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# Preliminary Findings:
# Task Clarity and Credibility in Relational Contracts

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**Abstract**

We develop and test a relational contracting model where building relationships requires the principal and agent to solve task clarity and credibility problems. We model task clarity as the likelihood of the agent finding a productive action for the principal and demonstrate that it influences the agent's propensity to fulfill promises—the usual notion of credibility in relational contracts. This is because improving task clarity increases the ease of replacing a relationship after a defection, making defection more tempting. We validate our model using a decade of administrative data from the Ethiopian floriculture industry. Our estimation documents that: i) task clarity problems are economically relevant in the industry and larger for domestic firms; ii) consistent with a unique prediction of our model, domestic firms, due to their lower task clarity and despite a lower discount factor, are less likely to defect on relationships as a response to improvements in the outside option; and iii) the buyer and seller components of task clarity explain differences between foreign and domestic firms in credibility and overall success in relational contracts.

**JEL classifications:** D86, F14, L14, O13, O19; Q17
**Keywords:** Contract theory, Relational contracts, Agriculture, Africa

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# 1 Introduction

Imperfect contract enforcement is a ubiquitous feature of real-life commercial transactions. In the absence of formal contract enforcement, trading parties rely on informal mechanisms, such as relational contracts where parties sustain collaboration by the expectation of repeated cooperative payoffs exceeding that of defection (Baker, Gibbons, and Murphy, 2002). The literature has mostly focused on how parties maintain such relationships. Yet, how do parties build such contracts in the first place?

To shed light on this question, we develop and test a relational contracting model where building and maintaining relationships requires players to solve two problems: clarity and credibility (Gibbons and Henderson, 2012). Clarity is the problem of communicating the terms of the relational contract to each other. Do parties *understand* each other's preferences and promises? We focus on one aspect of clarity: task clarity, which refers to whether the agent knows which actions will be perceived by the principal as valuable.[1] Credibility, on the other hand, is convincing each other that they are likely to keep their promises. Does each party *believe* the promises of the other? While credibility is a problem that exists throughout the relationship, task clarity is resolved early on because understanding is achieved through interaction.

Distinct from most of the theoretical and empirical literature on relational contracts which focuses on credibility and assumes the clarity problem has been solved, we study relationship formation in a setting where players face task clarity issues. In our model, players have imperfect task clarity, that is, they have incomplete information about *how* to cooperate and whether cooperation with the current partner is possible. Early in the relationship, the players must determine exactly which actions, if any, the other finds productive, and once this happens, the relationship settles into an established, productive relationship where only the credibility problem remains.

We study a repeated game where an agent may take an outside option or pay a cost to be matched with a principal. If matched, the players play a repeated game with a task clarity problem: the agent's action set is large, and only a certain fraction of these actions are productive for the principal. The match quality is unknown to the agent, and the higher the match quality, the larger the fraction of the agent's actions that are productive. The principal may respond by either paying the agent in full, which signals that the action is productive, or not. Once a productive action has been found, task clarity problems in the relationship have been resolved, but credibility concerns remain. After each unproductive interaction (i.e., one in which the buyer does not pay in full), the agent negatively updates his belief about the match quality. In each period, the agent may decide to try an action with the current principal or to break off the relationship and take the outside option. In the latter case, an unmatched agent may decide to pay a cost to be matched to a new principal in the next period.

Our main comparative static is that agents with lower task clarity problems are also more likely

1. Gibbons and Henderson, 2012 discuss four components of clarity: i) whether the agent knows which actions the principal perceives as cooperation (task clarity), ii) the choice set of the principal, iii) the payoffs from ii), and iv) the payoff for the agent.

to be tempted by the outside option. That is, higher clarity leads to lower credibility. To the best of our knowledge, this is novel in the literature since our model is the first to study task clarity and credibility in a context where new relationships may be built and strategically broken.

We test our model using a decade of administrative customs data and two waves of firm surveys from the Ethiopian floriculture industry. This industry is based on relational contracts: flowers are highly perishable, so upon receiving a shipment, a buyer could always claim the flowers were not of acceptable quality and refuse to pay. But, on the other hand, the seller could also claim the buyer somehow spoiled the flowers to avoid payment. On average, exporters receive higher prices through direct relationships with global buyers than through the spot market (auctions). However, the spot market acts as an outside option because, due to its volatility, it often pays a higher price than the relationship does. Despite the advantages of selling in direct relationships, domestically owned firms are much less successful at exporting directly to global buyers than foreign-owned firms.

The empirical analysis takes advantage of four features of the setting. First, unlike domestic sales, all export sales are administratively recorded by customs, and there is a very low domestic demand for flowers—practically all production is exported. Second, we use a decade of transaction-level data of all cut-flower exports from Ethiopia, including the IDs of domestic sellers and foreign buyers and information on units traded, prices, and transaction dates. Third, in the flower industry, direct supply relationships coexist alongside a well-functioning spot market, the Dutch auctions, and our data also include the prices Ethiopian firms receive at the auctions, which we can use to model the outside option of direct relationships. Fourth, the industry structure features a unique opportunity to test the predictions across two firm types: foreign and domestic firms. While these two types of firms have no differences, on average, in the quality of their products or their operation size, they present clear differences in their cost of capital and propensity to sell in relational contracts.

In our estimation, we first emphasize the role of task clarity. While credibility issues are independent of the number of shipments to the direct buyer, task clarity issues predominantly arise and are resolved during initial shipments. Consistently, our findings reveal that the probability of a relationship termination remains mostly constant beyond the fourth shipment when only credibility issues are present. However, in line with the importance of task clarity in relational contracts, the probability of relationships ending within the first four shipments is, on average, 14 percentage points higher than later on. Furthermore, we find that domestic firms face significantly greater task clarity issues.

We subsequently test a unique prediction of our model: credibility and task clarity are interrelated, and specifically, credibility decreases as clarity increases. This occurs in our model because task clarity affects how easily an exporter can replace a relationship after shirking and going to the auction. In the standard relational contract framework (e.g., Thomas and Worrall, 1988; Macleod and Malcomson, 1989), a lower discount factor increases the likelihood of the agent reneging on the relational contract in response to improvements in the outside option. These frameworks would predict in our context that domestic firms, due to their lower discount factor, are more likely to shirk in response to increases in the auction price.

However, this prediction may not hold in our model because domestic firms also have lower task clarity, which leads to higher credibility. Domestic firms may be less likely to shirk if the effect of lower clarity outweighs the effect of a lower discount factor on credibility. Consistent with our model prediction of lower task clarity leading to higher credibility, we find that domestic firms, characterized by lower clarity, have higher credibility than foreign firms; they are less likely to shirk in their relationships in response to improvements in their outside option, thereby demonstrating higher credibility despite having a lower discount factor.

We then dissect the task clarity problem onto a seller, a buyer, and a match component. We employ an AKM model to ascertain the buyer and seller components' contribution to the success of relational contracts (Abowd, Kramarz, and Margolis, 1999). We demonstrate that both components are crucial to the success of a relational contract, and the buyer component accounts for twice as much of the variation in the success probability of a relationship. Moreover, the AKM framework provides an estimate of each buyer and seller's component of clarity, allowing us to test whether domestic firms have lower clarity due to a lower seller or buyer component or both. We find that domestic firms have a lower seller component and a weakly lower buyer component. We then assess whether these differences in buyer and seller components explain the observed differences in task clarity and credibility between foreign and domestic firms.

We start by testing whether task clarity issues persist after controlling for the buyer component. Consistent with our variance decomposition estimates, controlling for the buyer component alleviates most of the observed clarity problems. However, the task clarity gap between foreign and domestic firms persists, suggesting that domestic firms still face more challenges in establishing relational contracts due to their inferior ability to select the productive action for the buyer. We then turn to the relationship between the task clarity components and credibility. Consistent with our model, we show that exporters with a higher seller component, which implies higher task clarity, have lower credibility: they are more likely to end their productive relationships in response to more favorable auction prices. The final segments of the estimation section show that higher buyer and seller clarity components are associated with a larger share of direct exports.

This article contributes to three strands of literature. The first is the economic theory of contracting. In weak contracting environments, trading parties rely on informal mechanisms to guarantee contractual performance (e.g., Johnson, McMillan, and Woodruff, 2002; Greif, 2005; Fafchamps 2010). Among those mechanisms, long-term relationships based on trust or reputation are the most widely studied and have received theoretical attention. The theoretical literature has developed a variety of models that capture salient features of real-life relationships, e.g., enforcement problems (e.g., Macleod and Malcomson, 1989; Baker, Gibbons, and Murphy, 1994; Baker, Gibbons, and Murphy, 2002; Levin, 2003), insurance considerations (e.g., Thomas and Worrall, 1988), or uncertainty over parties' commitment to the relationship (e.g., Ghosh and Ray, 1996; Watson 1999; Halac, 2012). However, these models do not study the problem of clarity, particularly how parties figure out what is expected of them in a relational contract. In this respect, Chassang (2010) is the closest theoretical paper to ours, since one of the players does not know which action the other party will find valuable. Unlike Chassang (2010), we assume that the agent's set of available actions is fixed in every period, and so once a productive action has been identified, the agent is free to keep choosing that action. As a result, we do not have the kind of imperfect public monitoring that Chassang (2010) focuses on. However, we introduce an outside option for the agent, as well as the possibility of ending a relationship and starting again with a new partner, which allows us to better understand how task clarity impacts credibility.

Second, the paper's theoretical advancements and empirical findings contribute to the nascent literature on the empirics of relationships between firms by not taking for granted the existence of relationships and focusing on the anatomy of relationship-building. In other words, how parties build such relational contracts and focus on whether an actor can understand the details of what is expected in the relationship, i.e., *how to cooperate*. This angle differs from a large portion of the existing work that assumes that parties are already in a relationship and in turn focuses on the credibility problem. McMillan and Woodruff (1999) find evidence consistent with long-term informal relationships facilitating trade credit in an environment that lacks formal contract enforcement. Banerjee and Duflo, 2000) infer the importance of reputation by showing that a firm's age strongly correlates with contractual forms in the Indian software industry. Macchiavello and Morjaria (2015) document the importance of credibility in relational contracts by exploiting an exogenous supply shock and relying on within buyer-seller relationships evidence to quantify the importance of the future rents necessary to enforce relational contracts.

Third, our findings resonate with contemporary industrial policy discussions (see, e.g., Juhász, Lane, and Rodrik, 2023). Historically, industrial policy—government interventions to stimulate and promote selected industries—has focused on "hard" support such as providing land, long-term credit, and facilitating air cargo logistics (see, e.g., Rodrik 2004). These are helpful incentives for producers exporting primary non-differentiated commodities where task clarity problems might not be as severe, since steel nuggets, aluminum rods, cocoa beans, and cotton bales are typically sold as homogeneous goods or reference priced. On the other hand, in differentiated goods markets (Rauch, 1999), where the exchange is typically through direct relationships with global buyers, domestic producers might struggle not because of a reluctance to try but due to the clarity problems we highlight. Our paper points to an explanation of why a viable domestic exporting sector did not develop to its full potential: domestic producers are drawing from a different distribution of buyers and struggling to understand what is expected of them. Thus helping domestic entrepreneurs solve task clarity problems could boost direct sales.

## 2 Model

An agent (e.g., an employee or a seller) can either take an outside option or be matched to play a repeated game with a principal (e.g., a manager or a buyer). All parties are risk-neutral and long-lived. The agent's discount factor is $\delta$ and the principal's discount factor is $\delta_p$. For the purposes of describing the model, we focus on the employee-manager application, but later discuss the details of the buyer-seller interpretation as it applies to our empirical application.

At the start of period $t$, the agent observes the value of his outside option, $s_t \in \{\ell, h\} \subset \mathbb{R}$, e.g., the utility the employee attains from leisure. The agent's action set in period $t$ is denoted $A_t$. If the agent is unmatched to a principal $A_t = \{\widetilde{a}\}$, where $\widetilde{a}$ denotes taking the outside option, which results in a payoff of $s_t$ for the agent. The probability of $\ell$, the low shock, is $\mu > 0$. The agent starts the game unmatched.

There are countably many possible principals indexed $i \in \mathbb{N}$. When the agent is matched to a principal, the agent chooses an action from the set $A_t = \{\widetilde{a}\} \cup \mathcal{A}_i$, where $\mathcal{A}_i \subset \mathbb{R}^d$ is normalized so that its (Lebesgue) measure is 1. If the agent chooses the outside option in period $t$, $a_t = \widetilde{a}$, the relationship with that principal ends. For simplicity, we assume that an agent cannot return to a previous principal once the relationship has broken down. The actions in $\mathcal{A}_i$ are interpreted as costly actions the employee could take in working for manager $i$. Because of task clarity problems, only a measurable subset of these actions $\mathcal{P}_i \subset \mathcal{A}_i$ are productive and produce $\xi > 0$ surplus for the principal. The remaining actions are unproductive and result in 0 surplus.

The measure of $\mathcal{P}_i$ is a random variable $\lambda \in [0, 1]$. The agent's prior PDF on $\lambda$ is $f_0$, e.g., $f_0 = Beta\,(\alpha, \beta)$ distribution, with $\alpha, \beta > 0$, so that $f_0(\lambda) = \lambda^{\alpha-1}\,(1-\lambda)^{\beta-1}\,/B\,(\alpha,\beta)$ where $B$ denotes the Beta function. We think $\lambda$ as the quality of the match between the principal and agent. A higher $\lambda$ means that the agent and principal are more likely to find a productive action for the task being preformed, which we interpret as one aspect of clarity.

We assume that the distribution of $\lambda$ does not vary across principals and that $\mathcal{P}_i$ is not informative about $\mathcal{P}_j$ for $j \neq i$. Because of this, even though there is learning when the agent is interacting with a particular principal, this is not transferable if the agent starts a relationship with a new principal. As such, we can think about the game effectively restarting whenever the agent starts a relationship with a new principal. This allows us to drop the dependence on $i$ from our notation and refer to a generic principal as *the* principal.

We assume that the principal knows $\mathcal{P}$ but is only able to communicate to the agent that productive actions belong to the set $\mathcal{A} \supset \mathcal{P}$ because of task clarity issues. The principal (privately) observes her payoff after the agent takes action $a_t \in \mathcal{A}$ and chooses $b_t \in \{0, 1\}$. We interpret $b_t = 1$ as cooperation (e.g., paying the agent a bonus) and $b_t = 0$ as defection (not paying the bonus). If the agent chooses the outside option $a_t = \widetilde{a}$, the agent is unmatched. Regardless of whether the agent is matched or not, at the end of each period he can pay a cost $c \geq 0$ to be matched to a new principal. If the agent is matched to a new principal, we reset time to $t = 0$.

1. The shock $s_t \in \{\ell, h\}$ is realized and observed by the agent.

2. The agent chooses an action $a_t \in A_t$.

3. If $a_t \neq \widetilde{a}$, the principal observes her payoff and chooses $b_t \in \{0, 1\}$.

4. The agent decides whether to pay cost $c \geq 0$ to match with a new principal.

The agent's stage game payoff in period $t$ is $u : A_t \times \{0,1\} \to \mathbb{R}$, defined as follows: $u(\widetilde{a}, \cdot) = s_t$ and $u(a_t, b_t) = p\mathbf{1}_{b_t=1}$ for any $a_t \neq \widetilde{a}$. We interpret $p > 0$ as the profit the agent gets from the bonus in this period, if the principal chooses to pay it. An unmatched principal gets zero utility in each period. A principal who is matched with the agent gets stage-game payoff $u_p : A_t \times \{0,1\} \to \mathbb{R}$ defined as $u_p(a_t, b_t) = \xi\mathbf{1}_{a_t \in \mathcal{P}} - p\mathbf{1}_{b_t=1}$. For the sake of concreteness, we assume that an agent who is indifferent breaks ties in favor of the principal he is currently matched with.

We assume that $\xi > p > \upsilon > 0$, so that there are benefits from trade and in expectation, the agent is better off contracting with the principal than taking the outside option if the bonus is paid. The agent's expected value from always taking the outside option is $\delta\upsilon/(1-\delta)$ where $\upsilon = \mathbb{E}[s_t] = \mu\ell + (1-\mu)h$.

The principal's incentives are purposefully simple: the only way she gets a positive payoff is when the agent chooses a productive action $a_t \in \mathcal{P}$. In order to get a signal to the agent that this action is indeed productive and to keep taking that action, the principal chooses $b_t = 1$ in response. We are particularly interested in these *relational contracting equilibria.* Note that there is another type of equilibrium where the principal always plays $b_t = 0$ and the agent always chooses $a_t = \widetilde{a}$. This *no relationship equilibrium* is Pareto dominated by the relational contracting equilibria.

In a relational contracting equilibrium the agent is indifferent among any $a \in \mathcal{A}$ which he has not yet tried. So when the agent chooses a new action it is a best response for him to uniformly randomize among the actions in $\mathcal{A}$. This ensures that the principal, even if she knows $\mathcal{P} \subset \mathcal{A}$, believes there is a $\lambda$ probability that the agent will choose a productive action on his next attempt.

## 2.1 Preliminaries

The agent's problem is self-similar every time he is matched to a new principal. As such, whenever an agent is matched to a new principal we will treat it as period $t = 0$. Thus we can think of period $t = -1$, as the start of the game where the agent is unmatched to a principal. Let $W_0$ be the agent's continuation value if he starts the period matched to a new principal, before the shock is realized.

In order for the agent to want to pay the cost of forming a relationship in period $t-1$ the following constraint needs to hold

$$\delta W_0 - c \geq \frac{\delta\upsilon}{1-\delta}. \tag{RC}$$

If this inequality is not met, the agent prefers to always take the outside option and we do not have a relational contracting equilibrium. As such, in characterizing relational contracting equilibria we will assume that inequality (RC) is met.

The agent's expectation about finding a productive action on the next attempt are important for defining the agent's strategy. When an agent is initially matched to a principal, in period 0, the agent believes that $\lambda \sim f_0$ and that its expected value is $\overline{\lambda}_0$. For example if $f_0$ is the $Beta(\alpha, \beta)$ distribution, we have that $\overline{\lambda}_0 = \frac{\alpha}{\alpha+\beta}$. If the agent chooses $a_0 \in \mathcal{A}$ and learns that it is unproductive $t$ times, the agent's posterior belief is $f_t$. In the running example with a Beta distribution, $f_t = Beta\left(\alpha, \beta + t\right)$. The expected value of $\lambda$ after $t$ failed attempts is $\overline{\lambda}_t$. For example, $\overline{\lambda}_t = \frac{\alpha}{\alpha+\beta+t}$.

