

# Institutional Foundations of Economic Stagnation in Primary-Commodities' Exporting Countries <sup>1</sup>

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*Abstract:* Research on secular trends in the terms of trade suggests that the aggregate terms of trade for primary commodities have faced a downward trend since at least the beginning of the twentieth century. In this paper, we use a two-sector general equilibrium model to explore the effects of primary commodities' terms of trade on the level of political support for the use of monopoly rights arrangements that impede economic progress in exporting countries. Our two-sector model incorporates the political economy of institutional change in the context of a small economy with a comparative advantage in the export of primary commodities. We show that poor terms of trade impede the ability of a country with such an economy to adopt better institutions.

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## 1. Introduction

Countries heavily dependent on primary commodities for export earnings are usually characterized by a surplus of labor and little use of productivity-enhancing intermediate goods in the production processes of these commodities. Most primary commodity exporters are located in Africa, Latin America and the Caribbean, as well as the Middle East. Primary commodities include, but are not restricted to, cash crops (e.g., cocoa, cotton, coffee) and natural resources (e.g., hardwood timber, oil and hard-rock minerals). One of the main debates pertaining to the economic prospects of these countries has centered on the issue of labor surplus absorption, opposing early 1950s' pre-structuralist classical development experts to their early 1960s structuralist counterparts who favored state intervention (e.g., Hans W. Singer 1950). With the failure of state-sponsored import-substitution industrialization favored by structuralists, the early 1990s saw a shift in balance, and a return to pre-structuralist development orthodoxy. An influential paper by Anne O. Krueger and Baran Tuncer (1982) sparked a neoclassical literature highlighting sound institutions and policies as catalysts of economic progress.

Yet a casual glance at cross-country measures of the quality of economic institutions such as those provided by The World Bank's *Doing Business* and *Transparency International* suggests that countries heavily dependent on exports of minimally processed primary commodities for income remain over-represented in the subset of countries with institutions and policies that impede their much needed structural transformation. Why are primary commodities exporting countries over-represented in the subset of countries with poor institutions and policies? Why can't they, like advanced industrialized countries, set up better policy and institutional environments? We suggest that the answer for these countries is that they face poor terms of trade for their exports.

Research on secular trends in the terms of trade suggests that the aggregate terms of trade for primary commodities have faced a downward trend since at least the beginning of the twentieth century (Andrew Powell 1991; Michael Bleaney and David Greenaway 1994; David Sapsford and V. N. Balasubramanyam 1994; Paul Cashin and C. John McDermott

2001; Jose Antonio Ocampo and Maria Angela Parra 2006). This observation, combined with research findings establishing a link between terms of trade and growth (e.g., William Easterly et al 1993; Enrique C. Mendoza 1997, Singer 1999) justify our focus on terms of trade. We establish a link between a country's reliance of primary commodities as a source of foreign exchange earnings, the terms of trade of these commodities, and the quality of its institutional and policy environment.

Imagine a small open economy consisting of two production sectors: a farm sector that produces and exports a cash crop (e.g., cocoa, coffee, hardwood timber) and an industrial sector that produces an intermediate good for the primary sector (e.g., fertilizers, pesticides, selected seeds). Suppose also that this economy uses foreign exchange earnings to pay for imports of a manufacturing good (e.g., drugs, vaccines, and other pharmaceutical and healthcare products that can boost healthcare outcomes in the society at large). Under balanced trade, the country's capacity to pay for its imports is limited by the value of its exports of the cash crop. More exports not only will boost standards of living through imports, but also initiate a structural transformation of farming, as the intermediate good substitute for labor in farming. Under a free enterprise institutional regime, a high demand for the intermediate good in turn will attract firms using more productive technologies to produce the intermediate good, creating more jobs in the industrial sector. As a result, the structural transformation of farming activities will be supported by technical progress in the industrial sector, bringing about improvements in standards of living. Why then isn't trade liberalization and free enterprise popular in countries that are heavy exporters of primary commodities?<sup>5</sup>

