plants and the movement of capital from the market coffee to the Fair Trade coffee sectors. Once supply is exceeding demand, Fair Trade farmers have no choice except to dump excess Fair Trade coffee at market coffee prices, which in turn lowers profits and rate of return per hectacre.

FIPP Networks within Commodity Markets: Some Grounded Dynamic Hypotheses

The insights from the policy runs have generated two hypotheses about the dynamics of Fair Trade Coffee:

Hypothesis 1: An increase in demand for Fair Trade coffee resulting from non-price related product differentiating information (Full Information Product Pricing) will result in a realignment of the proportions of Fair Trade and market coffee produced. If the increase in demand for Fair Trade coffee resulting from FIPP is very large relative to existing production capacity, then supply chain delivery delays can occur which will in turn reduce retail demand for Fair Trade coffee.

The dynamics of this hypothesis are captured in Figure 12.

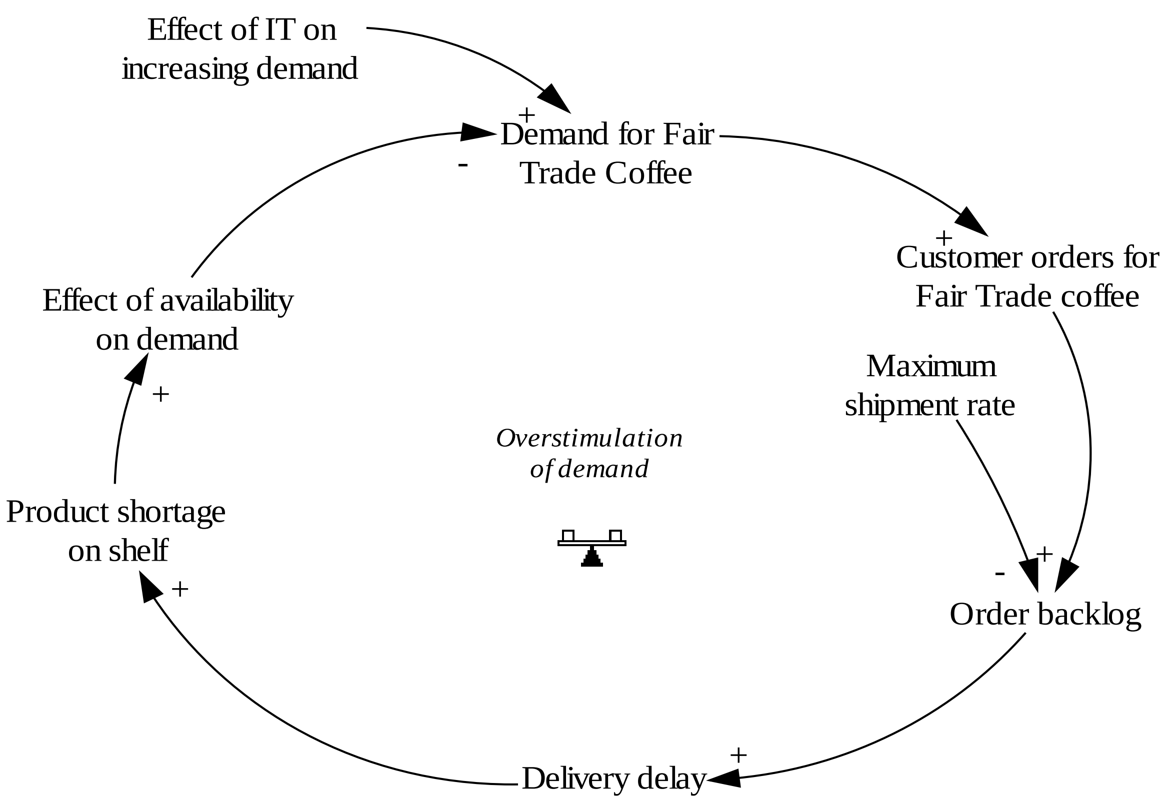


Figure 12: Hypothesis 1: Failure of Supply to Meet Demand

This research has demonstrated that increasing demand for Fair Trade products will result in a realignment of the proportions of Fair Trade and market coffee produced. However, if demand grows too fast relative to production capacity, shortages can result. These shortages cause product unavailability which will in turn actually reduce demand for Fair Trade coffee.