Let $V$ be the agent's continuation value if he knows at least one $a \in \mathcal{P}$ for the principal he is matched with, that is, the agent knows a productive action for the principal. In this case, we say that the agent is in a productive relationship. We assume that $\overline{\lambda}_t$ is decreasing in $t$ and tends to 0. It is easy to check that this holds in our example with the Beta distribution. Importantly, this assumption leads to the following observation.

**Fact 1** There exists an $n$, such that $\overline{\lambda}_n V + \left(1 - \overline{\lambda}_n\right)\left(\delta W_0 - c\right) < \ell + \delta W_0 - c$.

The above states that after some large number, $n$, of failures with a given principal, the agent prefers to take the outside option today (even if that outside option is low) rather than continue trying to form a productive relationship with the current principal. Clearly, this holds for any $\ell > 0$, since $\overline{\lambda}_n$ approaches 0 as $n \to \infty$ by assumption.

## 3 Theoretical Results

Let $W_t$ be the agent's period $t$ continuation value if he starts the period matched to a principal with whom he has interacted $t \geq 0$ times and is not in a productive relationship, i.e., the principal chosen $b_\tau = 0$ for all $\tau < t$. Let $W_t\left(s_t\right)$ be his continuation value in period $t$ after shock $s_t$ is realized. Thus we can write $W_t = \mu W_t\left(\ell\right) + \left(1 - \mu\right) W_t\left(h\right)$. Following shock $s_t$, the agent can either take the outside option, $a_t = \widetilde{a}$, which results in a present-value payoff of $s_t - \delta W_0 - c$, since under inequality (RC) the agent will pay the cost to be matched to a new principal in the following period. Alternatively, the agent can take an action $a_t \in \mathcal{A}$. If the agent is not in a productive relationship, the expected continuation value from this action is

$$\begin{aligned} & \int_0^1 \left(\lambda V + \left(1 - \lambda\right) \max\left\{\delta W_{t+1}, \delta W_0 - c\right\}\right) f_t\left(\lambda\right) d\lambda \\ = \; & \overline{\lambda}_t V + \left(1 - \overline{\lambda}_t\right) \max\left\{\delta W_{t+1}, \delta W_0 - c\right\}, \end{aligned}$$

where the maximum represents the agent's choice if the outcome of an attempt at a productive relationship is unsuccessful to either continue with the same principal or start over with a new one. This is a function of the agent's beliefs about the realized quality of the match, $\lambda$. For $s_t \in \{\ell, h\}$ we can then write the agent's continuation value after shock $s_t$ is realized at time $t$ as

$$W_t\left(s_t\right) = \max\left\{s_t + \delta W_0 - c, \overline{\lambda}_t V + \left(1 - \overline{\lambda}_t\right) \max\left\{\delta W_{t+1}, \delta W_0 - c\right\}\right\}. \tag{1}$$

This expression is quite intuitive: in the outer maximum, the agent either chooses the outside option or makes an attempt at forming a productive relationship with the principal he is currently matched with. In the latter case, if the result is unsuccessful, in the inner maximum the agent chooses to continue with the current principal or pay a search cost and start next period with a new principal.

Clearly $V > W_t$ for all $t$, since $V$ is the best possible expected continuation for the agent, where he knows a productive action for the principal he is matched with. In all other instances, a productive action is not known and is only found with some probability. Observe that both $W_t(s_t)$ is weakly decreasing in $t$, since $\overline{\lambda}_t$ is decreasing. As such $W_t$ is decreasing in $t$.

If the agent has no incentive to break a productive relationship, $V = \frac{p}{1-\delta}$ since the agent will choose the productive action and earn $p$ in every period going forward. However, if the agent has an incentive to break a productive relationship when the high shock is realized $V = \mu(p + \delta V) + (1-\mu)(h + \delta W_0 - c)$, since after a high shock the agent takes the outside option and pays cost $c$ to be matched to a new principal. Taking $V$ to be the maximum of these two options and simplifying we have that

$$V = \max\left\{\frac{p}{1-\delta}, \frac{\mu p + (1-\mu)(h + \delta W_0 - c)}{(1-\mu\delta)}\right\}. \tag{2}$$

We say that an agent has *no incentive to break a productive relationship* if

$$\frac{p}{1-\delta} \geq h + \delta W_0 - c, \tag{NB}$$

in which case $V = p/(1-\delta)$. To simplify notation, we write $V$ instead of $V(W_0)$, dropping the dependence on $W_0$.

Now, if $W_t(\ell) = \ell + \delta W_0 - c$, then $W_t(h) = h + \delta W_0 - c$ and hence $W_t = \upsilon + \delta W_0 - c$. For this $t$, $\delta W_0 - c \geq \delta W_t$ by (RC),[2] and thus $W_{t-1}(s_{t-1}) = \max\left\{s_{t-1} + \delta W_0 - c, \overline{\lambda}_{t-1} V + \left(1 - \overline{\lambda}_{t-1}\right)(\delta W_0 - c)\right\}$. In particular, $W_n = \upsilon + \delta W_0 - c$, since by Fact 1 the agent will stop making attempts at direct contracting with the principal after period $n$.

Let $\underline{K} \geq 0$ be the last time the agent attempts to establish a productive relationship with the current principal if a low shock has been realized, i.e., $W_k(\ell) = \ell + \delta W_0 - c$ for all $k > \underline{K}$ and $W_k(\ell) > \ell + \delta W_0 - c$ for all $k < \underline{K}$.[3] By the preceding paragraph, for all $k > \underline{K}$, we have $W_k = \upsilon + \delta W_0 - c$. Thus, given a $W_0$, $\underline{K}$ can be found by

$$\overline{\lambda}_{\underline{K}+1} < \frac{\ell}{V - \delta W_0 + c} \leq \overline{\lambda}_{\underline{K}}. \tag{3}$$

The weak inequality ensures that an indifferent agent makes an extra attempt with the current principal, which is consistent with our assumption that the agent breaks ties in favor of the current principal. Lemma 4 shows that for a fixed $W_0$, there exists a unique $\underline{K}$ and that $\underline{K} \geq 0$ whenever (RC) holds. We can therefore characterize $W_k(\ell)$ as a function of $\underline{K}$ as follows

$$W_k(\ell) = \begin{cases} \overline{\lambda}_k V + \left(1 - \overline{\lambda}_k\right)\delta W_{k+1} & \text{if } k < \underline{K} \\ \overline{\lambda}_k V + \left(1 - \overline{\lambda}_k\right)(\delta W_0 - c) & \text{if } k = \underline{K} \\ \ell + \delta W_0 - c & \text{if } k > \underline{K} \end{cases}. \tag{4}$$

2. This follows by inequality (RC) since $\delta W_t = \delta(\upsilon + \delta W_0 - c) = \delta\upsilon + \delta(\delta W_0 - c) < (1-\delta)(\delta W_0 - c) + \delta(\delta W_0 - c) = \delta W_0 - c$.

3. If the agent is indifferent between the outside option and taking an action with the principal at $\underline{K}$, we have $W_{\underline{K}}(\ell) = \ell + \delta W_0 - c$, because agents break ties in favor of the (current) principal. Otherwise $W_{\underline{K}}(\ell) > \ell + \delta W_0 - c$.

Conditional on a low shock, the agent will attempt to engage the principal up to period $\underline{K}$. If he fails to establish a productive relationship in period $\underline{K}$ the agent pays cost $c$ to be matched with a new principal in the following period.

Similarly, define $\overline{K} \geq 0$ to be the last time the agent attempts to interact with the principal if a high shock is realized. So $W_k(h) = h + \delta W_0 - c$ for all $k > \overline{K}$ and $\overline{W}_k \geq h + \delta W_0 - c$ for all $k \leq \overline{K}$. Clearly, $\overline{K} \leq \underline{K}$ since $\ell < h$. Thus $\overline{K}$ needs to satisfy

$$\begin{aligned} & \overline{\lambda}_{\overline{K}+1} V + \left(1 - \overline{\lambda}_{\overline{K}+1}\right) \max\left\{\delta W_{\overline{K}+2}, \delta W_0 - c\right\} \\ < \quad & h + \delta W_0 - c \leq \overline{\lambda}_{\overline{K}} V + \left(1 - \overline{\lambda}_{\overline{K}}\right) \max\left\{\delta W_{\overline{K}+1}, \delta W_0 - c\right\}. \end{aligned} \tag{5}$$

Given the definition of $\overline{K}$, we have that

$$W_k(h) = \begin{cases} \overline{\lambda}_k V + \left(1 - \overline{\lambda}_k\right) \delta W_{k+1} & \text{if } k < \overline{K} \\ \overline{\lambda}_k V + \left(1 - \overline{\lambda}_k\right) \max\{\delta W_{k+1}, \delta W_0 - c\} & \text{if } k = \overline{K} \\ h + \delta W_0 - c & \text{if } k > \overline{K} \end{cases}. \tag{6}$$

**Lemma 1.** *If $\overline{K} \geq 0$ then $V = p/(1-\delta)$ and the agent has no incentive to break a productive relationship.*

The proof is given in Appendix A.1. The converse does not hold, so we can have $V = p/(1-\delta)$ and $\overline{K} < 0$. As a result of the lemma, whenever the agent has an incentive to break a productive relationship, i.e., when $\frac{p}{1-\delta} < h + \delta W_0 - c$, we have that $\overline{K} < 0$ and thus $W_k = \mu W_k(\ell) + (1-\mu)(h + \delta W_0 - c)$.

We are now ready for the main result of this section. Define

$$\widehat{V} = \frac{h(1-\mu)\left(1 - \mu\delta + \mu\delta\overline{\lambda}_0\right) + \mu p(1 - \delta + \mu\delta\overline{\lambda}_0) - c(1-\mu)}{(1-\delta)(1 - \mu\delta + \mu^2\delta\overline{\lambda}_0)}.$$

**Theorem 1.** *A unique relational contracting equilibrium exists as long as the principal is sufficiently patient and*

$$\frac{\upsilon}{1-\delta} \leq \frac{\mu\overline{\lambda}_0 V + (1-\mu)h - c/\delta}{1 - \delta\left(1 - \mu\overline{\lambda}_0\right)},$$

*where $V = \frac{p}{1-\delta}$ if $c + p \geq 1 - \delta\mu\left(1 - \overline{\lambda}_0\right)$ and $V = \widehat{V}$ otherwise. If the above inequality fails, then only the no relationship equilibrium exists, where the agent always takes the outside option.*

*Proof.* Appendix A.2 shows the details of the proof. It first establishes that an equilibrium with direct relationships, if it exists, is unique, given our tie-breaking assumption that an agent that is indifferent makes one more attempt at direct contracting with the current principal.

However, no equilibrium with direct relationships exists if $W_0$ is so low that inequality (RC) fails. Since Lemma 5 shows that $W_0$ is increasing in both $\underline{K}$ and $\overline{K}$, the parameters which make $\underline{K} = 0$ and $\overline{K} = -1$ correspond to $W_0$ being as low as possible. So, consider the case where the agent makes no attempt at direct contracting after a high shock, but a single attempt is made after a low shock.

Thus, under these conditions, after solving for $W_0$ from equation (16), we have

$$W_0 = \frac{\mu\overline{\lambda}_0 V + (1-\mu)\,h - c\left(1-\mu\overline{\lambda}_0\right)}{1-\delta\left(1-\mu\overline{\lambda}_0\right)}. \tag{7}$$

For there to be an incentive to pay the cost $c$ and attempt a direct relationship inequality (RC) must hold so that $\delta\upsilon/(1-\delta) \leq \delta W_0 - c$. Substituting in for $W_0$ we obtain

$$\frac{\delta\upsilon}{1-\delta} \leq \frac{\delta\mu\overline{\lambda}_0 V + \delta\,(1-\mu)\,h - c}{1-\delta\left(1-\mu\overline{\lambda}_0\right)},$$

which, after dividing both sides by $\delta$, is the condition in the statement.

Now, from equation (2) we know that if $p/(1-\delta) \geq h + \delta W_0 - c$ then $V = \frac{p}{1-\delta}$ and the above expressions for $W_0$ and $V$ are in terms of exogeneous parameters. However if $p/(1-\delta) < h+\delta W_0 - c$ then $V = \frac{\mu p+(1-\mu)(h+\delta W_0-c)}{(1-\mu\delta)}$ and combining this with equation (7) we can solve for $V$ to get $V = \widehat{V}$. We have that $\frac{p}{1-\delta} \geq \widehat{V}$ if and only if $c + p \geq 1 - \delta\mu\left(1-\overline{\lambda}_0\right)$.

Finally, we verify that the principal has the incentive to follow the purported equilibrium strategy. Lemma 8 shows this is true if the principal is patient enough (obviously, if $\delta_p = 0$ the principal would never pay the agent following a productive action). ■

### 3.1 Benchmarks

One benchmark to consider is the limit where $\overline{\lambda}_0 \to 1$. This approaches the relational contracting setting where there are no clarity considerations, since (almost) all actions in $\mathcal{A}$ are productive.[4]

In such a case, we would have that the probability a relationship ends in any period is constant, either $(1-\mu)$ or 0, depending on whether the agent has an incentive to break a productive relationship after a high shock. The next lemma summarizes this observation.

**Lemma 2.** *Without clarity issues the probability of a relationship ending in any period is constant.*

If in addition to $\overline{\lambda}_0 \to 1$ we set $\mu = 1$, so that there are no high shocks, we would have a relational contracting equilibrium if $\frac{\upsilon}{1-\delta} \leq V - c/\delta$. This is familiar from standard relational contracting models with no clarity issues and no shocks, but where there is a cost to pay to get into a relationship. Much of the literature further assumes that $c = 0$, so that entering a relationship is costless. In this case, we would prefer the direct relationship to the outside option if $V \geq \upsilon/(1-\delta)$.

We can also consider the case where $\lambda$ is known to be constant, i.e., the prior distribution puts mass 1 on some $\lambda \in (0,1)$. The agent will now either never stop trying to form a productive relationship with a given principal, since at each attempt there is a $\lambda$ probability of finding a

4. Note that in this special case of our model the agent still has to pay a cost $c$ to get into a relationship. Because most relational contracting models do not study this decision, to get to that benchmark we would further have to set $c = 0$.

productive action and this does not change, or will take the outside option if the shock is high and attempt to form a productive relationship only when the outside option is low. In either case, the probability of a relationship ending is constant over time, either 0 or $(1-\mu)$.

### 3.2 Comparative Statics

We are now ready to show some comparative statics of our model. One focus will be on the probability that the relationship ends in a particular period $k$, conditional on the relationship reaching period $k$. This means that in period $k$ we observe a shipment and then no shipment in period $k+1$, i.e., the last shipment in the relationship occurs in period $k$ when the relationship ends. We denote this conditional probability $e_k(\lambda)$ and are in particular interested in how it varies with $\lambda$.

**Proposition 2.** *If the agent has an incentive to break a productive relationship then the probability that the relationship whose match quality is $\lambda$ ends in period $k$, conditional on reaching period $k$ is*

$$e_k(\lambda) = \begin{cases} 1-\mu & \text{if } 0 \le k < \underline{K} \\ 1-\mu+\mu(1-\lambda)^{\underline{K}+1} & \text{if } k = \underline{K} \\ 1-\mu & \text{if } k > \underline{K} \end{cases}.$$

*Furthermore, $e_k(\lambda)$ is (weakly) decreasing in $\lambda$.*

Observe that as $\lambda$ approaches 1, there are no clarity problems and the probability that the relationship ends in any period is constant.

**Proposition 3.** *If the agent has no incentive to break a productive relationship then the probability that the relationship whose match quality is $\lambda$ ends in period $k$, conditional on reaching period $k$ is*

$$e_k(\lambda) \begin{cases} 0 & \text{if } 0 \le k < \overline{K} \\ (1-\mu)(1-\lambda)^{k+1} & \text{if } \overline{K} \le k < \underline{K} \\ (1-\lambda)^{\underline{K}+1} & \text{if } k = \underline{K} \\ 0 & \text{if } k > \underline{K} \end{cases}.$$

*Furthermore $e_k(\lambda)$ is (weakly) decreasing in $\lambda$.*

The above shows that the probability of a relationship ending is decreasing over time for $k \in [\overline{K}, \underline{K})$ and is decreasing for all $k \ge \overline{K}$ if $\mu < \lambda$. The next result simply shows that as $h$ increases, the agent is more likely to break a productive relationship.

**Proposition 4.** *The value function $W_0$ is weakly increasing in $h$. Thus, the agent is more likely to break a productive relationship as $h$ increases.*

We next consider some comparative statics on the expected task clarity parameter, $\overline{\lambda}_0$. Proposition 5 shows that increasing expected clarity by increasing $\overline{\lambda}_0$ results in the agent being more likely to break a productive relationship.

**Proposition 5.** *$W_0$ is increasing in $\overline{\lambda}_0$ in any direct relationship equilibrium. Thus, as $\overline{\lambda}_0$ increases the agent is more likely to break a productive relationship. Moreover, $W_0$ is not a function of the realized $\lambda$, hence it doe not affect the likelihood of breaking a productive relationship.*

**Proposition 6.** *As $\overline{\lambda}_0$ increases, a relational contracting equilibrium is more likely to exist, i.e., the agent 3is more likely to attempt a relationship in the first place.*

We end the section by giving an intuitive comparative static on the agent's discount factor, $\delta$.

**Proposition 7.** *For a sufficiently high $\delta$, a relational contracting equilibrium exists. Furthermore $W_0$ is increasing in $\delta$ in any direct relationship equilibrium.*

## 4 Background

This section provides background information on the prevalence of relational contracts in the cut-flower industry, the industry in Ethiopia, contractual practices, and the differences and similarities between foreign and domestic producers. The empirical analysis relies on administrative datasets, information collected through two representative surveys of the Ethiopian flower industry, and numerous face-to-face interviews and engagements with stakeholders over the last twelve years.

**Cut-flowers and Relational Contracts.** From the perspective of testing ideas of relational contracts, the cut-flower export market has several advantages. Relational contracts exist alongside a well-functioning spot market, the Flower Auction in Holland, which makes it possible to measure temptations to deviate. Trade in flowers, a fragile and perishable product, has the innate feature of potentially leaving trading parties on both sides of the exchange exposed to opportunism. The seller might not export flowers "reliably " and/or the buyer could claim that flowers did not arrive in the "promised condition" and withhold payment while the seller could always claim otherwise. It would be difficult for an outside entity to adjudicate in such cases. The problem amplifies with the fact that it is also cross-border trade. Thus, producers do not write complete contracts with their buyers, and even if better bilateral contracts could be written they would not be easily enforceable. Thus trade in flowers offers the scope for transactions to occur though informal contracts: self-enforcing agreements such as a relation contract.