Suppose now that there are some non-state actors say, a coalition of households tied to firms operating a rudimentary technology in the industrial sector. Assume that these actors have the political leverage to induce state regulations that bar firms using a superior technology from entering the industrial sector. If such a coalition come to exist, it must

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<sup>5</sup>Keith Mardsen and Therese Belot (1987) reveal that some developing countries such as Guinea and Madagascar took measures to institutionalize free enterprise. But many other developing countries are yet to follow suit.

certainly be that the reward of membership (i.e., the market wage augmented by monopoly rents from having exclusive rights over the production of the intermediate good) outweighs the labor income each member would have secured under the free enterprise institutional regime. Otherwise, the coalition will not exist and free enterprise will be institutionalized. Hence the importance of the following question: from a household point of view, when does the economic reward from opposing free enterprise exceed the gain from institutionalizing it? Our two-sector general equilibrium model of institutional choice provides an answer to this question.

We use this model to look for sufficient conditions for the aggregate of households to reject monopoly-rights arrangements that impede the use of more productive technologies. For this purpose, we incorporate in this model the political economy of state protection of monopoly-rights arrangements. The main feature of this political economy is an institutional choice game involving households. The choice is between two institutional regimes: one is characterized by the use of monopoly-rights arrangements in the industrial sector and the other is a free enterprise regime. We assume that the structure of the industrial sector is determined by monopoly-rights arrangements if and only if (i) there are households who voluntarily enter the pool from which members of the coalition opposing free enterprise in the industrial sector are recruited, and (ii) the membership size of the coalition is high enough to give it sufficient political leverage. Such political leverage is formalized, for example, by the state decision to impose regulations that bar firms using superior production methods from entering the industrial sector, as in Stephen L. Parente and Edwards C. Prescott (1999). In that sense, a coalition membership size is a measure both of its political leverage and thus and of the size of barriers to entry in the industrial sector.

The institutional choice game involves three stages. In the first stage, each household decides non-cooperatively whether or not to enter the pool of households from which members of the coalition that opposes free enterprise (respectively favour the use of monopoly-rights arrangements) in the industrial sector are recruited. In the second stage, the coalition

and a potential entrant using a superior technology play an entry-deterrence game. At this stage the coalition must decide how many households to recruit from the pool in order to successfully deter entry by the potential entrant. The potential entrant must then decide whether or not to expend its resources to break the coalition's resistance to free enterprise. In the third and final stage, a two-player Cournot game ensues between the coalition and the new entrant, provided entry occurred earlier in the second stage. We require that the Nash equilibrium of this institutional choice game be sub-game perfect. We derive necessary and sufficient conditions for the economy to reject the use of monopoly-rights arrangements in the industrial sector. We show that there exists a threshold for the primary commodity's terms of trade: above this threshold, there is no political support for the use of monopoly-rights arrangements in the industrial sector, because free enterprise guarantees better economic prospects to all households through both technical progress in the industrial sector and structural transformation of the farm sector. However, below this threshold, all households *ex ante* support the use of monopoly-rights arrangements in the industrial sector, because terms of trade for the primary commodity are too poor to substantially raise households' economic prospects under a free enterprise regime, thus making the lure of monopoly rents attractive to them.

This research contributes to two branches of the development literature, namely the literature on trade and development and the literature on institutions and development. With respect to the trade and development literature, we join Singer (1950), Prebisch (1950), Krueger and Tuncer (1982), Ronald Findlay and Henryk Kierzkowski (1983), Kiminori Matsuyama (1992), Nancy L. Stokey (1996), Filippo Cartiglia (1997), Theo S. Echers (1999), Priya Ranjan (2001), José Antonio Ocampo and Maria Angela Parra (2006), Cristina Echevarria (2008), and Sylvain Dessy, Flaubert Mbiokop, and Stéphane Pallage (2009) in exploring the relative virtues of encouraging developing countries to specialize in primary commodities versus manufactures as a development strategy. This literature can be divided in two groups. One group includes authors who are either pessimistic or completely opposed to the idea of basing a country's economic development strategy