Hypothesis 2: Cost-based fair trade pricing structures will facilitate market expansion, but will lead to unstable and on average lower per unit returns to producing farmers.

The dynamics of this hypothesis are captured in Figures 13 and 14.

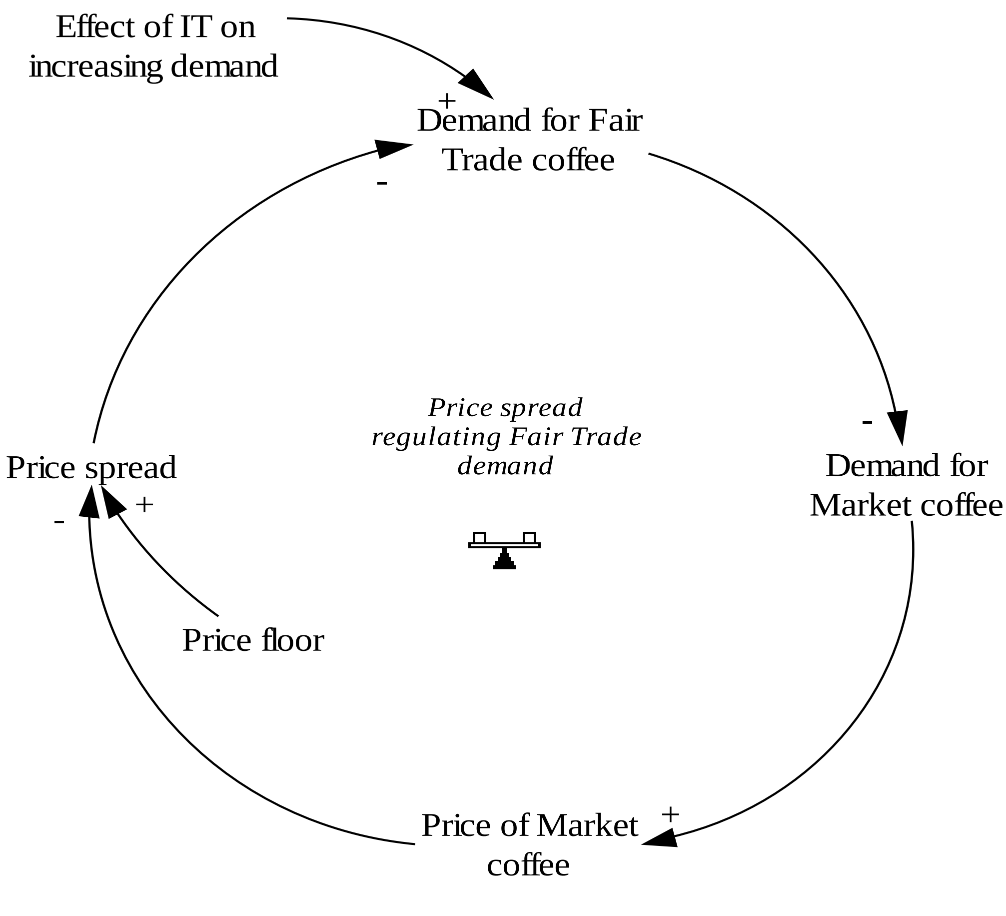


Figure 13: Hypothesis 2: Price Floor as a Demand Regulator

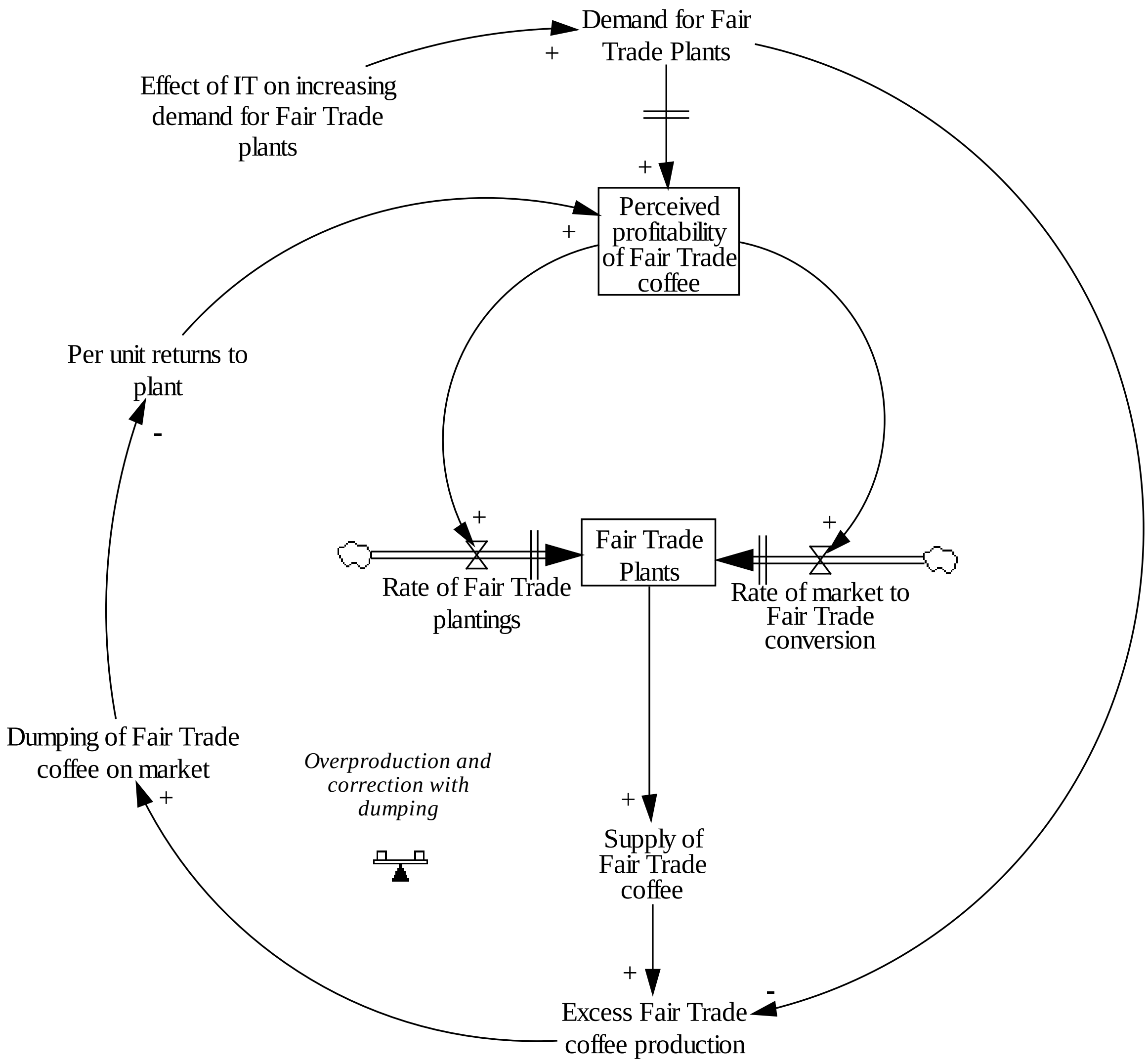


Figure 14: Hypothesis 2: Overproduction and Dumping of Fair Trade Coffee

A price floor on Fair Trade coffee has the property of acting as a regulating mechanism on demand. For example, if demand for Fair Trade coffee were increased by virtue of an information system designed to increase Fair Trade product demand, the demand for market coffee would drop by a corresponding amount assuming the overall demand for coffee remained constant. A drop in the demand for market coffee would result in a reduction in the price of market coffee. This drop in market coffee price increases the price spread which in turn reduces demand.

In cost-based pricing the price spread will always be constant and equal to the Fair Trade markup tacked onto the market price of coffee. Thus there is no balancing mechanism to regulate demand in the face of an exogenous force (FIPP IT system) increasing demand.

This lack of a force regulating demand would not in and of itself be a problem except for the delays associated with altering production capacity to meet perceived demand. For example, there is a delay between actual market demand for Fair Trade coffee and producer's perceptions of demand and profitability. When producers perceive Fair Trade coffee as more profitable, they will begin shifting resources into it. However, there are additional delays between the time Fair Trade coffee plants are planted and the time they mature and begin to yield Fair Trade coffee. Likewise, there is a delay in the movement of market coffee plants into the Fair Trade sector.

These delays result in an overproduction of Fair Trade coffee relative to true demand. This excess supply of Fair Trade coffee must be dumped at market price which reduces profits and per unit returns to plant. This will reduce perceptions of profitability and curtail further investment in Fair Trade production capacity, but only after the damage is done.