Consequently, flowers are exported through two market channels: the Flower Auction in the Netherlands and direct long-term relationships with global buyers. These distributions channels have similar transportation logistics but differ in terms of contractual arrangements between the exporter and global buyer. The Flower Auction provides institutional support for contract enforcement: flowers are inspected and graded, buyers bid for flowers, delivery is guaranteed and payments are enforced (as buyers must have an account at the auction) before the flowers are transferred to the buyers. Using the Flower Auctions incurs higher transport costs (the shipment travels a substantial distance to the Netherlands), various handling fees, and prevents buyers and sellers from agreeing on long-term plans. Direct trade with foreign buyers, on the other hand, bypasses these costs and constraints but exposes parties to short-run vulnerability and contracting malfunctions.

Typically producers and their global buyer negotiate a plan at the beginning of the harvest season for the whole season based largely on some target volume, also leaving room for some headroom to be managed as circumstances evolve. Prices in these negotiations aresettled at some constant price with their main buyer throughout the year but some have prices changing twice or thrice a year, usually through a catalogue. Prices are not referenced on quality or on tracking prices at the auctions. Moreover, our interviews with several producers and the flower association reveal that contracts do not contain any exclusivity clause.

Cut-flowers in general are a differentiated product (as opposed to a commodity product).[5] In our context the differentiation aspect is especially important when producers are engaging in direct trade,which typically requires bespoke preparation for different buyers. The buyer specifies numerous details that are pertinent to the transaction (e.g., delivery schedule, how flowers should be packaged and organized, sleeve length, appropriate temperature, arrangements accounting for spacing between flowers, etc.). In essence the details matter for direct trade much more than at the auction. These details on occasions might not be obvious to the seller (which would not be the case when selling a commodity such as a barrel of oil). Thus clarity issues are important in relational trade.

**Cut flowers and the Ethiopian Context.** In 2004, the Ethiopian government used a wide range of policies to encourage firm entry and export promotion. Our focus is on the floriculture industry. To promote the sector's growth, the government used policies such as soft loans (facilitated through the Ethiopian Development Bank), access to long-term land leases, and power and road infrastructure improvements to encourage rapid growth of the floriculture export sector (Oqubay, 2015). The policies were designed with the intention of "strengthening private sector growth and development;" the incentives were thus available to seasoned foreign as well as domestic firms to encourage robust development of the sector (MoFED, 2002). Ethiopia is now Africa's second largest exporter after Kenya. Furthermore, the growth of the industry has been unprecedented. It took Ethiopia five years to achieve half of what Kenya has achieved in three decades (Figure A.1).

The Ethiopian sector is an appropriate context to study our question because we observe the early stage development of a sector, which allows us to investigate relationship formation an important ingredient to study clarity. ,In contrast the recent blossoming of the horticulture sector in various East and Southern African countries (e.g., Kenya, Zambia, Tanzania) has largely been without direct government intervention. Furthermore, Ethiopia is a small player in the Dutch auctions, allowing us to model Ethiopian producers as price takers and thus enabling us to use variation in the auction price as an exogenous shock to Ethiopian producers.

Recall a key feature of relational contracts is that both parties can renege on their promises.

5. We understand a commodity product that is typically homogeneous, trades on standardized definitions on organized exchanges and is also often transacted via referenced price indices (Rauch, 1994).

Interviews with the CEOs of Ethiopian Horticulture Producer Association, Ethiopian Horticulture Agency Development, Ethiopian Investment Commission, and domestic flower farm MDs revealed that on numerous occasions domestic sellers were swindled of their payment after sending their produce. Hence in our modelling we allow for heterogeneous buyer types, thus allowing in the market place buyers that display "scammer"-like behavior as well as serious buyers.

**Value of Long-term Relationships.** Conceptually, direct trade can pay more or less than the auction: there is price discovery in the auction due to the potential of thick markets vs. relational contracts, which value supply assurance and thus could pay higher than the auction. Empirically, our data reveal that relationships are valuable because they pay, on average, more than auctions most of the time (top of Figure 1). However, the auction price fluctuates considerably, leading to approximately 20% of direct shipments being sold below the daily average auction price and 10% of direct shipments being sold at less than 80 cents per dollar of the daily average auction price, even in months where the average price at the auction is lower than the average price in direct shipments (bottom of Figure 1). This variation in the auction price relative to the relational contract price allows us to use it as an exogenous shock to the outside option.

**Data.** Transaction-level data on exports of flowers are available from trade transaction records from July 2007 to the present. Practically all production is exported. We restrict our sample period from 2007 to 2019, hence restricting our study period prior to COVID-19, resulting in approximately 270,000 transactions.[6] For the analysis on relationships, we only include relationships that start after July 2008 to ensure that the first transaction in the data is actually a relationship starting and not just the first *observed* transaction. Similarly, we only include relationships that start prior July 2018 to allow them to have enough time to potentially end within our data.

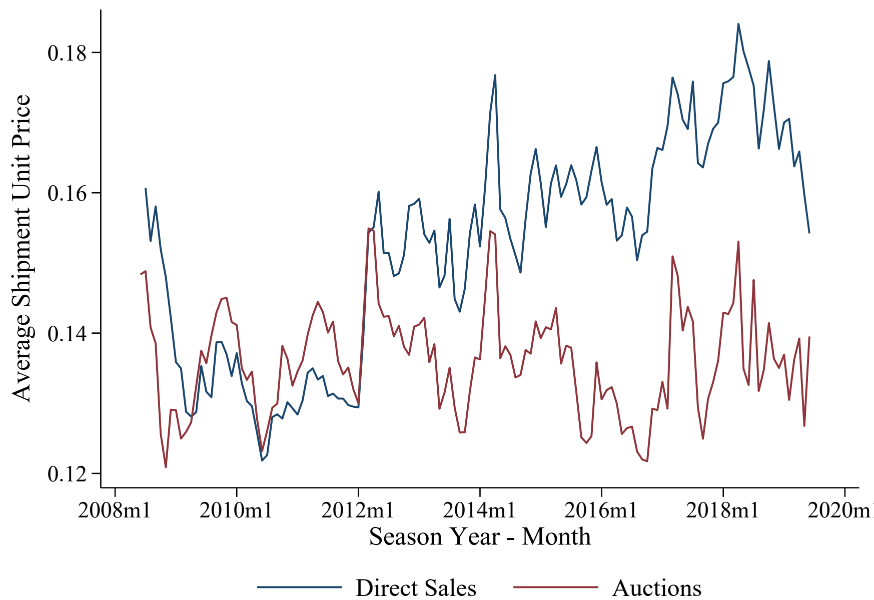
The data includes all floriculture exporters and all their exports. We focus on roses that account for 88% of the production. We exclude flower traders as they account for a relatively tiny share of exports (<1%) and we lack information on the location of producers where they source flowers. As our study focus is on relationship building, we exclude shipments of vertically integrated firms to their parent company. This leaves us with 64 flower−producing firms.

To complement these records, we collected two firm surveys close to the onset of the industry in 2008 and 2010 and we conducted mini-surveys between 2012-2022 to track ownership structure of the industry. Additional descriptive information was collected by conducting unstructured interviews with policy makers, CEOs of association and MDs of producing countries.

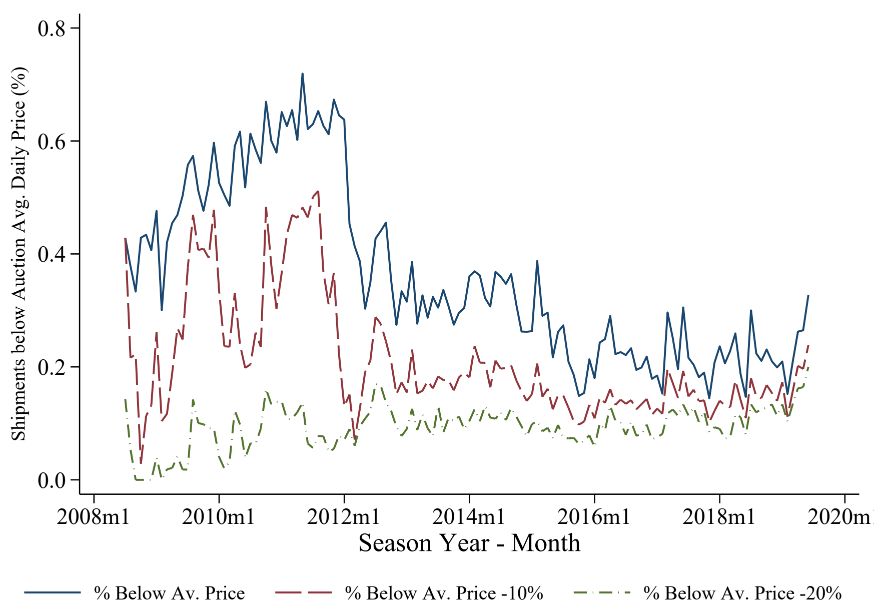
**Domestic and Foreign Producers.** While domestic and foreign producers share many similar characteristics, such as total production and quality of their produce, they differ in others relevant to relational contracts; for instance, domestic firms have a lower discount factor.

First, regarding the production volume of roses, including production sold to direct buyers and

6. Data after July 2019 is aggregated. Hence, it cannot be used for transaction-level analysis.



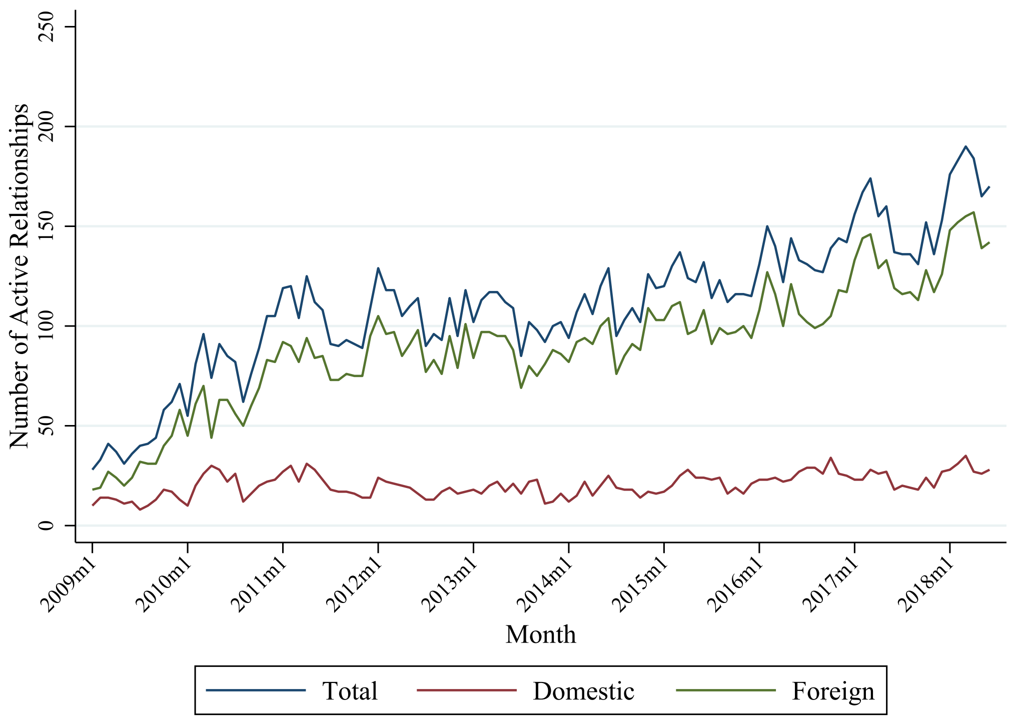

a) Average Shipment Unit Price in Relationships and Auctions



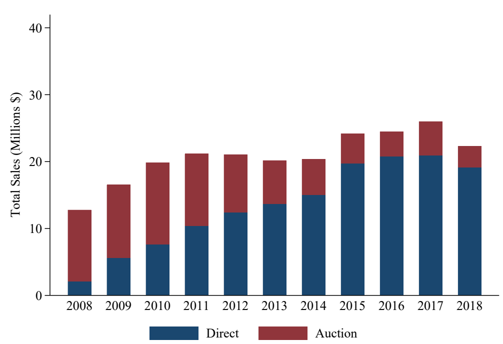

b) Share of Shipments below Auction Average Daily Price

Figure 1: Average Prices in Relationships and Auctions

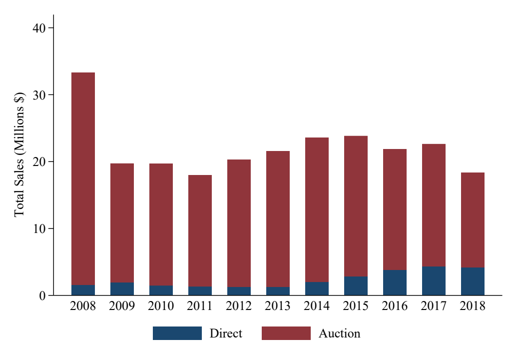
Note: Panel a) illustrates the monthly average shipment unit price for direct sales and auctions. All prices are USD. Panel b) exhibits the monthly share of direct shipments sold with a unit price below the average auction price of the day.




a)




b) Foreign Firms




c) Domestic Firms

Figure 2: Relationships and Floriculture Exports

Note: Figure A displays the number of active direct relationships by month in total and disaggregates them by domestic and foreign sellers. Figure B presents annual sales data for foreign sellers, categorized into direct transactions and auctions. Panel C exhibits annual sales for domestic sellers, similarly disaggregated by direct transactions and auctions. Both Panel B and Panel C express values in millions of USD.

to auctions, Figure A.2 displays that foreign and domestic are of similar size. The four largest producers are two foreign and two domestic, similarly out of the 10 largest producers, six are domestic. An important reason for why the size of operations does not significantly differ between foreign and domestic firms is that the Ethiopian government's industrial policy has also stimulated growth for domestic firms.

Recall, as highlighted earlier, that relationships are valuable, direct trade offers higher prices. Thus it is not surprising that we observe an expansion of relational trade in the industry. The number of active relationships has grown from less than 50 in 2009 to more than 150 a decade later (top graph in Figure 2). The growth of foreign firms has driven overall growth because their has been limited entry of domestic firms nor have they increased relationship formation. This increase in relational contracts has occurred due to a reallocation of shipments from the auction to direct buyers. The left-side bar chart on the bottom of Figure 2 shows that the total sales of foreign firms have not increased much since 2009. However, their share of direct sales has increased from less than half to almost the totality of foreign firms' exports. This is not the case for domestic firms, whose share of sales to direct buyers has remained constant through the same period.

Table 1: Cost of Capital and Discount Factor

| | Dependent Variable: | | | | |
|---|---|---|---|---|---|
| | External Funds Initial Year | Ethiopia Dev. Bank Funds | Hardship with Credit | Share of Collateral | Interest Rate |
| | (1) | (2) | (3) | (4) | (5) |
| Domestic | 0.529*** | 0.421*** | 0.733*** | 0.973*** | 9.214*** |
| | (0.0679) | (0.0870) | (0.117) | (0.164) | (0.497) |
| Foreign | 0.325*** | 0.227*** | 0.393*** | 0.521*** | 8.356*** |
| | (0.0569) | (0.0540) | (0.0945) | (0.143) | (0.248) |
| Difference (D-F) | 0.204** | 0.194* | 0.34** | 0.451** | 0.858 |
| | (0.089) | (0.102) | (0.15) | (0.218) | (0.555) |
| Firms (N) | 48 | 48 | 43 | 69 | 39 |

Note: The table displays the difference in reliance on credit, access to it, and its cost between foreign and domestic firms based on the 2008 and 2011 surveys. External funds are the share of working capital that is not from the firm's internal funds or retained earnings. Ethiopian Development Bank funds are the share of the working capital financed by the Ethiopian Development Bank. Hardship with credit is a dummy that takes the value of 1 if the firm responds that access to credit and the cost of financing (e.g., interest rates) are a major or very severe obstacle to the operation or growth of the business. Share of collateral is the value of the collateral required as a percentage of the firm's loan value. Interest rate is the marginal interest rate of the firm, the maximum interest rate that the firm pays in short or long-term liabilities that can be domestic or foreign. If Columns 1, 2, 3, and 5 are from the 2008 survey (not asked in 2011 survey), and column 4 is the average of the firm's response in 2008 and 2011. The stars next to the estimate, *, **, ***, represent statistical significance at the .10, .05, and .01 level.

Second, domestic firms have a lower discount factor (i.e., they have a higher willingness to pay for accessing cash earlier rather than later) because they are more cash- and credit-constrained. Using the firm-level surveys, we observe this lower discount factor in domestic firms relying more on external funds, experiencing more hardships in funding their operations, having to post higher collateral values, and paying higher interest rates. Table 1 shows that while foreign firms only fund

32% of their operations with external funds in the first year, domestic firms' external funds amount to more than 50% of their working capital.

The Ethiopian Development Bank funds account for most of this excess external working capital, funding 20pp more of the working capital of domestic firms than foreign ones. However, almost 75% of domestic firms respond that access to credit and the cost of financing (e.g., interest rates) are major or very severe obstacles to the operation or growth of their business, almost twice as likely as foreign firms to face these obstacles. Domestic firms also have to post collateral almost twice as large as foreign firms for their loans, reaching an average collateral of 97% of the loan value. Moreover, domestic firms pay one percentage point (10%) higher interest rates.