on its specialization in primary commodities (Singer 1950; Prebisch 1950; Findlay and Kierzkowski 1983; Matsuyama 1992; Stokey 1996; Ocampo and Parra 2006). The other includes authors who are optimistic about the success of this approach to development (Cartiglia 1997; Echers 1999; Ranjan 2001; Echevarria 2008; Dessy, Mbiekop, and Pallage 2009). We contribute to this strand of the trade and development literature by linking terms of trade of primary commodities to the emergence of coalitions of non-state actors with vested interest in opposing the adoption of growth-enhancing institutions and policies. Like the first group of authors, and unlike the second, we question the wisdom of a development strategy emphasizing heavy reliance on exports of primary products. Moreover, previous works do not model the causes of developing countries' reluctance to liberalize their trade. We fill this knowledge gap by endogenizing trade policy, through the political economy of policy and institutional change.

Finally, our paper also makes a contribution to the literature on institutions and development including contributions by Parente and Prescott (1999), Daron Acemoglu and James A. Robinson (2000), Jean-Marie Baland and Patrick François (2002), Pedro C. Vicente (2006), Robinson, Ragnar Torvik and Thierry Verdier (2006). Parente and Prescott (1999) highlight poor countries' inability to institutionalize free enterprise as the main barrier their long term economic prosperity. In their model opposition to free enterprise come from non-state agents with a vested economic interest in maintaining the use of less productive technologies. Acemoglu and Robinson (2000), by contrast, argue that barriers to the institutionalization of free enterprise are the result of political leverage by non-state agents who face a political loss from the institutionalization of free enterprise. Both these works treats gains (or losses) from opposing institutionalization of free enterprise as exogenous. Baland and François (2002), Vicente (2006), and Robinson, Torvik and Verdier (2006) all endogenize gains from opposing the use of better institutions in a resource-rich country. Their resource-curse mechanism emphasizes direct state monopoly over the extraction and trade of the primary, thus highlighting political incentives as the foundation of the curse. Like this second group of authors, we endogenize the rewards from opposing

better institutions and policies, but focus on economic (as opposed to political) incentives.

The remainder of this paper is structured as follows. Section 2 gives an overview of the model. Section 3 presents a discussion of this model under a free enterprise institutional regime, while section 4 provides a discussion under institutionalization monopoly-rights arrangements. Concluding remarks are presented in section 5. Section 6 contains proofs of the main results of the model.

## 2. Overview of the Analysis

In this section we lay out the structure of the economy. Consider a small open economy with three sectors: a farm sector, an industrial sector, and a household sector. The farm sector produces a cash crop solely for exporting. The industrial sector produces an intermediate good used as input in the farm sector. The household sector is composed of a continuum one of ex ante homogenous households. A household is a labor supplier, endowed with one unit of labor, and  $a$  units of a food staple. The staple food and a composite imported manufacturing good are the only consumption goods in this environment. The imported composite good includes, but is not restricted to, vaccines, drugs, and other pharmaceutical products which developing countries often import from developed countries. We take the imported good as the numeraire, and measure all other prices in units of this numeraire.

While the farm sector is perfectly competitive, the structure of the industrial sector, by contrast, is endogenous to households' choice of the institutional regime underlying entry in this sector. Each household derives income from the sale of his labor either to farmers or to firms in the industrial sector, or from being part of a group of entrepreneurs with protected monopoly rights over the use of a particular technology in the industrial sector, when the institutional regime permits it. There are two possible technologies for producing the intermediate good in this environment, namely  $\pi_0$  and  $\pi_1$ , with  $\pi_1 > \pi_0$ . The initial state of the economy is characterized by the use of  $\pi_0$  in the industrial sector, so that entrepreneurs using this technology may have a vested interest in erecting barriers to entry by rivals using the superior technology  $\pi_1$ . This incentive has implication for the structure

of the industrial sector. We assume that when barriers to entry exists, they are erected through entrepreneurs' employment of protected monopoly-rights arrangements.