Conclusions

This paper builds on research being done by a group of international researchers investigating the potential for Information Technologies to be leveraged to increase demand for Fair Trade products and to support FIPP networks (Zhang, *et al.*, 2008). The case of a Mexican Fair Trade coffee cooperative, *Tosepan Titataniske*, has been selected to be formally represented in a simulation model. The model utilized existing dynamic insights and formal structure pertaining to commodity markets, supply chains and market growth. The results generated a set of interesting implications, namely two grounded theory dynamic hypotheses. The first hypothesis holds that if demand for Fair Trade products is raised too sharply by an information system, Fair Trade producers may be unable to supply the quantity of products demanded which will in turn reduce the demand that was raised by the efforts of policy makers through the use of information technology. Thus, the production capacity of producers and the product and information flows of their distribution networks should be essential considerations during the planning phase of any IT system designed to increase demand. The second hypothesis holds that cost-based pricing may increase market share but will increase price instability and reduce per unit returns to capital. The main cause for these undesirable results is the set of delays that affect both the flow of information about demand and the generation and transition of new production capacity (plants in the case of coffee). These delays can cause an overshoot in the investment in capacity which will produce an excess supply of Fair Trade coffee relative to actual demand. This excess Fair Trade coffee must be dumped at market price which will reduce profits and per unit returns to capital. These results imply that efforts must be undertaken to reduce the deleterious effects of information and capital movement delays. Overcoming these challenges highlights the importance of a systems approach to managing these networks.