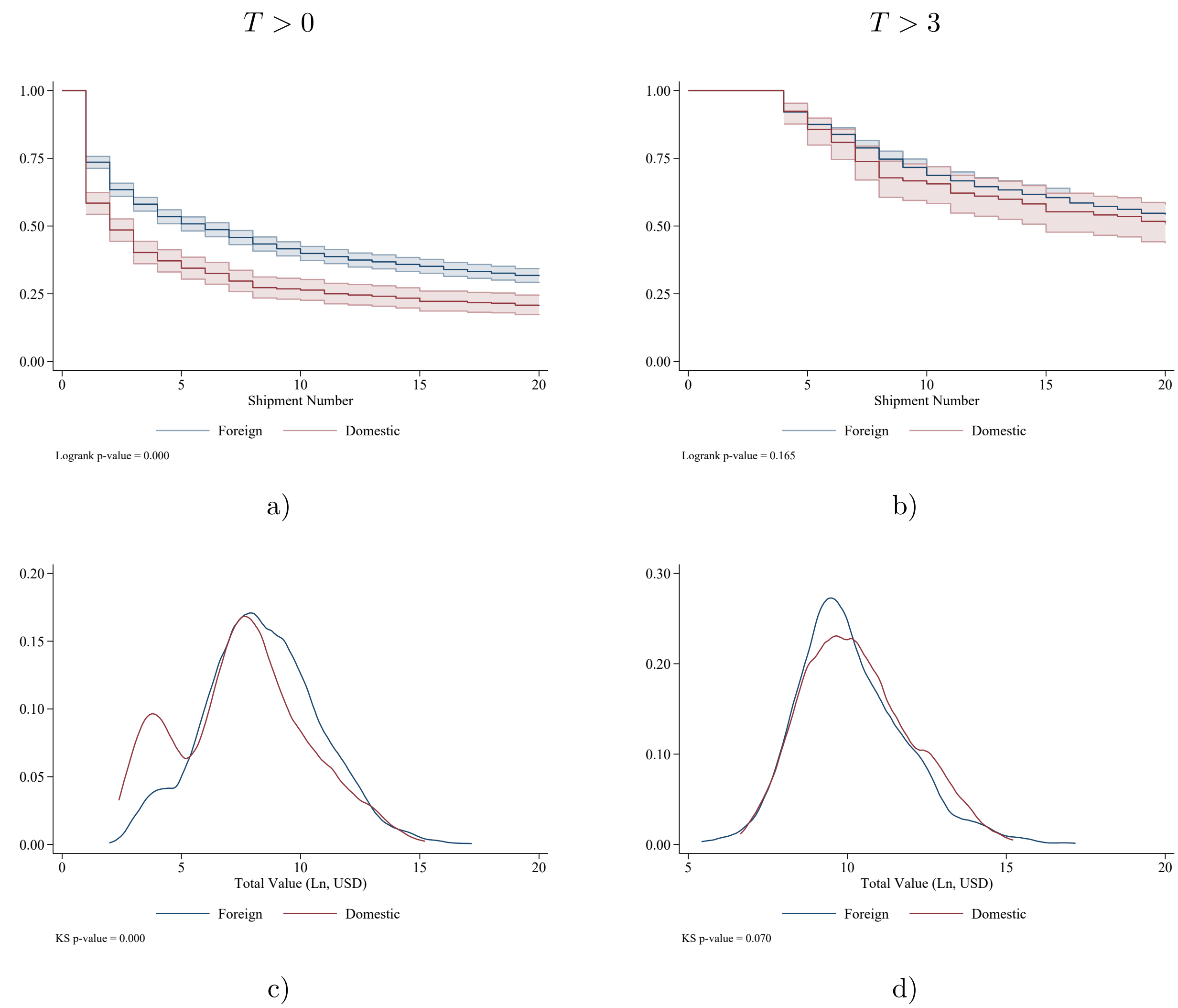



Figure 3: When Do Relationships Fail and How Valuable Are They?

Note: Panel a) presents the estimated Kaplan–Meier failure function for foreign and domestic sellers. Panel b) exhibits the estimated Kaplan–Meier failure function for foreign and domestic sellers, conditioned on having passed the third shipment. Panel c) and d) display the Kolmogorov–Smirnov equality-of-distributions test between foreign and domestic sellers based on the total value of transactions. Panel c) considers all direct transactions, while panel d) conditions on having passed the third shipment. The total value is expressed as the natural logarithm of USD.

Consistent with clarity being an important component in relationship building in this context, the top of Figure 3 shows that relationships are more likely to fail in the early transactions. In particular, only around 50% of relationships make it past the third shipment. Moreover, the issue of clarity is more severe for domestic firms. While almost 30% of foreign relationships do not make it past the first shipment, this share increases to almost 50% for domestic firms. Even though domestic firms are significantly worse at making it past the third shipment in the relationship, they are as likely to retain the relationship as foreign firms after passing the third shipment (Figure 3, top right).

A potential concern is *different quality* of flowers being supplied by domestic and foreigners. Roses can be divided into three segments based on stem length and bud size: sweethearts, intermediates, and T-hybrids. Customs transactions do not record these actual exported varieties. However, industry practitioners typically point to using unit stem weight as a suitable proxy for quality, as heavier heads are typically higher quality and valued more. We investigate along these lines in Table A.2 and show that domestic firms do not have lower quality measured by the unit weight of the flowers.

# 5 Estimation

The preceding section illustrated the suitability of the Ethiopian floriculture industry for studying relational contracts. This section connects the theoretical framework with the data, underscoring the model's key components and predictions. First, we study the task clarity problem. While the credibility problem should be present throughout the relationship and, therefore, be independent of the number of transactions between the buyer and seller, the task clarity problem arises and is resolved in early iterations. Our estimates reveal that the probability of a relationship terminating remains constant beyond the fourth shipment, which is consistent with the credibility problem being independent of the number of transactions so far. However, in line with the significant role of task clarity in relational contracts, the probability of relationships ending within the first four shipments is, on average, 14 percentage points higher than later on. Furthermore, we find that domestic firms face a significantly greater clarity problem.

Subsequently, we test a unique prediction of our model: credibility is a function of task clarity and higher clarity leads to lower credibility. In the standard relational contract framework, a lower discount factor increases the likelihood of the agent reneging on the relational contract in response to improvements in the outside option. These frameworks would predict in our context that domestic firms are more likely to shirk in response to increases in the auction price because they have a lower discount factor. However, this prediction may not hold in our framework because domestic firms also have lower task clarity, which leads to higher credibility. Domestic firms may be less likely to shirk as a response to improvements in the outside option if the effect of lower clarity outweighs the effect of a lower discount factor on credibility. We find that domestic firms, characterized by lower clarity, have higher credibility; i.e., they are less likely to shirk in their relationships in response to improvements in their outside option. Thereby demonstrating higher credibility despite having a lower discount factor.

We then dissect the task clarity problem. In our model, task clarity is determined by the expectation and the realization of $\lambda$. We decompose this parameter onto three components: i) seller ($\lambda_s$), ii) buyer ($\lambda_b$), and iii) match ($\lambda_{b,s}$). The seller component is the seller's ability to choose productive actions, which varies across sellers due to differences in screening ability, managerial practices, capability to understand buyer's requirements, and communications skills, among others.[7] The buyer component is a measure of the selectivity of the buyer—i.e., the share of actions of sellers that would be productive. Finally, the match component captures the idiosyncratic part of a buyer-seller pair.

We employ an AKM model to ascertain the buyer and seller's contribution to the success of a relationship (Abowd, Kramarz, and Margolis, 1999, henceforth AKM). We demonstrate that both components are crucial to the success of a relationship, but the buyer component accounts for twice as much of the variation in the probability of a relationship becoming productive. Moreover, the AKM framework provides an estimate of the buyer and seller component for each buyer and seller. Separating and estimating the task clarity components allows us to test whether domestic firms have a lower clarity due to the buyer or the seller component, or both. We find that domestic firms have a lower seller component, but their buyers do not have a statistically different buyer component. Can the difference in the seller component explain the differences in task clarity and credibility between foreign and domestic firms?

We start by testing whether task clarity issues persist after controlling for the buyer component using buyer-fixed effects. Consistent with the buyer component explaining a significant fraction of the variance in the probability of a relationship becoming productive, we find that controlling for the buyer alleviates most of the observed task clarity problems. For example, the difference in the probability of a relationship ending within the first four periods compared to later periods declines by up to 80%, and it becomes negligible for foreign firms. However, the clarity gap between foreign and domestic firms persists, suggesting that domestic firms face more challenges in establishing relational contracts due to their inferior ability to select productive actions.

We then turn to the relationship between the task clarity components and credibility. We show that exporters with a higher seller component of clarity, have lower credibility: they are more likely to end their productive relationships as a response to more favorable auction prices. The final segments of this section assess the relationship between the buyer and seller components of task clarity and the firm's overall success in establishing and sustaining relational contracts. We find that sellers who are proficient in selecting productive actions for the buyer (higher $\lambda_s$) and those facing better buyers (higher $\lambda_b$) sell a larger share of their exports in direct transactions.

7. This is a constant in our model because we do not have more than one seller.

## 5.1 The Task Clarity Problem

The issue of task clarity in relational contracts pertains to whether the agent knows which of her actions will be productive to the principal. While the challenge of credibility, keeping promises, persists throughout the relationship due to shocks to the outside option, task clarity issues primarily exist only early on, as repeated interactions within a stable environment tend to resolve these concerns. Propositions 2 and 3 deliver two tests for the existence of task clarity issues.

The first testable prediction is that if task clarity issues exist, relationships are more likely to terminate during early shipments. This occurs because the uncertainty regarding whether the seller and buyer will find a productive action is resolved once the principal has paid the agent. In our model, shipments past $\underline{K}$ only occur when the principal has paid the agent. Consequently, Propositions 2 and 3 show that the probability of the relationship ending, $e$, is weakly lower for shipments past $\underline{K}$ than for those prior. Formally, the first test of these propositions is:

$$e_{k<\underline{K}}\left(\lambda_b, \lambda_s\right) \leq e_{k>\underline{K}}\left(\lambda_b, \lambda_s\right)$$

Furthermore, as credibility issues persist throughout the relationship, the probability of a relationship ending at any shipment past $\underline{K}$, when task clarity issues have been resolved, should be constant. This prediction distinguishes our model from one with continuous learning. With learning, the probability of relationship termination decreases monotonically. In contrast, in our framework, the probability of relationship terminating becomes constant after task clarity issues are resolved. The second testable prediction is whether clarity issues are indeed eventually resolved, i.e., the probability of a relationship ending in a given shipment becomes constant once task clarity issues have been addressed. Combining Propositions 2 and 3 for shipments when task clarity issues have been resolved ($k > \underline{K}$), we obtain our second testable prediction, the probability of a relationship ending becomes constant:

$$e_{k>\underline{K}} \begin{cases} 0 & \text{if there is no incentive to break productive relationships} \\ 1-\mu & \text{if there is incentive to break productive relationships} \end{cases}$$

We evaluate these predictions by comparing the likelihood of a relationship between seller $s$ and buyer $b$ terminating at shipment $h$ relative to the 10th shipment, as per equation 8. The estimation incorporates year x month-fixed effects ($\zeta_t$) to account for industry-wide shocks and seller fixed effects ($\phi_s$) to ensure that the $\beta_i$'s reflect within-firm variations in the probability of relationship termination rather than across-firm differences in clarity or credibility.

$$\mathbb{1}[\textit{Relationship End}]_{s,b,h} = \sum_{i=1, i\neq 10}^{30} \beta_i \mathbb{1}[h=i]_{s,b,h} + \phi_s + \zeta_t + \epsilon_{s,b,h} \tag{8}$$

Additionally, we estimate equation 9 to examine whether this within-firm task clarity issue is more pronounced for domestic firms by interacting the shipment dummies with a variable, $D_s$, indicating whether seller $s$ is a domestic firm.

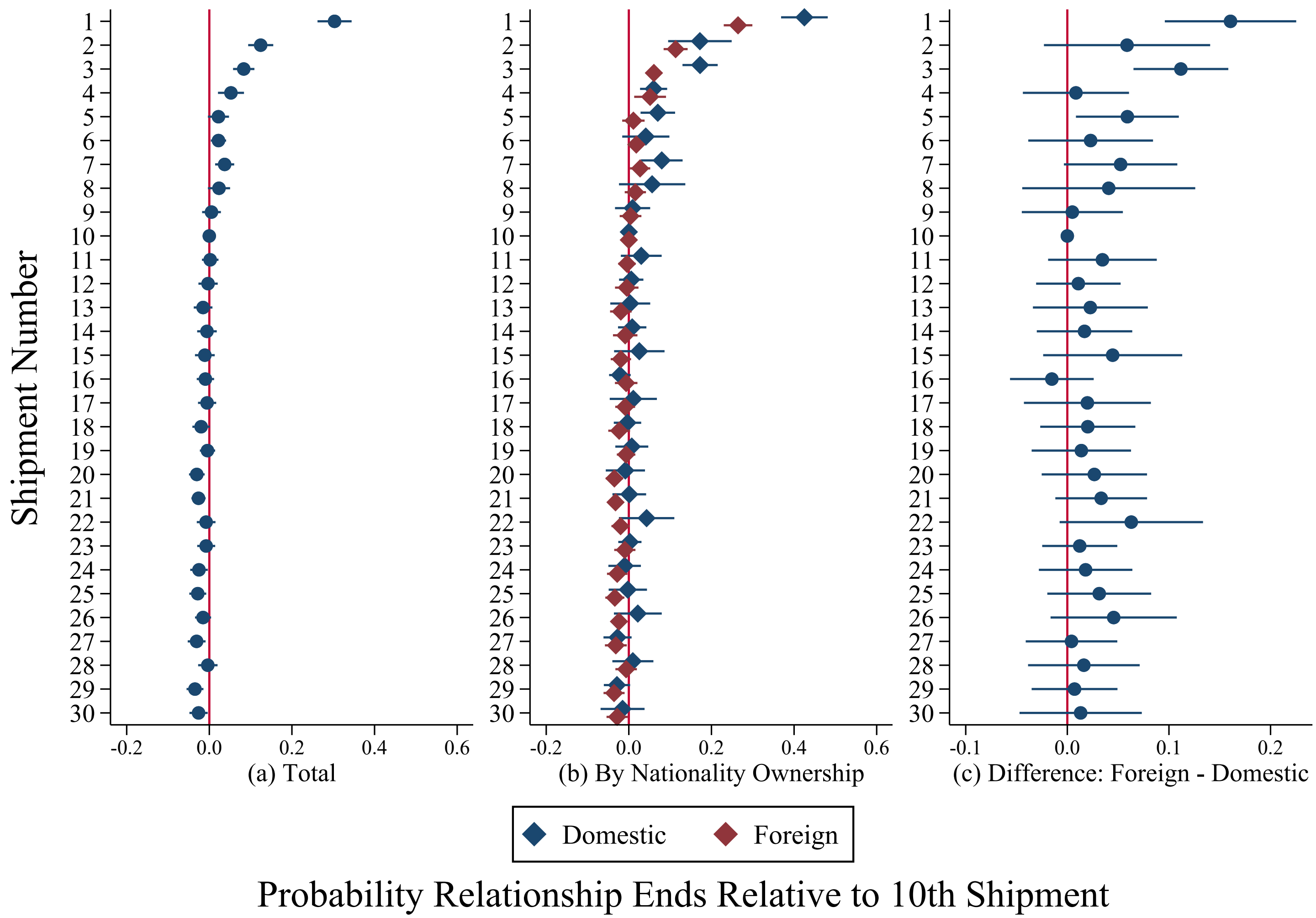



Figure 4: Clarity Issues in Ethiopian Flower Exports

Note: Panel (a) presents the $\hat{\beta}_{1,i}$ estimates of equation 8. Panel (b) displays the estimates of equation 9 for domestic ($\hat{\beta}_{1,i}$) and foreign ($\hat{\beta}_{1,i} + \hat{\beta}_{2,i}$) firms. Panel (c) includes the estimate for the differences between foreign and domestic firms ($\hat{\beta}_{2,i}$). Standard errors are two-way clustered at the exporter and buyer levels. All coefficients are displayed with their 95% confidence interval.

$$\mathbb{1}[Relationship\ End]_{s,b,h} = \sum_{i=1, i\neq 10}^{30} \left(\beta_{1,i}\mathbb{1}[h=i]_{s,b,h} + \beta_{2,i}\mathbb{1}[h=i]_{s,b,h} \times D_s\right) + \phi_s + \zeta_t + \nu_{s,b,h} \quad (9)$$

The left graph in Figure 4 demonstrates that, in line with the relevance of task clarity in the industry, firms are more likely to terminate their relationships during early shipments than later ones (first testable prediction of this section). Specifically, the likelihood of a relationship terminating within the first 3-4 shipments is significantly higher than in subsequent ones. Moreover, the estimates align with the resolution of task clarity issues beyond the fourth shipment and the relative independence of credibility issues and the shipment number beyond this point (the second testable prediction of this section). Relative to the 10th shipment, the likelihood of relationship failure within the first four shipments is, on average, 14 percentage points higher. However, for shipments 5 to 9 and 11 to 30, the likelihood of relationship termination is, on average, 0.08 percentage points lower.

The middle graph indicates that task clarity issues affect both foreign and domestic firms, but are more severe for domestic firms. The graph on the right reveals that the likelihood of a relationship ending in the first shipment is 16 pp higher for domestic than for foreign firms. Cumulatively, in the first three shipments, the likelihood of a relationship terminating for domestic firms is 33 pp higher than for foreign firms.

### 5.2 The Relationship between Task Clarity and Credibility

The conventional concept of credibility in relational contracting pertains to the likelihood of an agent honoring their commitments (Gibbons and Henderson, 2012), and in a setting with no task clarity considerations, the likelihood of an agent defecting increases with the quality of the outside option and decreases with the continuation payoff of the current relationship (see Section 3.1 Benchmark with no clarity problems). In our empirical context, the value of the outside option increases with the auction price, which fluctuates over time but remains constant across firms. However, the continuation payoff may exhibit substantial variations across firms due to differences in the discount factor. Specifically, domestic firms, which have a lower discount factor,[8] should be more likely to terminate a relationship in response to an improvement in the outside option.

However, this may not hold true in our model, because domestic firms also exhibit lower task clarity. Therefore, their response to improvements in the outside option, in a framework that considers clarity, is ex ante ambiguous. On one hand, the standard comparative static remains valid: firms with lower discount factors are more likely to defect when the outside option improves. On the other hand, firms with lower task clarity are less likely to defect when the outside option improves, as they consider the difficulty of initiating a new relationship. Formally, agents will not

8. Refer to Table 1.

defect when inequality NB is satisfied.

A novel contribution of the model is that the credibility inequality is not solely a function of the outside option, discount factor, and continuation payoff within the relationship but also of the task clarity parameter $\lambda_s$. Specifically, proposition 5 shows that firms with higher $\lambda_s$, which facilitate the initiation of new productive relationships and increase $W_0$, are more likely to shirk in existing relationships.

To test whether improvements in the outside option impact relationship termination, we estimate the effect of the price spread (average price at auctions relative to the average price paid by direct buyers) in month $t$ on the number of relationships that concluded for seller $s$ in month $t$. This estimation strategy capitalizes on Ethiopian producers being price takers because of their small size relative to global flower production. Consequently, the timing and size of fluctuations in auction prices are exogenous to Ethiopian producers.

We identify a relationship ending as the last transaction between the buyer and the seller. While these terminations could be attributed to either party, our analysis primarily attributes them to the seller, which aligns with incentive compatibility: when the auction price is high, the seller has a higher incentive to renege in its relationship, while the buyer has a lower incentive to do so. Consequently, it is plausible to attribute the rise in relationship terminations to sellers during periods when sellers have a heightened incentive to shirk and buyers have a diminished incentive to do so.