Let  $I_r \in \{0, 1\}$  denote a scale operator that takes the value  $I_r = 0$  if the institutional regime is characterized by state protection of monopoly-rights arrangements (hereafter MRAs) in the industrial sector, and  $I_r = 1$ , if it is characterized by free enterprise (hereafter FE) instead. Henceforth, all variables with a superscript (\*) denote variable under FE, and all others are variables under MRA.

## 2.1. The Industrial Sector

The industrial sector produces an intermediate good for the farm sector (e.g., fertilizers, pesticides, selected seeds, or light machinery). Production in the industrial sector takes place using labor only, given the technology  $\pi_i$  available to firms,  $i = 0, 1, \dots$ . Assume that there are only two possible technologies for producing the intermediate good namely,  $\pi_0$  and  $\pi_1$ , with  $\pi_1 > \pi_0$ . Total output by the representative firm using technology  $\pi_i$  is

$$Q_x^i = \pi_i N_x^i \tag{2.1}$$

where  $N_x^i \in [0, 1]$  denotes total labor used by the representative firm of type  $i$ , where

$$\sum_{i=0,1} N_x^i \leq N_x.$$

Under the MRA, the coalition, when it exists, will strategically choose its membership size to deter entry by any firm endowed with a superior technology  $\pi_1 > \pi_0$ . If entry occurs nevertheless, the industrial sector will be a duopoly with aggregate output of the intermediate good given by:

$$Q_x = \pi_0 N_x^0 + \pi_1 N_x^1. \tag{2.2}$$

Assuming that firms in this sector pay the farm sector wage  $\omega$ , the profit of a representative

firm of type  $i$  thus is

$$\Pi_i = p_x \pi_i N_x^i - \omega N_x^i, \quad (2.3)$$

where  $p_x$  denotes the price of the intermediate good in units of the imported good. If entry is deterred, then the industrial organization will be a monopoly, with total supply of the industrial good given by

$$Q_x = \pi_0 N_x, \quad (2.4)$$

and the monopolist profit will be given by

$$\Pi_0 = p_x \pi_0 N_x - \omega N_x. \quad (2.5)$$

We assume that this profit is equally shared between members of the coalition, so that the per capita monopoly rent  $r_c$  accrued to members is

$$r_c = \frac{\Pi_0}{N_x}, \quad (2.6)$$

where  $N_x$  denotes the membership size of the coalition of households opposing free enterprise in the industrial sector.

By contrast, under FE, we assume that perfect competition will drive away low-technology firms, so that aggregate output will be given by

$$Q_x^* = \pi_1 N_x^*, \quad (2.7)$$

where  $N_x^*$  is a measure of the size of the industrial sector under FE. The zero-profit condition under FE will thus generate the following pricing rule for labor services used:

$$\omega^* = p_x^* \pi_1. \quad (2.8)$$

## 2.2. The Farm Sector

Firms in the farm sector are perfectly competitive. They combine the intermediate good ( $X_a$ ) and labor ( $N_a$ ) to produce  $A$  units of the cash crop according to a CES technology given by

$$A = [\psi X_a^\rho + (1 - \psi) N_a^\rho]^{1/\rho}, \quad (2.9)$$

where  $\rho > 0$  denotes the elasticity of substitution between the two factors, and  $\psi \in (0, 1)$ , the factor share parameter.

Let  $p_a$  denote the export price for the cash crop measured in units of the imported good. Under the small-open economy assumption,  $p_a$  is exogenous and can be interpreted as the terms of trade of the cash crop. Profit-maximization by perfectly competitive firms yields the following factor pricing rules:

$$\omega = (1 - \psi) p_a \left( \frac{A}{N_a} \right)^{1-\rho} \quad (2.10)$$

$$P(I_r) = p_a \psi \left( \frac{A}{X_a} \right)^{1-\rho}, \quad (2.11)$$

where  $P(I_r) \equiv I_r p_x^* + (1 - I_r) p_x$ , and  $I_r$  is the indicator of the existing institutional regime underlying firms' entry in the industrial sector. Resource constraints in the farm sector are the following:

$$N_a \leq 1 - (1 - I_r) N_x + I_r N_x^* \quad (2.12)$$

$$X_a \leq (1 - I_r) Q_x + I_r Q_x^*. \quad (2.13)$$

Under market-clearing, the inverse demand function for the intermediate good is given by

$$P(I_r) = p_a \psi \left[ \frac{A}{(1 - I_r) Q_x + I_r Q_x^*} \right]^{1-\rho}. \quad (2.14)$$