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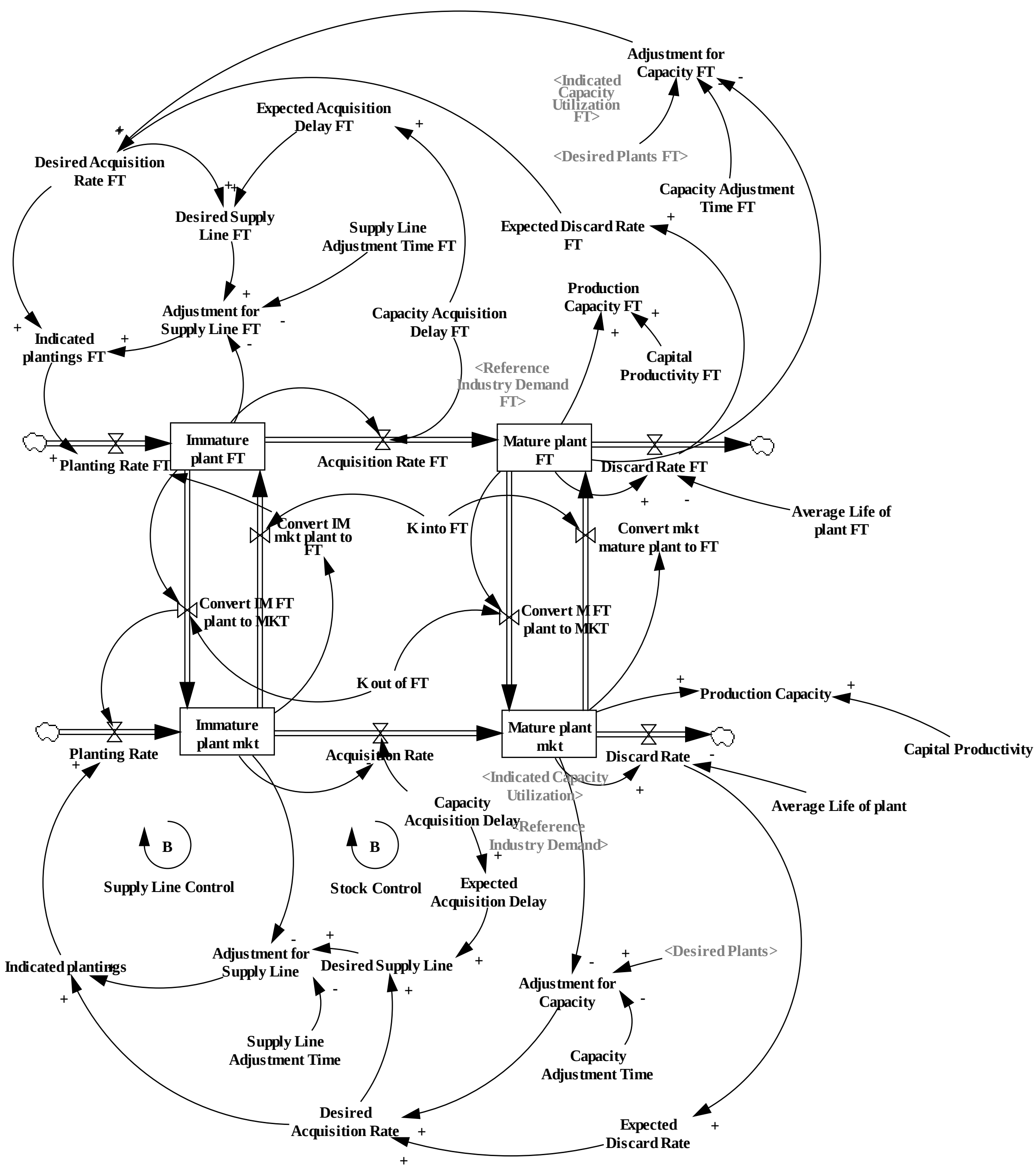
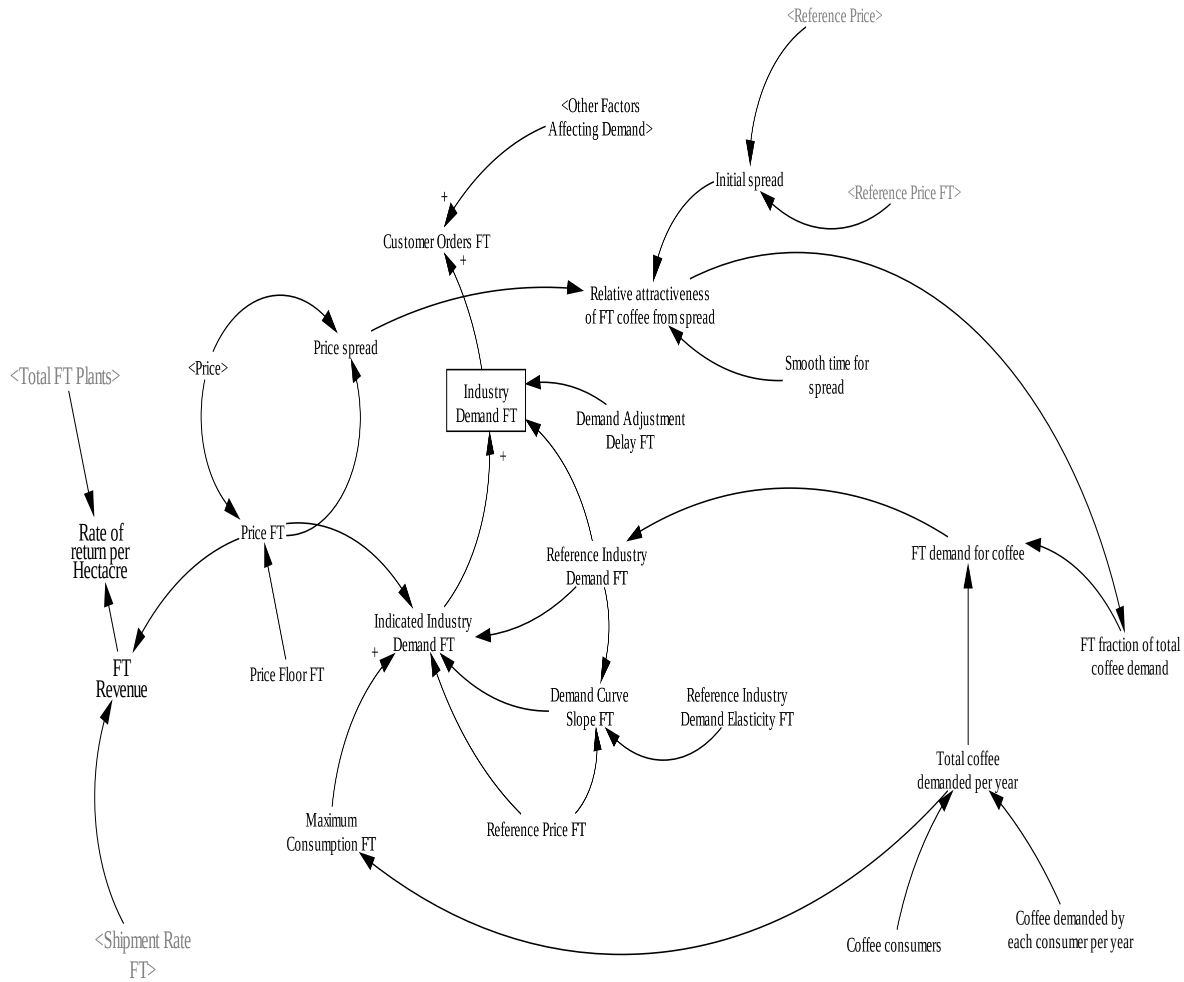
Appendix: Key Sector Diagrams