We employ the following equation to estimate the responses of foreign and domestic firms to improvements in the outside option and the difference between these responses:

$$Y_{s,t} = \beta_0 + \beta_1 Price\ Spread_t + \beta_2 D_s + \beta_3 Price\ Spread_t \times D_s + \beta_4 X_{s,t} + \epsilon_{s,t} \tag{10}$$

where the dependent variable, $Y_{s,t}$, is either the number of relationships of seller $s$ that ended in month $t$, whether the seller ended at least one relationship that month, or the share of relationships that the seller terminated that month. The independent variables are the average monthly price difference between roses sold at auctions and those sold directly to buyers (price spread), an indicator of whether the firm is domestic, and the interaction of these two variables. Our controls, $X_{s,t}$, include the number of active relationships in every specification and the share of shipments to direct buyers in half of them.

In response to a one standard deviation increase in the average monthly price spread between auctions and direct relationships, the number of relationships that foreign sellers terminate escalates by .04 (16%), the probability of them terminating at least one relationship increases by .024pp (14%), and the share of relationships that end rise by .009 (15%) (Table 2). Despite possessing a lower discount factor, domestic firms exhibit less defection in their relationships when the outside option improves to the extent that the effects observed for foreign firms dissipate. In our model, this outcome arises because domestic firms, due to their lower task clarity, have a lower incentive to shirk in their relationship because it is harder for them to form new ones, and this effect outweighs the effect of the lower discount factor that increases their incentive to defect.

Table 2: Outside Option and Maintaining Relationships

| Dependent Variable: | # Ending Relationships | | I[At Least One] | | % Ending Relationships | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Price Spread (Std) | 0.0411** | 0.0353** | 0.0240** | 0.0272** | 0.0088* | 0.0129** |
| | (0.017) | (0.015) | (0.010) | (0.010) | (0.005) | (0.005) |
| I[Domestic] | 0.0567** | 0.0281 | 0.0010 | 0.0167 | -0.0059 | 0.0141 |
| | (0.027) | (0.031) | (0.018) | (0.020) | (0.010) | (0.013) |
| Price Spread (Std) x I[Domestic] | -0.0427** | -0.0372** | -0.0351*** | -0.0382*** | -0.0154** | -0.0193** |
| | (0.019) | (0.017) | (0.012) | (0.013) | (0.007) | (0.007) |
| Mean Dep. Var | 0.246 | 0.246 | 0.169 | 0.169 | 0.059 | 0.059 |
| Observations | 4210 | 4210 | 4210 | 4210 | 4210 | 4210 |
| Control # Active Relantionships | Y | Y | Y | Y | Y | Y |
| Control % in Direct Transactions | | Y | | Y | | Y |

Note: The table displays the estimation of equation 10 using OLS. In Columns 1 and 2, the outcome is the number of relationships that ended in the month; in Columns 3 and 4, it is a dummy that equals one if the seller had at least one relationship that ended in the month; and in Columns 5 and 6 the outcome is the share of relationship that ended in the month. Standard errors in parentheses are clustered at the exporter level. The stars next to the estimate, *, **, ***, represent statistical significance at a .10, .05, and .01 level, respectively.

### 5.3 Decomposing the Task Clarity Problem

The goal of this section is to understand and estimate the relative significance of the components of task clarity ($\lambda$). We decompose this parameter onto three components: i) seller ($\lambda_s$), ii) buyer ($\lambda_b$), and iii) match ($\lambda_{b,s}$). The seller component is the seller's ability to choose productive actions, which varies across sellers due to differences in screening ability, managerial practices, capability to understand buyer's requirements, and communications skills, among others.[9] The buyer component is a measure of the selectivity of the buyer, for example, the share of actions of sellers that would be productive. Finally, the match component captures the idiosyncratic component of how well a buyer-seller pair may interact; for example, the managers know each other or are alumni of the same school.

We choose to parameterize the relationship between lambda and its components in a form that allows for a convenient estimation using standard econometric tools. In particular, we assume the following functional form:

$$\lambda(\lambda_s, \lambda_b, \lambda_{s,b}) = \frac{1}{1 + e^{-(\lambda_s + \lambda_b + \lambda_{s,b})}}$$

Then, dividing by $1 - \lambda$ both sides of the equation and taking logs, we obtain the following linear relationship:

9. This is a constant in our model because we do not have more than one seller.

$$Z = log(\frac{\lambda}{1-\lambda}) = \lambda_s + \lambda_b + \lambda_{s,b}$$

We replace each term with their empirical counterparts to estimate the parameters. The buyer and seller components ($\lambda_s$ and $\lambda_b$) are the seller and buyer fixed effects. The idiosyncratic component of the match, $\lambda_{s,b}$, is our error term. And finally, since $\lambda$, and hence, $Z$, are non-observable, we replace $Z$ with an empirical counterpart that is highly correlated with task clarity, whether a buyer and seller pair reached a productive relationship, i.e., reached the fourth shipment.[10] Our estimating equation becomes:

$$\mathbb{1}[Productive]_{s,b} = \lambda_s + \lambda_b + \lambda_{s,b} \tag{11}$$

In summary, we decompose task clarity into its buyer and seller components using a two-way fixed effect regression with fixed effects for buyers and sellers. This methodology is analogous to the one introduced by Abowd, Kramarz, and Margolis (1999) (AKM model) to decompose wages by employer and employee components. This framework has been extensively used in the labor literature (e.g., Song et al., 2019; Card, Heining, and Kline, 2013). However, Kline, Saggio, and Sølvsten (2020) shows that the ordinary least squares estimation of the two-way fixed effects model may lead to bias involving a linear combination of the unknown observation-specific variances. Hence, we follow their recommended approach and estimate the model using the leave-one-out connected set sample, which comprises buyer-seller pairs that remain connected after the removal of any given buyer or seller.

After estimating the buyer and seller components using the AKM framework, we incorporate them as explanatory variables in equation 12. This allows us to estimate the impact of buyer and seller components of clarity on the likelihood of reaching a productive relationship and the fraction of the variance that each of them explains.

$$\mathbb{1}[Productive]_{s,b} = \beta_0 + \beta_1 \hat{\lambda_s} + \beta_2 \hat{\lambda_b} + \varepsilon_{s,b} \tag{12}$$

Higher seller and buyer components increase the likelihood of reaching a productive relationship (Table 3). This holds true across the four specifications that vary on the minimum number of shipments between a buyer and a seller to consider a relationship productive. Our preferred specification is in Column 2, reaching at least four shipments, because based on the findings of Figure 4, on average, task clarity issues are resolved by the fourth shipment. In our preferred specification, a one standard deviation increase in the seller component corresponds to a 19.2 percentage point (pp) rise in the probability of reaching a productive relationship. Similarly, a one standard deviation increase in the buyer component results in a 28.5 pp increase in the probability of reaching a productive relationship.

10. We chose this definition of productive based on the findings of Figure 4 where, on average, clarity issues are resolved by the fourth shipment. Our results are robust to alternative definitions of productive relationships based on reaching the third, fifth, or sixth shipment.

Table 3: Productive Relationships and Task Clarity Components ($\lambda_s$, $\lambda_b$)

| | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| Productive: | Reach 3 Shipments | | Reach 4 Shipments | | Reach 5 Shipments | | Reach 6 Shipments | |
| | OLS | ANOVA | OLS | ANOVA | OLS | ANOVA | OLS | ANOVA |
| Exporter ($\lambda_s$) | 0.201*** | 14.43% | 0.192*** | 12.21% | 0.208*** | 13.94% | 0.193*** | 14.63% |
| | (0.018) | | (0.016) | | (0.017) | | (0.014) | |
| Buyer ($\lambda_b$) | 0.263*** | 25.30% | 0.285*** | 30.10% | 0.283*** | 27.92% | 0.283*** | 28.69% |
| | (0.016) | | (0.011) | | (0.011) | | (0.011) | |
| Mean Dep. Var | 0.577 | | 0.504 | | 0.456 | | 0.430 | |
| Observations | 1725 | | 1725 | | 1725 | | 1725 | |

Note: The table presents the OLS estimates of equation 12 and the corresponding ANOVA decomposition. Standard errors in parentheses are clustered at the exporter level. The stars *, **, ***, represent statistical significance at a .10, .05, and .01 level, respectively. Observations are weighted to give each exporter the same weight.

The analysis of variance (ANOVA) presented in Table 3 reveals that the buyer's component accounts for 30% of the variance in the probability of a relationship becoming productive, while the seller's component explains 12%. These estimates underscore the importance of both buyer's and seller's components of clarity in determining the probability of a relationship reaching its productive phase, with the buyer type having a more substantial explanatory power.

### 5.4 Domestic Firms and Task Clarity Components

The preceding section, in line with our model derivation, demonstrated that the heightened task clarity issues faced by domestic firms could be attributed to two components: the firm's ability to select the productive action ($\lambda_s$) and the selectivity of their buyers ($\lambda_b$). This section delves into the questions of whether domestic and foreign firms have different $\lambda_s$ and $\lambda_b$ and whether these differences are consistent with their differences regarding clarity and credibility.

We test for differences between foreign and domestic firms in the clarity components ($\lambda_s$ or $\lambda_b$) using the following estimating equation at the buyer-seller pair level:

$$Clarity\ Component_{s,b} = \beta_0 + \beta_1 Domestic_s + \nu_{s,b} \tag{13}$$

Our estimates indicate that the main driver of the differences in task clarity between foreign and domestic firms is that domestic firms have a lower $\lambda_s$; they are less effective at choosing productive actions for buyers. Table 4 presents the estimates of equation 13 using four alternative definitions of reaching a productive relationship in the estimation of the buyer and seller components with the AKM framework.[11] The estimates' magnitudes are consistent across the specifications. Domestic firms have approximately a half standard deviation lower $\lambda_s$, and there is no statistically significant

11. The alternative definitions are after reaching the 3rd, 4th, 5th, or 6th shipment,

Table 4: Clarity Components and Domestic Firms

| Dependant Variable: | Exporter ($\lambda_s$) | | | | Buyer ($\lambda_b$) | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| [I]Domestic | -0.410 | -0.569** | -0.444* | -0.481* | 0.008 | -0.028 | -0.050 | -0.052 |
| | (0.249) | (0.243) | (0.248) | (0.278) | (0.112) | (0.105) | (0.110) | (0.114) |
| Productive reach Ship. | 3 | 4 | 5 | 6 | 3 | 4 | 5 | 6 |
| Mean Dep. Var | -0.287 | -0.266 | -0.169 | -0.221 | 0.055 | 0.035 | 0.011 | 0.029 |
| Observations | 2565 | 2565 | 2565 | 2565 | 1725 | 1725 | 1725 | 1725 |

Note: The table presents the OLS estimates of equation 13. The dependent variable is the standardized and winsorized exporter component (columns 1-4) and buyer component (columns 5-8). Differences across columns arise from the definition of productive relationship, i.e., the number of shipments required to consider a relationship productive. Standard errors presented in parentheses are clustered at the exporter level. The stars next to the estimate, *, **, ***, represent statistical significance at a .10, .05, and .01 level, respectively. Observations are weighted to give each exporter the same weight.

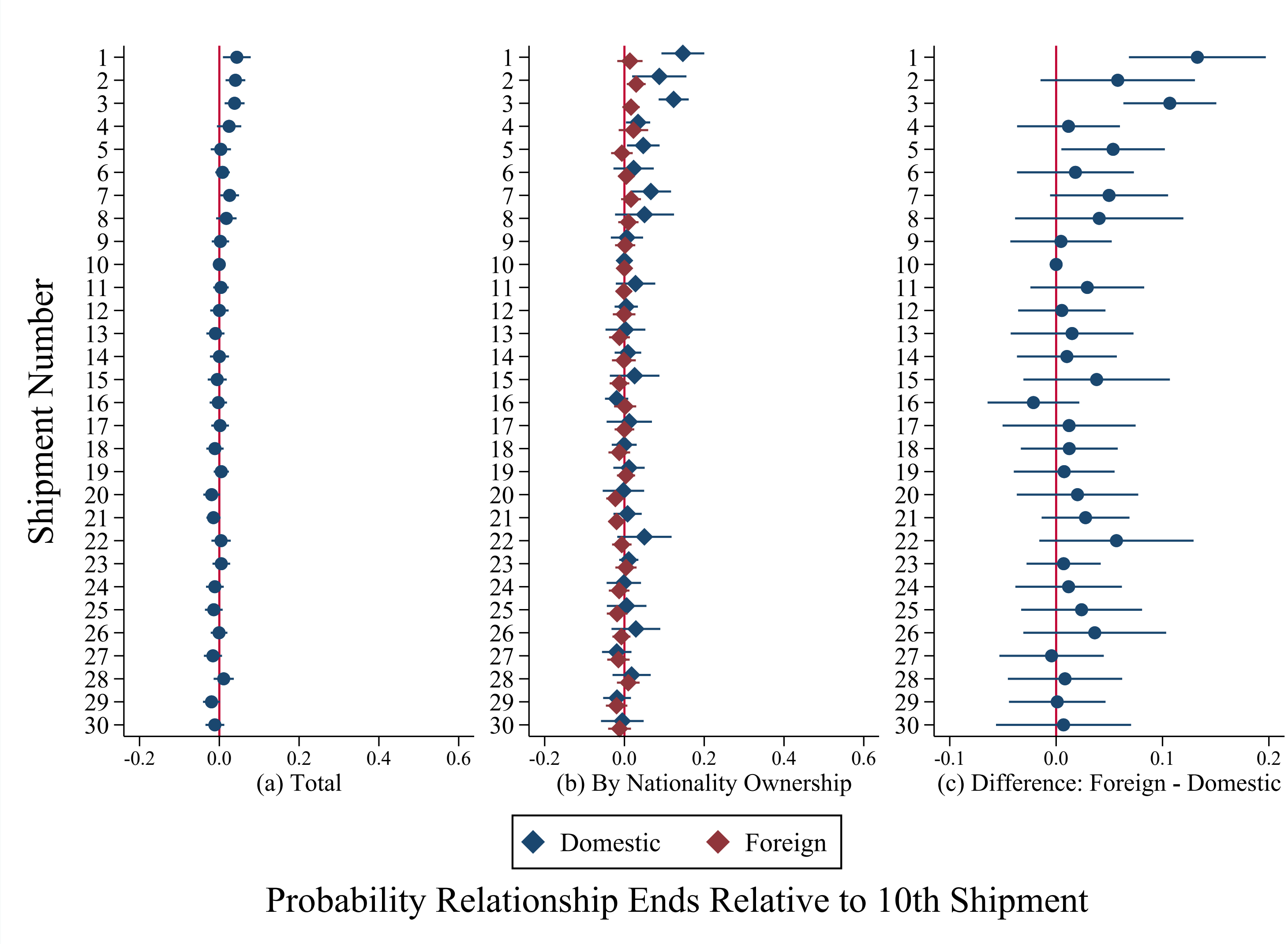



Figure 5: Clarity Issues in Ethiopian Flower Exports Controlling with Buyer Fixed Effects

Note: Panel (a) presents the $\hat{\beta}_{1,i}$ estimates of equation 8, including exporter fixed effects. Panel (b) displays the estimates of equation 9 for domestic ($\hat{\beta}_{1,i}$) and foreign ($\hat{\beta}_{1,i} + \hat{\beta}_{2,i}$) firms including exporter fixed effects. Panel (c) includes the estimate for the differences between foreign and domestic firms ($\hat{\beta}_{2,i}$). Standard errors are two-way clustered at the exporter and buyer levels. All coefficients are displayed with their 95% confidence interval.

difference in the type of buyers they face.

Our AKM estimates highlighted that the buyer component is crucial to the task clarity problem. However, the evidence suggests that domestic firms do not deal with significantly lower-quality buyers. Hence, the expectation is that controlling for the buyer component should decreases the severity of the clarity problem, but the difference in clarity between foreign and domestic firms should persist because domestic firms have lower $\lambda_s$. To test these predictions, we re-estimated equation 8 including buyer fixed effects to control for the buyer component.

Consistent with our framework, our ANOVA estimates, and the estimates of the differences in the clarity components between foreign and domestic firms, we find that controlling for buyer quality significantly reduces the clarity problems but does not eliminate the differences in clarity between foreign and domestic firms. The left-hand side graph in Figure 5 illustrates that controlling for variation across buyers significantly reduces the clarity problem in the industry. The cumulative probability of a relationship ending within the first three shipments decreases by 76% overall, 53% for domestic firms and 86% for foreign firms.

However, the differences in task clarity between foreign and domestic firms persist. On average, the probability of a domestic firm failing within the first three shipments is 12% higher than for the tenth shipment. For foreign firms, this probability is 2%. Consequently, the disparity between foreign and domestic firms remains, averaging 10 pp for the first three shipments. Hence, differences in the seller component of clarity are the primary driver of differences in task clarity between foreign and domestic firms.

Based on our model, differences in task clarity will lead to disparities in credibility. Can differences across sellers in these clarity components explain differences in their credibility? To answer this question, we test whether $\lambda_s$ and $\lambda_b$ affect sellers' credibility, i.e., the likelihood of the seller ending the relationship as a response to improvements in the outside option.

Getting a measure of the seller component to test whether it affects credibility is straightforward because we use our seller-specific estimate from the AKM model. However, getting a buyer component at the seller level is more complicated. A natural approach is to average the estimated buyer component from all the buyers the seller has interacted with so far. However, whether this measure should affect credibility depends on the assumptions on the sellers' beliefs about the distribution of buyers that they face. In the model, higher expected clarity has a negative effect on credibility, but previous realizations of clarity do not. Then, only if previous buyers affect the seller's beliefs about the distribution of future buyers will the history of buyers also affect credibility. On the other hand, if the realizations of $\lambda$ or previous buyers do not affect the beliefs about the expected $\lambda$, as we assume in the model, this measure of the buyer component will not affect credibility because it is a measure of the realization of $\lambda$ and not of its expectation.