### 2.3. The Household Sector

Each household's has preferences over a food staple and an imported good  $m$ . The utility ( $u$ ) representing these preferences is additively separable in both goods:

$$u = f + \gamma m, \quad \gamma > 0 \quad (2.15)$$

where  $\gamma > 0$  denotes the common utility weigh households assign to the imported good.

A household's earned income depends on whether or not (i) a coalition with protected monopoly rights exists, and (2) whether or not he is a member of this coalition. Let  $y_c$  denote the income of a coalition member,  $y_a$ , the income of a non-member, and  $y^*$ , the income of a typical household under free enterprise. Let  $I_c \in \{0, 1\}$  denote a scale operator that takes the value  $I_c = 0$  if a household is a member of the coalition, and  $I_c = 1$  if not. Each household's budget constraint thus is given by:

$$m \leq y(I_c, I_r), \quad (2.16)$$

where

$$y(I_c, I_r) = (1 - I_r) [y_a I_c + (1 - I_c) y_c] + y^* I_r, \quad (2.17)$$

$$y_c = \omega + r_c \quad (2.18)$$

$$y_a = \omega \quad (2.19)$$

$$y^* = \omega^*; \quad (2.20)$$

$\omega$  and  $\omega^*$ , are the labor wages under MRA and FE respectively, and  $r_c$ , the per capita coalition rent under MRA, conditional on being a member of the coalition opposing free enterprise in the industrial sector.

Given  $(I_c, I_r)$ , we can therefore write a typical household's indirect utility level as

follows, using (2.15) and (2.16):

$$V(I_c, I_r) = a + \gamma y(I_c, I_r). \quad (2.21)$$

We assume that households are forward-looking: they decide on whether or not to enter the pool from which members of the coalition are recruited by balancing the utility of being recruited as a member of the coalition against the utility of being a wage-earner when the institutional regime is FE. If households decide not to enter the pool, there would be no MRAs and the institutional regime will be FE.

Denote as  $\vartheta(I_c) \equiv V(1, I_c) - V(0, I_c)$  the net gain to a household with status  $I_c \in \{0, 1\}$  from supporting institutionalization of free enterprise. From (2.21), substituting in (2.18) and (2.20), we can write a household's net gain from not entering the pool as follows:

$$\vartheta(0) = (\omega^* - \omega + r_c)\gamma, \quad (2.22)$$

where  $r_c$  is as defined in (2.6). In other words,  $\vartheta(0)$  is the net gain from opposing the use of MRAs in the industrial sector. Thus  $\vartheta(0) < 0$  is necessary for MRAs to be institutionalized in the industrial sector, while  $\vartheta(0) \geq 0$  is sufficient for FE to be institutionalized. We want to derive sufficient condition for  $\vartheta(0)$  to be positive (respectively, negative). For this purpose, we must compute  $\omega^*$ ,  $\omega$ , and  $r_c$ . We take a general equilibrium approach to characterizing these variables. We begin with the determination of  $\omega^*$ , which is the labor wage under FE.

### 3. Equilibrium under FE

In this section, we define and characterize a general equilibrium for this two sector-economy under FE. In other words,  $I_r = 1$ . In this context, both the farm sector and the industrial sector are perfectly competitive. Therefore, in the industrial sector, surviving firms are those using the superior technology  $\pi_1$ , so that total output is given by (2.7).