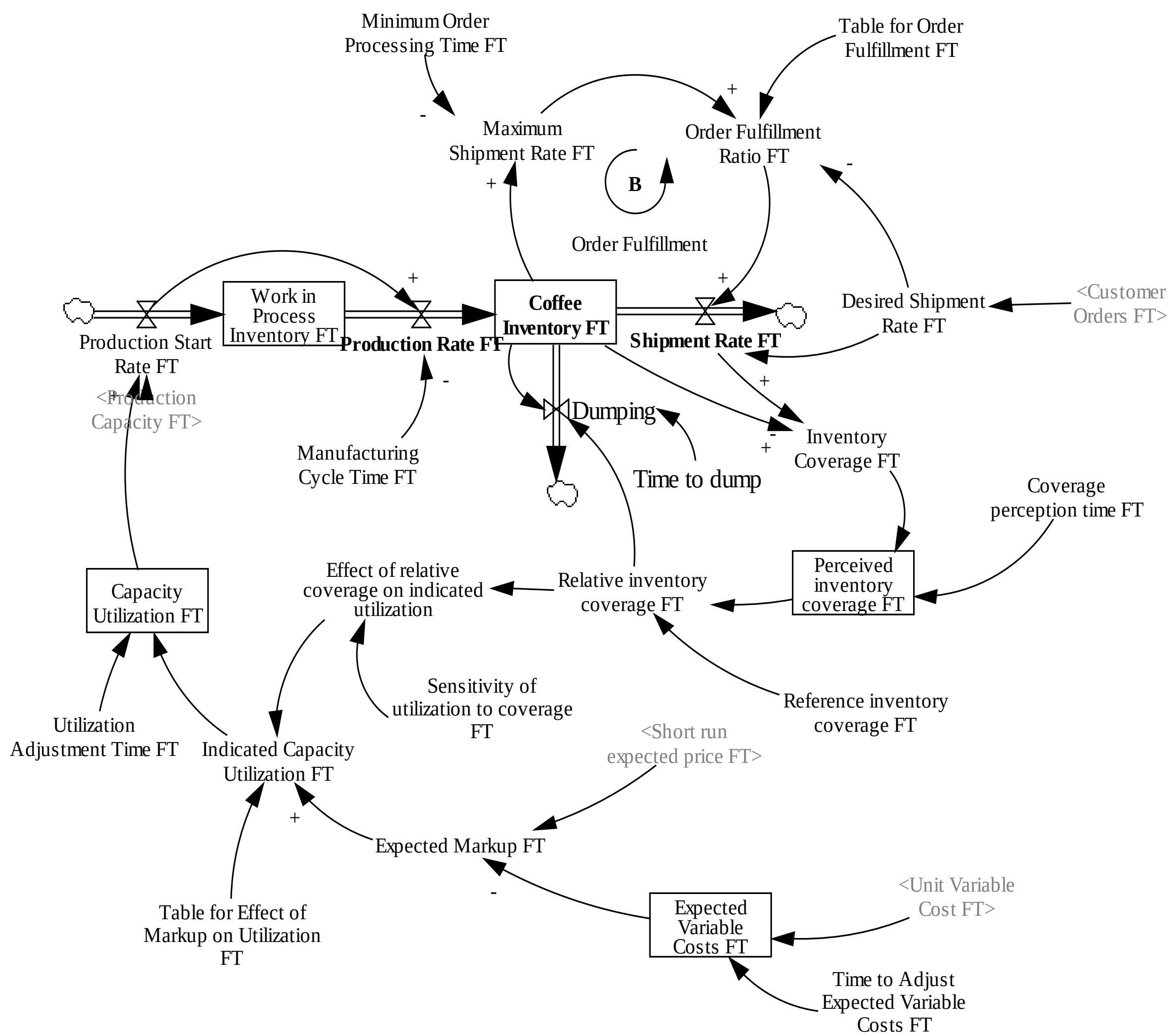
Coffee Plant Sector



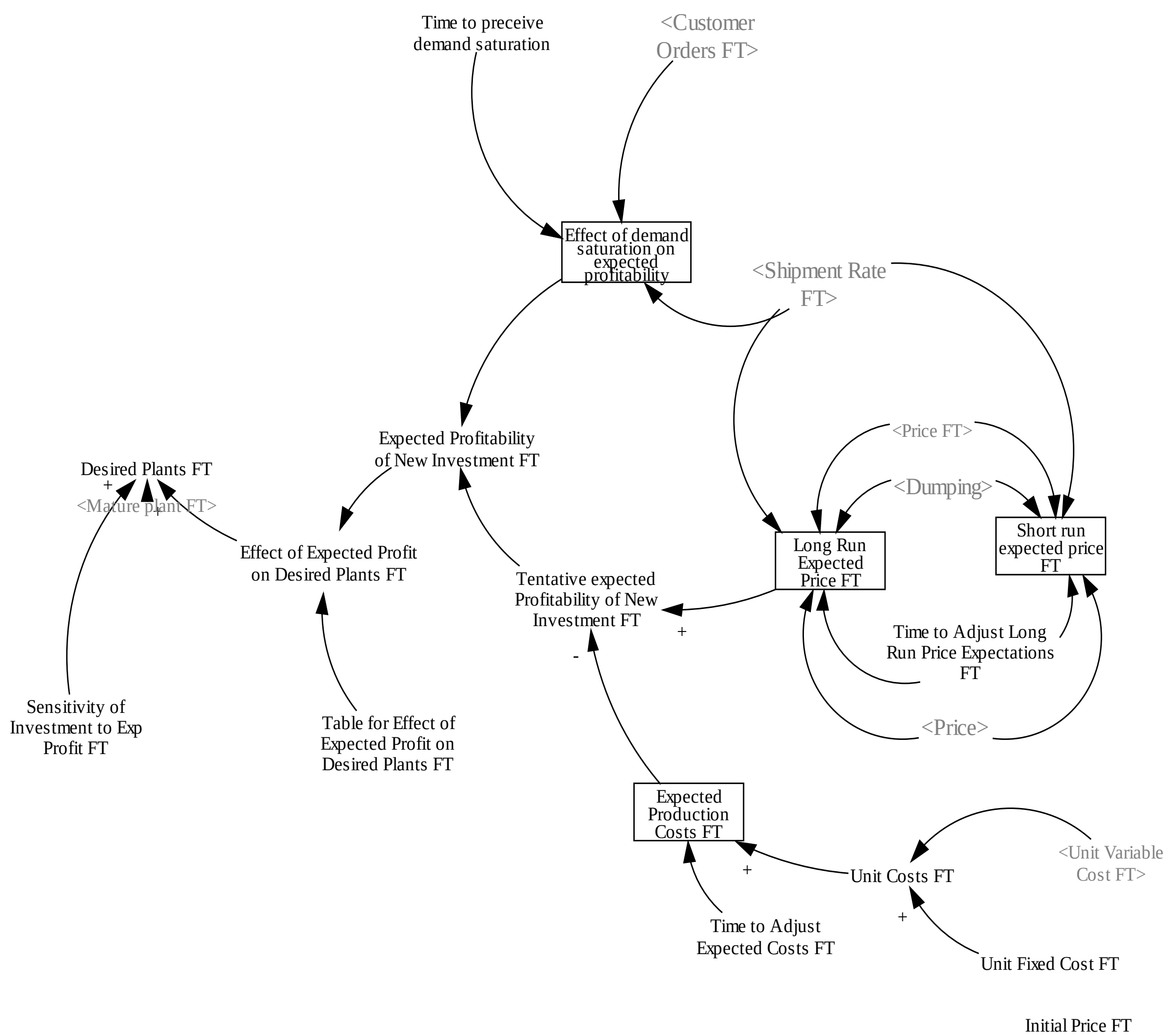
<u>Fair Trade Coffee Demand Sector</u>



Fair Trade Coffee Production and Inventory



<u>Desired Production Capacity for Fair Trade Coffee</u>



Decision for allocation of plants