The following is the estimating equation, where the dependent variable, $Y_{s,t}$, is either the number of relationships of seller $s$ that ended in month $t$, whether the seller ended at least one relationship that month, or the share of relationships that the seller terminated that month. The component of clarity used in the estimation is $\lambda_j$. When estimating the effect of the seller component, we use

$\hat{\lambda}_s$ estimated using the AKM framework, and when estimating the effect of the buyer component, we use the average of the buyers' component, $\hat{\lambda}_b$, that the seller interacted with until last month. The set of controls, $\kappa_{s,t}$, vary across specifications and include the number of active relationships, an indicator for whether the seller is foreign or domestic, and seller fixed effects.

$$Y_{s,t} = \beta_0 + \beta_1 Price\ Spread_t + \beta_2 \lambda_j + \beta_3 Price\ Spread_t \times \lambda_j + \beta_4 \kappa_{s,t} + \epsilon_{s,t} \tag{14}$$

Table 5: Clarity Components and Ending Relationships

| Dependent Variable: | # Ending Relationships | | | I[At Least One] | | | % Ending Relationships | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Price Spread (Std) | 0.0358** | 0.0311** | 0.0312** | 0.0163** | 0.0179** | 0.0180** | 0.0057 | 0.0080* | 0.0081* |
| | (0.014) | (0.012) | (0.012) | (0.008) | (0.008) | (0.008) | (0.004) | (0.004) | (0.004) |
| Seller ($\lambda_s$) | -0.0329 | -0.0250 | -0.0226 | -0.0015 | -0.0043 | -0.0028 | -0.0008 | -0.0048 | -0.0037 |
| | (0.026) | (0.024) | (0.027) | (0.011) | (0.011) | (0.011) | (0.006) | (0.006) | (0.006) |
| Price Spread (Std) x Seller ($\lambda_s$) | 0.0366*** | 0.0366*** | 0.0373*** | 0.0229*** | 0.0229*** | 0.0233*** | 0.0097** | 0.0097* | 0.0100** |
| | (0.012) | (0.011) | (0.011) | (0.008) | (0.009) | (0.008) | (0.005) | (0.005) | (0.005) |
| Mean Dep. Var | 0.271 | 0.271 | 0.271 | 0.186 | 0.186 | 0.186 | 0.065 | 0.065 | 0.065 |
| Observations | 3813 | 3813 | 3813 | 3813 | 3813 | 3813 | 3813 | 3813 | 3813 |
| Control # Active Relationships | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Control % in Direct Transactions | | Y | Y | | Y | Y | | Y | Y |
| Control Domestic | | | Y | | | Y | | | Y |

Note: The table displays the estimation of equations 14 using OLS. The sample includes all productive relationships (survived past the third shipment). Price Spread is calculated as the standardized difference between the average price at auctions and the average price in direct sales. A relationship ends if no more shipments are observed between a buyer and a seller or if there are more than nine months between two shipments. Columns 1-3 outcome is the number of relationships ending. In Columns 4-6 the outcomes denote a dummy that equals 1 if the seller had at least one relationship ending and zero otherwise. Columns 7-9 the outcomes is the share of relationships ending in the month. Standard errors in parentheses are clustered at the exporter level. The stars next to the estimate, *, **, ***, represent statistical significance at the .10, .05, and .01 level, respectively.

As predicted by our model, task clarity affects credibility, and differences in the clarity components lead to differences in credibility. In particular, sellers with a higher seller component of clarity are less likely to keep their promises when the outside option improves. A one standard deviation increase in the price spread between auctions and direct relationships leads to an increase in the number of relationships that end by .04 (17%) for sellers with average $\lambda_s$ (Table 5). However, for sellers with one standard deviation higher $\lambda_s$, the effect is 0.07 (28%), an increase of .03 (68%) for each standard deviation of $\lambda_s$. The estimates are robust to include controls for the number of active relationships, the share of production in direct relationships, and whether the seller is foreign or domestic.

On the other hand, there is no statistically significant relationship between the history of buyers—our measure of the buyer component of clarity at the seller level—and credibility. This would occur if the history of buyers did not affect the sellers' beliefs about the distribution of buyers, which is what we assume in our model. There are many reasons why sellers would not update their beliefs about the distribution of buyers based on the buyers they have faced so far. A first example of why this may happen is that when the relationship does not work, this may indicate that the buyer's component was low or that the match component was low, so it is harder to update when part of the problem may be due to the unobservable quality of the match. Another possible reason is that since the sellers face relatively few buyers, the history of buyers provides very little information about the buyer's distribution. Alternatively, sellers may believe there is regression to the mean in the type of buyers they face, so even if they have faced a couple of good buyers, they do not change their beliefs about the distribution.

### 5.5 Clarity Components and Relational Contracts

The preceding section underscored the significance of task clarity components in explaining differences in clarity and credibility across firms. This section delves into understanding the empirical relationship between task clarity and selling in relational contracts. In our framework, the effect of clarity on a seller's share of direct sales is ambiguous. On the one hand, firms with higher clarity are more likely to reach a productive relationship (direct effect). However, because higher clarity leads to lower credibility, they are also more likely to end these relationships when the price at the auction becomes more favorable (indirect effect). Hence, the relationship between task clarity and the share of exports to direct buyers is an empirical question because the answer relies on whether the direct effect dominates the indirect one or vice versa.

To answer this empirical question, we use the following estimating equation, where $\hat{\lambda}_s$ is the seller component of clarity, and $\overline{\lambda}^b_{s,t-1}$ denotes the average $\hat{\lambda}_b$ of buyers that seller $s$ interacted with until last month, $t-1$. The estimation incorporates year-month fixed effects ($\zeta_t$) to account for industry-wide shocks.

$$ShareDirectSales_{s,t} = \beta_1 \hat{\lambda}_s + \beta_2 \hat{\overline{\lambda}}_{b,t-1} + \zeta_t + \nu_{s,t} \tag{15}$$

Table 6: Clarity Components and Relational Contracts

| | Dependent Variable: % Direct Sales | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Seller ($\lambda_s$) | 0.173*** | | 0.192*** | | 0.217*** |
| | (0.058) | | (0.059) | | (0.057) |
| Buyer ($\lambda_b$) | | 0.066*** | 0.089*** | 0.065 | 0.212** |
| | | (0.023) | (0.021) | (0.098) | (0.090) |
| Buyer Measure | | Last ($\lambda_b$) | | Cumulative ($\overline{\lambda}_b$) | |
| Mean Dep. Var | 0.499 | 0.557 | 0.557 | 0.558 | 0.558 |
| Observations | 4445 | 2751 | 2751 | 2763 | 2763 |
| Month x Year FE | Y | Y | Y | Y | Y |

Note: The table displays the estimation of Equation 15. Columns 2 and 3 use the last buyer that the seller faced as a measure of $\lambda_b$. Columns 4 and 5 use all the buyers the seller has interacted with so far as a measure of $\lambda_b$. Standard errors in parentheses are clustered at the seller level. The stars next to the estimate, *, **, ***, represent statistical significance at the .10, .05, and .01 levels, respectively.

In the Ethiopian floriculture industry setting, we find that the direct effect dominates the indirect one. Firms with higher task clarity transact more with direct buyers. This occurs because the easiness of forming new relationships that higher clarity implies (direct effect) dominates the effect of lower credibility (indirect effect). Both task clarity components, $\lambda_s$ and $\lambda_b$, are positively linked to a higher share of direct sales. Firms that are better at understanding what is required from them, those with higher $\lambda_s$, have a larger share of direct shipments. In particular, one standard deviation higher $\lambda_s$ is associated with a 17 to 22 pp higher share of direct monthly sales (Table 6). A similar pattern emerges when analyzing the relationship between the buyer types that a firm faces ($\lambda_b$) and the share of its production going to direct buyers. One standard deviation higher average of buyer types so far is linked to a 21 pp larger share of direct sales. Similarly, one standard deviation higher type of buyer last month is associated with a 9 pp larger share of direct sales.

# 6 Concluding Remarks

We explore the role of task clarity in relational contracts in a model where, upon the matching of an agent and a principal, it is not immediately apparent which actions of the agent, if any, will be valuable to the principal. The likelihood of a productive relationship increases with clarity, which is a function of the principal and agent types. We demonstrate that task clarity influences the agent's propensity to fulfill promises, the usual notion of credibility. This is because task clarity determines the ease of replacing a relationship after defection.

We validate our model in an appropriate context using a decade of trade data from the Ethiopian floriculture industry. In this industry, exporters obtain higher prices through direct relationships with global buyers relative to the spot market.

Our empirical analysis documents: i) Ethiopian floriculture exporters behave consistently with a relational contract framework where the price at international flower auctions functions as the outside option of productive relationships, ii) task clarity problems are significant in the industry and larger for domestic firms, iii) consistent with a unique prediction of our model, domestic firms, despite a lower discount factor, are less likely to defect on a productive relationship as a response to improvements in the outside option due to their lower clarity, (iv) clarity is a function of buyer and seller types, and these types have a significant effect on the share of production exporters sell in direct relationships.

Our message is subtle. With non-differentiated commodities, task clarity problems might not be as severe because these goods are traded and governed by standardized definitions and referenced prices. However, for differentiated goods where the transaction is typically through direct relationships with global buyers', domestic producers might struggle not because of the lack of trying or quality but due to the task clarity problems we highlight. Our paper points to an explanation of why a viable domestic exporting sector did not emerge a decade later, and hence, aiding domestic entrepreneurs on how to successfully screen buyers and how to better understand what their buyers are asking from them could be a margin that could help with more direct sales.

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# A Omitted Proofs

## A.1 Proof of Lemma 1

**Lemma 3.** *If $\overline{K} \geq 0$ then $V = \frac{p}{1-\delta}$ and the agent has no incentive to break a productive relationship.*

*Proof.* We will show the contrapositive, i.e., if $V = \frac{\mu p+(1-\mu)(h+\delta W_0-c)}{(1-\mu\delta)}$ then $\overline{K} < 0$. Let $\frac{p}{1-\delta} < h+\delta W_0 - c$. By definition, $W_k(h) = \max\left\{h+\delta W_0 - c, \overline{\lambda}_k V + \left(1-\overline{\lambda}_k\right)\delta W_{k+1}\right\}$. Since $V > W_{k+1}$ for all $k$, $V > \overline{\lambda}_k V + \left(1-\overline{\lambda}_k\right)\delta W_{k+1}$. Thus, we are left to prove that $V < h+\delta W_0 - c$. From the definition of $V$ it suffices to show

$$\begin{aligned}\frac{\mu p+(1-\mu)(h+\delta W_0-c)}{(1-\mu\delta)} &< h+\delta W_0 - c, \text{ or}\\ \mu p &< \mu(1-\delta)(h+\delta W_0-c)\\ \frac{p}{1-\delta} &< h+\delta W_0 - c,\end{aligned}$$

which follows by the assumption that the agent has an incentive to break a productive relationship, i.e., the negation of inequality (NB). The second statement is the contrapositive of the first. ■

## A.2 Proof of Theorem 1

**Theorem 8.** *A unique equilibrium with direct relationships exists as long as*

$$\frac{\upsilon}{1-\delta} \leq \frac{\mu\overline{\lambda}_0 V + (1-\mu)h - c/\delta}{1-\delta\left(1-\mu\overline{\lambda}_0\right)},$$

*where $V = \max\left\{\frac{p}{1-\delta}, \frac{\mu p+(1-\mu)(h+\delta W_0-c)}{(1-\mu\delta)}\right\}$, and the principal is sufficiently patient.*

The proof requires a few lemmas.

**Lemma 4.** *Fix $W_0$ which satisfies (RC). Then $\underline{K}$ is well-defined and unique.*

*Proof.* Since $\overline{\lambda}_n$ is decreasing in $k$, inequality (3) implies that at most one $\underline{K}$ satisfies the definition. We just need to show that $\infty > \underline{K} \geq 0$.

Fact 1 states that $\overline{\lambda}_n(V - \delta W_0 + c) \leq \ell$ and hence $\underline{K} < n$ by inequality (3). To complete the proof we need to show that $\underline{K} \geq 0$. Assume by way of contradiction that $\underline{K} < 0$. Then by definition $W_0(\ell) = \ell + \delta W_0 - c > \overline{\lambda}_0 V + \left(1-\overline{\lambda}_0\right)\delta W_1$. It also follows that $W_0(h) = h+\delta W_0 - c$, since $h > \ell$, and hence $W_0 = \upsilon + \delta W_0 - c$. However, if this is the case then $W_0 = (\upsilon - c)/(1-\delta)$ and

$$\delta W_0 - c = \delta\frac{\upsilon - c}{1-\delta} - c = \frac{\delta\upsilon - c}{1-\delta} < \frac{\delta\upsilon}{1-\delta},$$

but this contradicts inequality (RC). Therefore $\underline{K} \geq 0$. ■

**Lemma 5.** *The value function $W_0\left(\overline{K}, \underline{K}\right)$ is increasing in both arguments.*

*Proof.* Observe that given $\left(\underline{K},\overline{K}\right)$, we can compute $W_k$ using equations (4) and (6) as follows

$$W_k = \begin{cases} \overline{\lambda}_k V + \left(1-\overline{\lambda}_k\right)\delta W_{k+1} & \text{if } k\in(0,\overline{K}) \\ \overline{\lambda}_k V + \left(1-\overline{\lambda}_k\right)(\delta W_0 - c) & \text{if } k=\overline{K}=\underline{K} \\ \quad \mu\left[\overline{\lambda}_k V + \left(1-\overline{\lambda}_k\right)\delta W_{k+1}\right] & \\ \quad +(1-\mu)\left[\overline{\lambda}_k V + \left(1-\overline{\lambda}_k\right)\max\left\{\delta W_{k+1},\delta W_0 - c\right\}\right] & \text{if } k=\overline{K}<\underline{K} \\ \mu\left[\overline{\lambda}_k V + \left(1-\overline{\lambda}_k\right)\delta W_{k+1}\right] & \\ \quad +(1-\mu)\left[h+\delta W_0 - c\right] & \text{if } k\in(\overline{K},\underline{K}) \\ \mu\left[\overline{\lambda}_k V + \left(1-\overline{\lambda}_k\right)(\delta W_0 - c)\right] & \\ \quad +(1-\mu)\left[h+\delta W_0 - c\right] & \text{if } k=\underline{K}>\overline{K} \\ \mu\ell+(1-\mu)h+\delta W_0 - c & \text{if } k>\underline{K} \end{cases}. \tag{16}$$

Fix $\underline{K}$ and observe that $W_k$ is weakly increasing in $W_{k+1}$ by equation (16), since either $W_k$ is independent of $W_{k+1}$ (if $k>\underline{K}$) or strictly increasing in $W_{k+1}$ (if $k\le\underline{K}$). Now, suppose that $\underline{K}$ increases to $\underline{K}^*>\underline{K}$. We have that $W_{\underline{K}^*}\left(\ell;\overline{K},\underline{K}^*\right)\ge W_{\underline{K}^*}\left(\ell;\overline{K},\underline{K}\right)=\ell+\delta W_0-c$, by equation (4). But then, since $W_k$ is increasing in $W_{k+1}$, we have that $W_k\left(\overline{K},\underline{K}^*\right)\ge W_k\left(\overline{K},\underline{K}\right)$ for all $k<\underline{K}^*$. Similarly, if $\overline{K}$ is increased to $\overline{K}^*>\overline{K}$, we have that $W_{\overline{K}^*}\left(h;\overline{K}^*,\underline{K}\right)\ge W_{\overline{K}^*}\left(h;\overline{K},\underline{K}\right)=h+\delta W_0-c$ and hence $W_k\left(\overline{K}^*,\underline{K}\right)\ge W_k\left(\overline{K},\underline{K}\right)$ for all $k\le\overline{K}^*$. ∎

To prove the theorem, we now show that a unique solution for $W_0$ exists for fixed $\underline{K}$. Fix the primitives of the problem and fix $\underline{K}$. From equation (16) we have that, for a given guess for $W_0$ and $\underline{K}$, we can derive an updated $W_0$. For all $k>\underline{K}$, set $W_k=\upsilon+\delta W_0-c$. From equation (2), a guess for $W_0$ results in $V=\max\left\{\frac{p}{1-\delta},\frac{\mu p+(1-\mu)(h+\delta W_0-c)}{(1-\mu\delta)}\right\}$.

If $V=\frac{\mu p+(1-\mu)(h+\delta W_0-c)}{(1-\mu\delta)}$, by Lemma 1, $\overline{K}=-1<\underline{K}$. Therefore, we can iterate backwards and set $W_k=\mu\left[\overline{\lambda}_k V+\left(1-\overline{\lambda}_k\right)\delta W_{k+1}\right]+(1-\mu)\left[h+\delta W_0-c\right]$ for all $k\in[0,\underline{K}]$. So consider $V=\frac{p}{1-\delta}$. We need to check if $\overline{K}=\underline{K}$, which will be the case if inequality (5) holds. Since $\underline{K}\ge\overline{K}$ the left-hand inequality in (5) is met. So we only need to check if at $\overline{K}=\underline{K}$

$$h+\delta W_0-c<\overline{\lambda}_{\overline{K}}V+\left(1-\overline{\lambda}_{\overline{K}}\right)\delta W_{\overline{K}+1}.$$

If the above inequality holds, set $W_k=\overline{\lambda}_k V+\left(1-\overline{\lambda}_k\right)\delta W_{k+1}$ for all $k\in[0,\underline{K}]$. Otherwise, let $W_{\underline{K}}=\mu\left[\overline{\lambda}_k V+\left(1-\overline{\lambda}_k\right)\delta W_{k+1}\right]+(1-\mu)\left[h+\delta W_0-c\right]$ and continue to iterate backwards, checking the right-hand inequality in (5). If it holds for some $k$, set $\overline{K}=k$ and define the remaining $W_k$ as in (16), until an upated $W_0$ emerges.

Let $T_0^K:\mathbb{R}\to\mathbb{R}$ be this map that takes a guess for $W_0$ and maps it to another $W_0$. The closed form expression is not simple in general (although one can give it for special cases, for example if $\mu=1$).