Perfect competition will wipe out all rents and thus all households will earn the same

wage regardless of their sector of employment. Therefore combining (2.10) with (2.8) yields the following equilibrium wage equalization condition:

$$\omega^* = (1 - \psi) p_a \left( \frac{A}{N_a} \right)^{1-\rho} = p_x^* \pi_1. \quad (3.1)$$

Furthermore, all households will enjoy the same level of consumption of the imported good, which, from the budget constraint in (2.16), is given by  $m = y^* = p_x^* \pi_1$ . Under balanced trade, imports of the manufacturing good must be paid for by exports of the cash crop. In other words, the following trade-balance condition must be met in equilibrium

$$p_a A = p_x^* \pi_1. \quad (3.2)$$

In addition, the market for the intermediate good must clear in equilibrium:

$$X_a = Q_x. \quad (3.3)$$

Given these equilibrium conditions as well as those pertaining to firms' choice of inputs, proving the existence and unicity of a general equilibrium under FE essentially amounts to proving that there exists a unique relative price  $p_x^*$  that clears the intermediate good market. We therefore prove the following proposition in the Appendix section.

**Proposition 1.** *Under an FE institutional regime, a general equilibrium exists and is unique:*

$$p_x^* = \left( \psi^{\frac{1}{1-\rho}} + \left[ \frac{(1-\psi)}{\pi_1^\rho} \right]^{\frac{1}{1-\rho}} \right)^{(1-\rho)/\rho} p_a, \quad (3.4)$$

where  $p_a$  denotes the terms of trade for the cash crop.

As an implication of Proposition 1, we use the equation  $\omega^* = p_x^* \pi_1$  in combination with (2.22) to obtain the net gain from opposing the use of MRAs (alternatively, supporting the

institutionalization of FE) as follows:

$$\vartheta(0) = \left[ \left( \psi^{\frac{1}{1-\rho}} + \left[ \frac{(1-\psi)}{\pi_1^\rho} \right]^{\frac{1}{1-\rho}} \right)^{(1-\rho)/\rho} p_a \pi_1 - \omega - r_c \right] \gamma. \quad (3.5)$$

To obtain a complete characterization of this net gain, it remains to compute  $\omega$  and  $r_c$ . We begin with the computation of  $r_c$  given  $\omega$ .

#### 4. The Institutional Choice Game

Recall that under the MRA regime, a coalition of households uses its political leverage to obtain protected monopoly rights tied to the use of the inferior technology  $\pi_0$  by all firms in the industrial sector. This coalition recruits its members among households—the labor suppliers. Therefore a necessary condition for such coalition to exist is that at least some households be willing to join the pool from which its members are recruited. From the viewpoint of a household considering whether or not to join the pool, we stated above that the incentive to join comes from the fact that there is a reward for being a member of the coalition that opposes free enterprise in the industrial sector. This reward is the market wage augmented by monopoly rents from having protected monopoly rights ( $\omega + r_c$ ). However, each household also knows that absent the monopoly-rights arrangement that bars firms operating a superior technology from entering the industrial sector, free enterprise will lead to the adoption of more productive technologies, causing workers to earn better wages. In other words, while being a member of coalition opposing free enterprise in the industrial sector brings rewards, it also has an opportunity cost measured by the forgone utility from being a worker in an economy with an FE institutional regime which enhances technical progress in the industrial sector as well as structural transformation of the farming sector. We argued in that context, that whether or not an equilibrium with MRA exists depends on whether (i) there are households willing to enter the pool from which members of the coalition looking to secure monopoly rights tied to the use of a rudimentary technology  $\pi_0$ , and (ii) the number  $N_x$  of those recruited as members is high

enough to deter entry by a group using a superior technology. This latter condition implies a strategic game between the coalition and a potential competitor in the industrial sector. This game involves in three stages. In the first stage (referred to as the coalition game), each household decides non-cooperatively whether or not to enter the pool of households from which members of the coalition that opposes free enterprise in the industrial sector will be recruited. In the second stage game (referred to as the entry-deterrence game), the coalition decides on membership size  $N_x$  by randomly selecting members from the pool. At this same stage, the potential entrant must decide whether or not to allocate a level of resource  $\phi N_x$  to breaking the coalition's resistance to free enterprise. In the third and final stage, a two-player Cournot game ensues between the coalition and the new entrant, provided entry occurred earlier in the second stage. We require that the Nash equilibrium of this institutional choice game be subgame perfect. Therefore the game is solved by backward induction, beginning with the post-entry game.