**Lemma 6.** *The map $T_0^K:\mathbb{R}\to\mathbb{R}$ is a contraction for every fixed $\underline{K}$ and $\overline{K}$.*

*Proof.* To show that $T_0$ is a contraction mapping take two guesses for $W_0$, namely $W_0^+>W_0^-$ and we will show that $T_0^K\left(W_0^+\right)-T_0^K\left(W_0^-\right)<W_0^+-W_0^-$. We will denote by $W_k(W_0)$, the value of $W_k$ when starting with a particular $W_0$ and iterating backwards. First observe that by equation

(2), $V\left(W_0^+\right) - V\left(W_0^-\right) \geq 0$ and

$$\begin{aligned} V\left(W_0^+\right) - V\left(W_0^-\right) &\leq (1-\mu)\,\delta\left(W_0^+ - W_0^-\right)/(1-\mu\delta) \\ &< \delta\left(W_0^+ - W_0^-\right). \end{aligned}$$

From equation (16) we have that

$$\begin{aligned} W_{\underline{K}}\left(W_0^+\right) - W_{\underline{K}}\left(W_0^-\right) &< \mu\left[\overline{\lambda}_{\underline{K}}\delta\left(W_0^+ - W_0^-\right) + \left(1-\overline{\lambda}_{\underline{K}}\right)\delta\left(W_0^+ - W_0^-\right)\right] + (1-\mu)\,\delta\left(W_0^+ - W_0^-\right) \\ &= \delta\left(W_0^+ - W_0^-\right). \end{aligned}$$

Furthermore, for $\overline{K} < k < \underline{K}$

$$\begin{aligned} W_k\left(W_0^+\right) - W_k\left(W_0^-\right) &< \mu\left[\overline{\lambda}_k\delta\left(W_0^+ - W_0^-\right) + \left(1-\overline{\lambda}_k\right)\delta^2\left(W_0^+ - W_0^-\right)\right] + (1-\mu)\,\delta\left(W_0^+ - W_0^-\right) \\ &< \delta\left(W_0^+ - W_0^-\right). \end{aligned}$$

Similarly, for $k \leq \overline{K}$ we also have that $W_k\left(W_0^+\right) - W_k\left(W_0^-\right) \leq \delta\left(W_0^+ - W_0^-\right)$. In particular, we have that

$$W_0\left(W_0^+\right) - W_0\left(W_0^-\right) \leq \delta\left(W_0^+ - W_0^-\right),$$

and since $\delta < 1$, $T_0$ is a contraction. By the Banach fixed-point theorem $T_0^K$ admits a unique fixed point, $W_0^*\left(\underline{K}, \overline{K}\right)$. In order to simplify notation, we denote $V\left(W_0^*\left(\underline{K}, \overline{K}\right)\right)$ by $V^*\left(\underline{K}, \overline{K}\right)$ and $W_k\left(W_0^*\left(\underline{K}, \overline{K}\right)\right)$ by $W_k^*\left(\underline{K}, \overline{K}\right)$. ■

**Lemma 7.** *There exists at most one equilibrium where the agent attempts a direct relationship.*

*Proof.* Note that for a fixed $\left(\underline{K}, \overline{K}\right)$ we have a unique $W_0^*(K)$ by the lemma above. For this to be an equilibrium inequality (3) must hold, i.e., $\overline{\lambda}_{\underline{K}+1} < \frac{\ell}{V-\delta W_0^*(K)+c} \leq \overline{\lambda}_{\underline{K}}$. Suppose there are two equilibria for which this holds $\left(\underline{K}, \overline{K}\right)$ and some other $\left(\underline{L}, \overline{L}\right)$ with $\underline{L} > \underline{K}$, and $\overline{L} \geq \overline{K}$. Since $W_0$ is increasing in both $\underline{K}, \overline{K}$ by Lemma 5 $W_0^*\left(\underline{L}, \overline{L}\right) > W_0^*\left(\underline{K}, \overline{K}\right)$, and thus $\frac{\ell}{V-\delta W_0^*\left(\underline{K},\overline{K}\right)+c} < \frac{\ell}{V-\delta W_0^*\left(\underline{L},\overline{L}\right)+c}$. But this is a contradiction, since $\left\{\overline{\lambda}_n\right\}$ is decreasing in $n$ and thus for inequality (3) to hold in both equilibria, we would have to have:

$$\overline{\lambda}_{\underline{L}+1} < \frac{\ell}{V-\delta W_0^*\left(\underline{L}, \overline{L}\right)+c} \leq \overline{\lambda}_{\underline{L}} \leq \overline{\lambda}_{\underline{K}+1} < \frac{\ell}{V-\delta W_0^*\left(\underline{K}, \overline{K}\right)+c} \leq \overline{\lambda}_{\underline{K}}.$$

This argument also shows that there cannot be another equilibrium at some $\left(\underline{L}, \overline{L}\right)$ with $\underline{L} > \underline{K}$, and $\overline{L} < \overline{K}$ where $W_0^*\left(\underline{L}, \overline{L}\right) \geq W_0^*\left(\underline{K}, \overline{K}\right)$.

Thus the only case left to consider is $\underline{L} > \underline{K}$ and $\overline{L} < \overline{K}$ with $W_0^*\left(\underline{L}, \overline{L}\right) < W_0^*\left(\underline{K}, \overline{K}\right)$. At

$\overline{K} > \overline{L}$ in the $\left(\underline{L}, \overline{L}\right)$ equilibrium, inequality (5) implies

$$h > \overline{\lambda}_{\overline{K}} V\left(\underline{L}, \overline{L}\right) + \left(1 - \overline{\lambda}_{\overline{K}}\right) \delta W_{\overline{K}+1}\left(\underline{L}, \overline{L}\right) - \delta W_0^*\left(\underline{L}, \overline{L}\right) + c.$$

However, in the $\left(\underline{K}, \overline{K}\right)$ equilibrium, inequality (5) and equation (2) imply $\overline{\lambda}_{\overline{K}}\left(V\left(\underline{K}, \overline{K}\right) - \delta W_0^*\left(\underline{K}, \overline{K}\right) + c\right) \geq h$. Since the parameter $h$ is exogeneous, a necessary condition for both of these equilibria to exist is

$$V\left(\underline{K}, \overline{K}\right) - \delta W_0^*\left(\underline{K}, \overline{K}\right) > V\left(\underline{L}, \overline{L}\right) - \delta W_0^*\left(\underline{L}, \overline{L}\right),$$

since $\delta W_{\overline{K}+1}\left(\underline{L}, \overline{L}\right) \geq v + \delta W_0\left(\underline{L}, \overline{L}\right) - c \geq W_0\left(\underline{L}, \overline{L}\right)$, where the last inequality follows by (RC).

But this leads to a contradiction since

$$\begin{aligned}
& V\left(\underline{K}, \overline{K}\right) - V\left(\underline{L}, \overline{L}\right) - \delta\left(W_0^*\left(\underline{K}, \overline{K}\right) - W_0^*\left(\underline{L}, \overline{L}\right)\right) \\
\leq\ & \frac{(1-\mu)\,\delta\left(W_0^*\left(\underline{K}, \overline{K}\right) - W_0^*\left(\underline{L}, \overline{L}\right)\right)}{(1-\mu\delta)} - \delta\left(W_0^*\left(\underline{K}, \overline{K}\right) - W_0^*\left(\underline{L}, \overline{L}\right)\right) \\
=\ & \frac{-\mu}{1-\mu\delta}\delta\left(W_0^*\left(\underline{K}, \overline{K}\right) - W_0^*\left(\underline{L}, \overline{L}\right)\right) < 0.
\end{aligned}$$

Therefore, there generically exists a unique Pareto efficient equilibrium with direct relationships. The only possible non-uniqueness is when an agent is indifferent between making an additional attempt with the current principal or starting with a new one. ■

The condition for a direct relationship equilibrium to exist was given in text and is based on verifying inequality (RC). We are left to verify that a principal who is sufficiently patient will indeed play $b_t = 1$ if $a_t \in \mathcal{P}$.

**Lemma 8.** *There exists a $\overline{\delta_p} \in (0,1)$ such that for all $\delta_p > \overline{\delta_p}$, principals optimally play $b_t = 1$ if $a_t \in \mathcal{P}$ and $b_t = 0$ otherwise.*

*Proof.* The principal's benefit of playing $b_t = 1$ in response to a productive action $a_t \in \mathcal{P}$ is a present value payoff of $(\xi - p)/(1-\beta)$. The only possible deviation is that a principal may decide to play $b_t = 0$ even when $a_t \in \mathcal{P}$. Fix the last period the agent makes an attempt at a productive realtionship with the principal, $K \leq \underline{K}$. The best case for the deviation is that the agent finds a productive action in period 0 and low shocks are realized at all times up to $\underline{K}$. In this case the principal's expected payoff from deviating is $\xi + \beta\lambda\frac{(\xi-p)}{1-\beta} + (1-\lambda)\,\beta^2\lambda\frac{(\xi-p)}{1-\beta} ... + (1-\lambda)^{K-1}\,\beta^K\lambda\frac{(\xi-p)}{1-\beta}$, assuming that the principal knows the realized $\lambda \in (0,1)$. If the principal does not know the realized $\lambda$, we can use $\lambda = \overline{\lambda}_0$ to get an upper bound on the expected payoff from deviating. The principal prefers to pay the agent after a productive action if:

$$\begin{aligned}
\frac{\xi - p}{1-\delta_p} &\geq v + \frac{(\delta_p(1-\lambda) - \delta_p^{K+1}(1-\lambda)^{K+1})\lambda(\xi - p)}{(1-\delta_p+\delta_p\lambda)(1-\lambda)\,(1-\delta_p)} \\
1 - \delta_p + \lambda(1-\lambda)^K\delta_p^{K+1} &\geq \frac{\xi}{\xi - p}(1-\delta_p+\delta_p\lambda)\,(1-\delta_p)\,.
\end{aligned}$$

Note that when $\delta_p = 1$ the inequality holds strictly since $\lambda(1-\lambda)^K > 0$. Since both sides of the expression are continuous in $\delta_p$, there is some $\overline{\delta_p} \in (0,1)$ such that the inequality holds for all $\delta_p > \overline{\delta_p}$. Thus, for sufficiently high $\delta_p$, the principal does prefer to pay the agent even when the very first action chosen by the agent is productive. ■

### A.3 Proof of Proposition 2

**Proposition 9.** *If the agent has an incentive to break a productive relationship then the probability that the relationship whose match quality is $\lambda$ ends in period $k$, conditional on reaching period $k$ is*

$$e_k(\lambda) = \begin{cases} 1-\mu & \text{if } 0 \leq k < \underline{K} \\ 1-\mu+\mu(1-\lambda)^{\underline{K}+1} & \text{if } k = \underline{K} \\ 1-\mu & \text{if } k > \underline{K} \end{cases}.$$

*Furthermore, $e_k(\lambda)$ is (weakly) decreasing in $\lambda$.*

*Proof.* By lemma 1 we have $\overline{K} < 0$. So relationships always end after a high shock, which occurs with probability $(1-\mu)$ in each period. For $k < \underline{K}$ or $k > \underline{K}$ this is the only way that a realtionship can end. However, in period $\underline{K}$, a relationship can also end after a low shock (so that period $\underline{K}$ is the last time we see an interaction between the agent and principal) if it is not stable at that time. This occurs with probability $(1-\lambda)^{\underline{K}+1}$ if the match quality is $\lambda$ (since the last attempt occurs after $\underline{K}$ failures with the principal). So the probability that a relationship ends in period $\underline{K}$ is $(1-\mu)+\mu(1-\lambda)^{\underline{K}+1}$. Finally, observe that

$$\frac{\partial}{\partial\lambda} e_{\underline{K}}(\lambda) = -\mu(\underline{K}+1)(1-\lambda)^{\underline{K}} < 0.$$

■

### A.4 Proof of Proposition 3

**Proposition 10.** *If the agent has no incentive to break a productive relationship then the probability that a relationship with match quality $\lambda$ ends in period $k$, conditional on reaching period $k$ is*

$$e_k(\lambda) \begin{cases} 0 & \text{if } 0 \leq k < \overline{K} \\ (1-\mu)(1-\lambda)^{k+1} & \text{if } \overline{K} \leq k < \underline{K} \\ (1-\lambda)^{\underline{K}+1} & \text{if } k = \underline{K} \\ 0 & \text{if } k > \underline{K} \end{cases}.$$

*Furthermore $e_k(\lambda)$ is (weakly) decreasing in $\lambda$.*

*Proof.* The conditional probabilitiy that a relationship ends before $\overline{K}$ is 0, since after either the high or the low shock the relationship continues, regardless of whether it is productive or not. At $\overline{K}$ and all periods up to $\underline{K}$, an unproductive relationship ends following a high shock, but no relationship ends following a low shock. At period $\underline{K}$ all unproductive relationships end, regardless of the shock. After period $\underline{K}$, only productive relationships remain and there is no chance of the relationship ending. The comparative static on $\lambda$ follows since

$$\begin{aligned}\frac{\partial}{\partial\lambda}e_k(\lambda) &= -(1-\mu)(k+1)(1-\lambda)^{k+1}<0\text{, and}\\ \frac{\partial}{\partial\lambda}e_{\underline{K}}(\lambda) &= -(\underline{K}+1)(1-\lambda)^{\underline{K}}<0.\end{aligned}$$

■

### A.5 Proof of Proposition 4

**Proposition 11.** *The value function $W_0$ is weakly increasing in $h$. Thus, the agent is more likely to break a productive relationship as $h$ increases.*

*Proof.* Note that $\widehat{V}$, as defined in equation (**??**) is strictly increasing in $h$. As a result, either $\frac{\partial V}{\partial h}=0$, if $V=p/(1-\delta)$, or $\frac{\partial V}{\partial h}>0$. Fix $W_0$ and $\underline{K}$, and consider a small increase from $h$ to $h'$.

First, suppose that the parameters of the problem are such that $\overline{K}(h)=\underline{K}$ before the change. As in the proof of theorem 1 we work backwards. We have that $W_{\underline{K}}(h)=\overline{\lambda}_{\underline{K}}V(h)+\left(1-\overline{\lambda}_{\underline{K}}\right)(\delta W_0-c)$, where we have explicitly added the dependence on $h$ to variables that are affected by it. If $\overline{K}(h)=\overline{K}(h')$, $W_{\overline{K}(h)}(h')\geq W_{\overline{K}(h)}(h)$ since $V$ is weakly increasing in $h$. Furthermore, if $\overline{K}(h)=\overline{K}(h')$, we have that $W_k$ is increasing in $W_{k+1}$ for $k<\overline{K}$ and iterating backwards we must have that $W_0(h')\geq W_0(h)$. Observe that inequality (3) shows that $\underline{K}$ does not depend on $h$, so $\underline{K}$ will not change (recall that $W_0$ is fixed). We could however have that $\overline{K}(h')=\underline{K}-1<\underline{K}=\overline{K}(h)$. We now have $W_{\underline{K}}(h')=\mu\left[\overline{\lambda}_{\underline{K}}V(h')+\left(1-\overline{\lambda}_{\underline{K}}\right)(\delta W_0-c)\right]+(1-\mu)[h'+\delta W_0-c]$ and we could write:

$$W_{\underline{K}}(h')-W_{\underline{K}}(h)\geq(1-\mu)\left(h'+\overline{\lambda}_{\underline{K}}[\delta W_0-c-V(h)]\right)\geq 0, \tag{17}$$

where the last inequality follows since $h'+\overline{\lambda}_{\underline{K}}(\delta W_0-c-V(h))\geq 0$. To see this, observe that inequality (5) holds at $h'$ and $\overline{K}(h)-1$ so that $\overline{\lambda}_{\overline{K}(h)}V(h')+\left(1-\overline{\lambda}_{\overline{K}(h)}\right)(\delta W_0-c)\leq h'+\delta W_0-c$, and the above inequality implies that

$$\begin{aligned}0 &\leq h'+\overline{\lambda}_{\underline{K}}(\delta W_0-c-V(h'))\\ &\leq h'+\overline{\lambda}_{\underline{K}}(\delta W_0-c-V(h)),\end{aligned}$$

where the second inequality follows since $V(h)\leq V(h')$. Note that since $V$ is increasin in $h$

$$\begin{aligned}W_{\underline{K}-1}(h) &= \overline{\lambda}_{\underline{K}-1}V(h)+\left(1-\overline{\lambda}_{\underline{K}-1}\right)\delta W_{\underline{K}}(h)\\ &\leq \overline{\lambda}_{\underline{K}-1}V(h')+\left(1-\overline{\lambda}_{\underline{K}-1}\right)\delta W_{\underline{K}}(h')=W_{\underline{K}-1}(h').\end{aligned}$$

The same is true for all other $k<\overline{K}(h)$. Thus we have that $W_0(h')\geq W_0(h)$.

Next, suppose that the parameters of the problem are such that $\overline{K}(h)<\underline{K}$. As in the proof of theorem 1 we work backwards. From equation (16) we see that for all $k>\overline{K}(h)$, we have that $W_k(h')\geq W_k(h)$. We have that if there is no change to $\overline{K}$, so that $\overline{K}(h')=\overline{K}(h)$, the proof trivially goes through since all $W_k$ are weakly increasing in $h$. Similarly if $\overline{K}(h') > \overline{K}(h)$, lemma 5, implies that $W_0$ will also increase. So consider, as before a small increase in $h$, so that $\overline{K}(h') = \overline{K}(h) - 1$. We then have $W_{\overline{K}(h)}(h') = \mu\left[\overline{\lambda}_{\overline{K}(h)} V(h') + \left(1 - \overline{\lambda}_{\overline{K}(h)}\right)\delta W_{\overline{K}(h)+1}(h')\right] + (1-\mu)[h' + \delta W_0 - c]$ and $W_{\overline{K}(h)}(h) = \overline{\lambda}_{\overline{K}(h)} V(h) + \left(1 - \overline{\lambda}_{\overline{K}(h)}\right)\delta W_{\overline{K}(h)+1}(h)$. Thus because

$$
\begin{aligned}
W_{\overline{K}(h)}(h') - W_{\overline{K}(h)}(h) &\geq (1-\mu)\left[h' + \delta W_0 - c - \left(\overline{\lambda}_{\overline{K}(h)} V(h) + \left(1 - \overline{\lambda}_{\overline{K}(h)}\right)\delta W_{\overline{K}(h)+1}(h)\right)\right] \\
&\geq 0,
\end{aligned}
$$

where the first inequality follows since $V(h') \geq V(h)$. The second inequality follows by the LHS of inequality (5) since it implies

$$
\begin{aligned}
h' + \delta W_0 - c &\geq \overline{\lambda}_{\overline{K}(h)} V + \left(1 - \overline{\lambda}_{\overline{K}(h)}\right)\delta W_{\overline{K}(h)+1}(h') \\
&\geq \overline{\lambda}_{\overline{K}(h)} V + \left(1 - \overline{\lambda}_{\overline{K}(h)}\right)\delta W_{\overline{K}(h)+1}(h),
\end{aligned}
$$

where the latter inequality is because $W_k(h') \geq W_k(h)$ for $k > \overline{K}(h)$. The result follows from equation (16), since $W_k$ is increasing in $W_{k+1}$ for all $k \leq \overline{K}(h')$. Thus we have that $W_0(h) \leq W_0(h')$, i.e., $W_0(h)$ is increasing in $h$.

The agent has an incentive to break a productive realtionship if $\frac{p}{1-\delta} < h + \delta W_0 - c$ and since the right-hand side of this inequality is increasing in $h$, the agent is more likely to reneg on a productive relationship if $h$ increases. ■

### A.6 Proof of Proposition 5

**Proposition.** *$W_0$ is incresing in $\overline{\lambda}_0$ in any direct relationship equilibrium. Thus, as $\overline{\lambda}_0$ increases the agent is more likely to break a productive relationship. Moreover, $W_0$ is not a function of the realized $\lambda$, hence it doesn't effect the likelihood of breaking a productive relationship.*

*Proof.* Theorem 1 establishes when a direct relationship equilibrium exists. We have that $\widehat{V}$ is increasing in $\overline{\lambda}_0$ since

$$
\frac{\partial \widehat{V}}{\partial \overline{\lambda}_0} = \frac{\mu\delta(1-\mu)(\mu(c+p) + h(1-\mu)(1-\mu\delta))}{(1-\delta)\left(1 - \delta\mu + \delta\mu^2\overline{\lambda}_0\right)^2} > 0.
$$

Thus, $V$ is weakly increasing in $\overline{\lambda}_0$, since $V = \max\left\{\frac{p}{1-\delta}, \widehat{V}\right\}$. Now, the condition for the existence of a direct relationship equilibrium in theorem 1 can be written as

$$
\frac{\upsilon}{1-\delta} \leq \frac{\mu\overline{\lambda}_0 V + (1-\mu)h - c/\delta}{1 - \delta\left(1 - \mu\overline{\lambda}_0\right)}.
$$

The derivative of the left-hand side with respect to $\overline{\lambda}_0$ is 0. The derivative of the right hand side is

$$\frac{\mu\left(V\left(1-\delta\right)-\delta\left(1-\mu\right)h\right)}{\left(\mu\delta\overline{\lambda}_0-\delta+1\right)^2}>\frac{\mu\left(V\left(1-\delta\right)-\delta\upsilon\right)}{\left(\mu\delta\overline{\lambda}_0-\delta+1\right)^2}>0,$$

where the last inequality follows since $V\geq p/\left(1-\delta\right)>\delta\upsilon/\left(1-\delta\right)$, where $p>\upsilon$ by assumption. As such a direct relationship equilibrium is more likely to exist if $\overline{\lambda}_0$ increases.

To see that in a direct relationship equilibrium $W_0$ increases $\overline{\lambda}_0$, fix $\underline{K}$ and $\overline{K}$ and consider equation (16). Since $\overline{\lambda}_k$ is increasing in $\overline{\lambda}_0$, we have that $W_k$ increases whenever $\overline{\lambda}_0$ increases for all $k$. Working backwards, this is true for all $k$ up to $W_0$, since $W_k$ is increasing in $W_{k+1}$ for all $k$. Now, notice that since $\overline{\lambda}_k$ is increasing in $\overline{\lambda}_0$, we have that $\underline{K}$ and $\overline{K}$ are also increasing in $\overline{\lambda}_0$, since inequalities (3) and (5) are going to hold for weakly larger $\underline{K}$ and $\overline{K}$ when $\overline{\lambda}_k$ increases. If a change in $\overline{\lambda}_0$ causes these values to increase, lemma 5 implies that $W_0$ is increasing in $\underline{K}$ and $\overline{K}$ and $W_0$ will only increase further in response to an increase in $\overline{\lambda}_0$. As such, $W_0$ is increasing in $\overline{\lambda}_0$.

From inequality (NB), an agent will not break a productive relationship if $\frac{p}{1-\delta}\geq h+\delta W_0-c$, but note that the RHS of this inequality is increasing in $\overline{\lambda}_0$, since $W_0$ is increasing in $\overline{\lambda}_0$, making it more likely that the agent will break a productive relationship when $\overline{\lambda}_0$ increases.

Theorem 1 shows that $\lambda$ only affects the likelihood of reaching a productive relationship, but not the decision to break a productive relationship. ■

### A.7 Proof of Proposition 7

**Proposition 12.** *For a sufficiently high $\delta$, a direct relationship equilibrium exists. Furthermore $W_0$ is incresing in $\delta$ in any direct relationship equilibrium.*

*Proof.* Theorem 1 gives the following inequality required for the existence of a direct relationship equilibrium

$$\begin{aligned} 0 &\leq \frac{\mu\overline{\lambda}_0V}{1-\delta\left(1-\mu\overline{\lambda}_0\right)}-\frac{\upsilon}{1-\delta}+\frac{\left(1-\mu\right)h-c/\delta}{1-\delta\left(1-\mu\overline{\lambda}_0\right)} \\ 0 &\leq \frac{\mu\overline{\lambda}_0V\left(1-\delta\right)-\upsilon\left(1-\delta\left(1-\mu\overline{\lambda}_0\right)\right)}{\left(1-\delta\right)\left(1-\delta\left(1-\mu\overline{\lambda}_0\right)\right)}+\frac{\left(1-\mu\right)h-c/\delta}{1-\delta\left(1-\mu\overline{\lambda}_0\right)}. \end{aligned}$$

Since $V = \max\left\{\frac{p}{1-\delta}, \widehat{V}\right\}$, it suffices to show that:

$$\begin{aligned}
0 &\leq \frac{\mu\overline{\lambda}_0 p - \upsilon\left(1-\delta\left(1-\mu\overline{\lambda}_0\right)\right)}{(1-\delta)\left(1-\delta\left(1-\mu\overline{\lambda}_0\right)\right)} + \frac{(1-\mu)\,h - c/\delta}{1-\delta\left(1-\mu\overline{\lambda}_0\right)} \\
0 &\leq \frac{\mu(\overline{\lambda}_0\,(p-\delta\upsilon) - \upsilon\,(1-\delta)}{(1-\delta)\left(1-\delta\left(1-\mu\overline{\lambda}_0\right)\right)} + \frac{(1-\mu)\,h - c/\delta}{1-\delta\left(1-\mu\overline{\lambda}_0\right)} \\
0 &\leq \frac{\mu\overline{\lambda}_0\,(p-\delta\upsilon)}{(1-\delta)\left(1-\delta\left(1-\mu\overline{\lambda}_0\right)\right)} + \frac{(1-\mu)\,h - \upsilon - c/\delta}{1-\delta\left(1-\mu\overline{\lambda}_0\right)} \\
0 &\leq \frac{\mu\overline{\lambda}_0\,(p-\delta\upsilon)}{(1-\delta)\left(1-\delta\left(1-\mu\overline{\lambda}_0\right)\right)} - \frac{\mu\ell + c/\delta}{1-\delta\left(1-\mu\overline{\lambda}_0\right)}.
\end{aligned}$$

Observe that as $\delta \to 1$, the first term on the RHS is positive (since $p > \upsilon$) and approaches infinity, while the second is finite. Thus, for $\delta$ larger than some $\underline{\delta}$ a direct relationship equilibrium exists.

To see that $W_0$ is increasing in $\delta$, from equation (16) note that $W_k$ is increasing in $\delta$ for all $k$, for a fixed $\underline{K}$ and $\overline{K}$. Note however that $\underline{K}$ and $\overline{K}$ may decrease in $\delta$. Again fix $W_0$ and working backwards, we have that for all $k > \underline{K}$, $W_k$ increases in $\delta$. Consider increasing $\delta$ to $\delta'$ and suppose that $\underline{K}(\delta') = \underline{K}(\delta) - 1$. We have that:

$$\begin{aligned}
W_{\underline{K}(\delta)}(\delta) &= \mu\left[\overline{\lambda}_{\underline{K}(\delta)} V(\delta) + \left(1-\overline{\lambda}_{\underline{K}(\delta)}\right)(\delta W_0 - c)\right] + (1-\mu)\,[h + \delta W_0 - c] \\
W_{\underline{K}(\delta)}(\delta') &= \mu\ell + (1-\mu)\,h + \delta' W_0 - c,
\end{aligned}$$

so that

$$\begin{aligned}
& W_{\underline{K}(\delta)}(\delta') - W_{\underline{K}(\delta)}(\delta) \\
= \;& \mu\ell + \delta' W_0 - c - \mu\left[\overline{\lambda}_{\underline{K}(\delta)} V(\delta) + \left(1-\overline{\lambda}_{\underline{K}(\delta)}\right)(\delta W_0 - c)\right] - (1-\mu)\,[\delta W_0 - c] \\
\geq \;& \mu\ell + \delta' W_0 - c - \mu\left[\overline{\lambda}_{\underline{K}(\delta)} V(\delta') + \left(1-\overline{\lambda}_{\underline{K}(\delta)}\right)(\delta' W_0 - c)\right] - (1-\mu)\,[\delta' W_0 - c] \\
= \;& \mu\left(\ell - \overline{\lambda}_{\underline{K}(\delta)}\,(V(\delta') - \delta' W_0 + c)\right) \geq 0,
\end{aligned}$$

where the second inequality follows since $V$ is increasing in $\delta$. to see the final inequality, observe that the LHS of inequality (3) for $\delta'$ gives that $\ell - \overline{\lambda}_{\underline{K}(\delta)}\,(V(\delta') - \delta' W_0 + c) \geq 0$. As such, the increase in $\delta$ results in an increase in $W_{\underline{K}}$ even if there is a decrease in $\underline{K}$. We can similarly show that for all $k < \underline{K}(\delta)$, $W_k(\delta') \geq W_k(\delta)$. Thus, we have that $W_0$ is increasing in $\delta$. ■

# B Additional Tables and Figures

## B.1 Tables

Differences in Attempts:

$$I[Attempt]_{s,t} = \zeta_t + \beta Domestic_s + X_{s,t} + \epsilon_{s,t} \tag{18}$$

Table A.1: Attempting New Relationships

| | I[Attempt] | | | | Number of Attempts | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| I[Domestic] | -0.124*** | -0.116** | -0.010 | 0.004 | -0.770*** | -0.686*** | -0.128 | -0.018 |
| | (0.045) | (0.047) | (0.028) | (0.029) | (0.244) | (0.263) | (0.162) | (0.174) |
| Model | Linear | | | | Poisson | | | |
| N | 4056 | 4056 | 4056 | 4056 | 3472 | 3472 | 3472 | 3472 |
| Seller Age | | Y | Y | Y | | Y | Y | Y |
| Seller Success History | | | Y | Y | | | Y | Y |
| Seller Last Year Direct Sales | | | | Y | | | | Y |
| Month x Year FE | Y | Y | Y | Y | Y | Y | Y | Y |

Table A.2: Differences in Quality

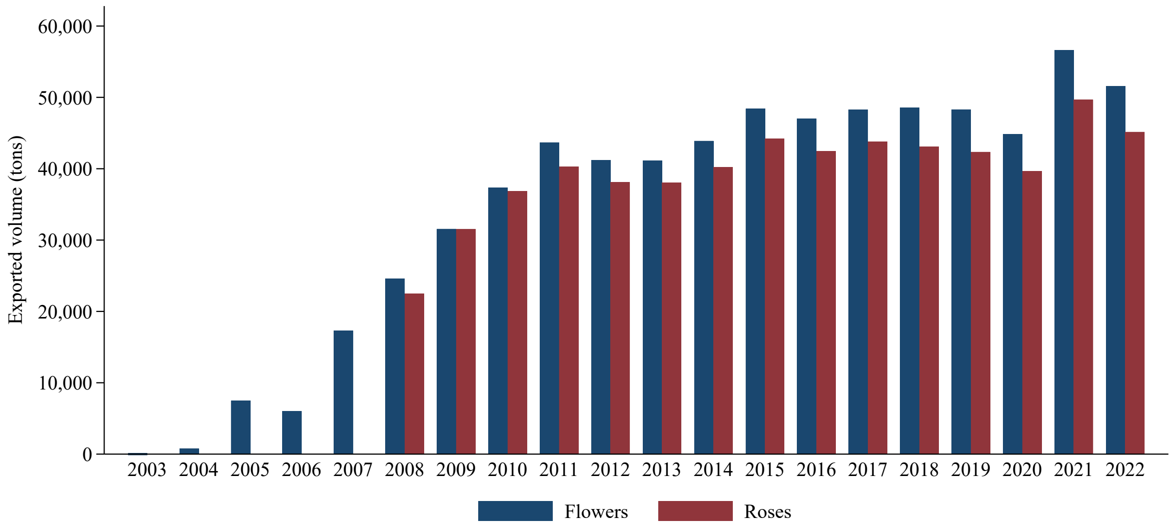
| | Dependent Variable: Ln Unit Weight | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | | | Direct | | | Auction | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| I[Domestic] | 0.0158 | 0.0188 | 0.0209 | 0.0967 | 0.0661 | 0.0640 | -0.0477 | -0.0163 | -0.0132 |
| | (0.0976) | (0.0890) | (0.0873) | (0.130) | (0.117) | (0.112) | (0.0883) | (0.0823) | (0.0815) |
| Observations | 144,271 | 144,271 | 144,271 | 81,873 | 81,873 | 81,873 | 62,398 | 62,398 | 62,398 |
| Season FE | | Y | | | Y | | | Y | |
| Month x Year FE | | | Y | | | Y | | | Y |

Table A.3: Clarity Components and Ending Relationships

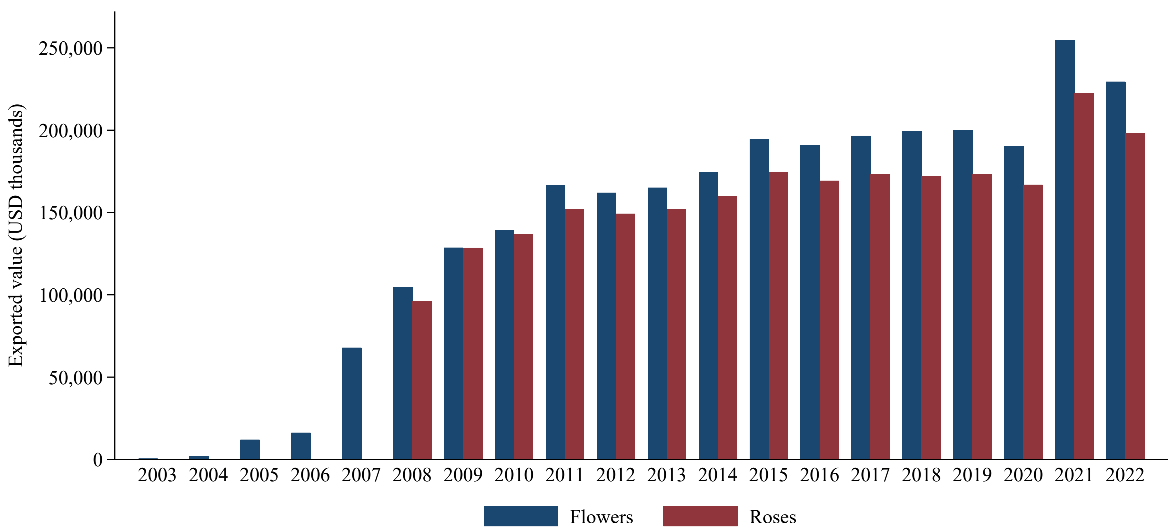
| Dependent Variable: | # Ending Relationships | | | I[At Least One] | | | % Ending Relationships | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Price Spread (Std) | 0.0278* | 0.0254* | 0.0254* | 0.0118 | 0.0129 | 0.0130 | 0.0045 | 0.0058 | 0.0058 |
| | (0.015) | (0.014) | (0.014) | (0.008) | (0.008) | (0.008) | (0.005) | (0.005) | (0.005) |
| Cumulative Buyer $(\bar{\lambda}_b)$ | 0.0065 | 0.0182 | 0.0181 | -0.0177 | -0.0231 | -0.0230 | -0.0076 | -0.0138 | -0.0135 |
| | (0.037) | (0.040) | (0.039) | (0.019) | (0.019) | (0.019) | (0.016) | (0.015) | (0.015) |
| Price Spread (Std) | -0.0336 | -0.0450 | -0.0450 | 0.0048 | 0.0101 | 0.0101 | -0.0003 | 0.0057 | 0.0057 |
| x Cumulative Buyer $(\bar{\lambda}_b)$ | (0.026) | (0.028) | (0.028) | (0.016) | (0.017) | (0.017) | (0.013) | (0.013) | (0.013) |
| Mean Dep. Var | 0.285 | 0.285 | 0.285 | 0.201 | 0.201 | 0.201 | 0.069 | 0.069 | 0.069 |
| Observations | 2367 | 2367 | 2367 | 2367 | 2367 | 2367 | 2367 | 2367 | 2367 |
| Control # Active Relationships | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Control % in Direct Transactions | | Y | Y | | Y | Y | | Y | Y |
| Control Domestic | | | Y | | | Y | | | Y |

Note: The table displays the estimation of Equations **??** using OLS. The sample includes all productive relationships (survived past the third shipment). Price Spread is calculated as the standardized difference between the average price at auctions and the average price in direct sales. A relationship ends if there are no more shipments observed between a buyer and a seller or if there are more than 9 months between two shipments. In Columns 1-3 the outcome is the number of relationships ending. In Columns 4-6 the outcome denotes a dummy that equals 1 if the seller had at least one relationship ending and zero otherwise. Columns 7-9 the outcomes is the share of relationships ending in the month. Standard errors in parentheses are clustered at the exporter level. The stars next to the estimate, *, **, ***, represent statistical significance at a .10, .05, and .01 level, respectively.

## B.2 Figures




a) Volume




b) Value

Figure A.1: Flowers Exports Ethiopia

Source: International Trade Center

Note: Panel a) illustrates the volume of exported flowers and roses, while panel b) delineates their respective values in US Dollars in yearly basis. Flowers, categorized under code 603, encompass cut flowers and flower buds suitable for bouquets or ornamental purposes, whether fresh, dried, dyed, bleached, impregnated, or otherwise prepared. Roses (code 60311) specifically denote fresh cut roses and buds suitable for bouquets or ornamental use. Data pertaining to roses is solely accessible from 2008 onwards.

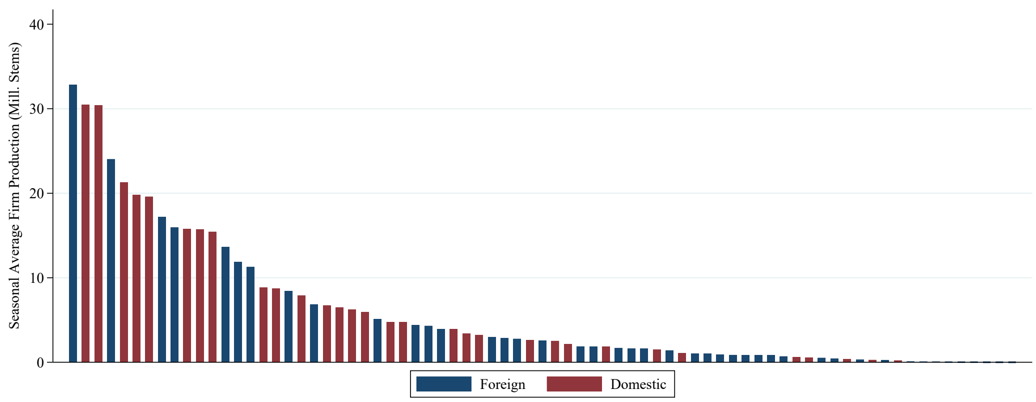



Figure A.2: Firm Production by Firm Type

Note: The figure depicts the seasonal average total firm production, ordered from largest to smallest, and indicates whether each firm is domestic or foreign. The values are expressed in millions of flower stems.