#### 4.1. The Post-Entry Stage

This game is played in the third and final stage between the coalition and the new entrant, when entry occurred in the second stage. In this game the players are the coalition members and the new entrant. A player's payoff under Cournot competition is given by (2.3), where  $p_x$  is given by (2.14).

Using (2.1) and (2.14), we can thus write the payoffs of both players as follows:

$$\Pi_0(Q_x^0; Q_x^1) = \left[ \left( \frac{A}{Q_x^0 + Q_x^1} \right)^{1-\rho} \psi p_a - \omega \pi_0^{-1} \right] Q_x^0, \quad (4.1)$$

for the coalition, and

$$\Pi_1(Q_x^1; Q_x^0) = \left[ \left( \frac{A}{Q_x^0 + Q_x^1} \right)^{1-\rho} \psi p_a - \omega \pi_1^{-1} \right] Q_x^1 \quad (4.2)$$

for the new entrant. The new entrant's best response to the coalition's choice of output

level  $Q_x^0$  thus is

$$B(Q_x^0) = \arg \max_{Q_x^1} \Pi_1(Q_x^1; Q_x^0). \quad (4.3)$$

In other words, using (4.2), it can be shown that  $B(Q_x^0)$  is the value of  $N_x^1$  that equates the marginal revenue of the new entrant to his marginal cost:

$$\left( \frac{A}{Q_x^0 + B(Q_x^0)} \right)^{1-\rho} \psi p_a \pi_1 \left[ \frac{(1-\rho) Q_x^0}{Q_x^0 + B(Q_x^0)} + \rho \right] \equiv \omega. \quad (4.4)$$

Given  $(A, \omega)$ , and using (2.1), we can re-write the potential entrant best response as follows, by solving Eq. (4.4):

$$\bar{B}(N_x^0) = \frac{\psi}{2(1-\rho)\omega} \left[ \rho + \left( \rho + \frac{4(1-\rho)\pi_0\omega}{\psi\pi_1} \right)^{1/2} \right] N_x^0. \quad (4.5)$$

where  $\bar{B}(N_x^0) \equiv B(Q_x^0)$  and  $Q_x^0 = \pi_0 N_x^0$ .

On the basis of (4.5), we can also re-write the new entrant's duopoly profit as follows using (4.2):

$$\bar{\Pi}_1(N_x^0) = \left[ \left( \frac{A}{\pi_0 N_x^0 + \pi_1 \bar{B}(N_x^0)} \right)^{1-\rho} \psi \pi_1 p_a - \omega \right] \bar{B}(N_x^0), \quad (4.6)$$

where  $\bar{\Pi}_1(N_x^0) \equiv \Pi_1[\bar{B}(N_x^0); \pi_0 N_x^0]$ . Expression (4.6) will prove useful for solving the second stage game.

## 4.2. Entry-deterrence Stage

In this stage, the game is again played between the coalition and the potential entrant. Since the potential entrant must incur a cost  $\phi N_x^0$  to break the coalition's opposition to free entry in the industrial sector, in this stage of the game, expression (4.6) above gives the coalition all the information it needs to have about how the potential entrant will react to its choice of membership size  $N_x^0$ . Indeed, entry is effectively deterred if and only if  $\bar{\Pi}_1(N_x^0) \leq \phi N_x^0$ . Any choice of membership size  $N_x^0 = N_x$  that satisfies this

weak inequality will effectively deter entry, and the coalition knows that the potential entrant knows that. Therefore, the coalition can successfully deter entry by choosing its membership size  $N_x^0 = N_x$  such that

$$\bar{\Pi}_1(N_x) = \phi N_x. \quad (4.7)$$

We refer to  $N_x$  as the optimal coalition size. We then use (4.5) to prove the following proposition in the Appendix section.

**Proposition 2.** *Given  $(A, \omega)$ , the optimal coalition membership size is given by*

$$N_x = \left[ \frac{(\pi_0 + \rho\pi_1\lambda)}{(\pi_0 + \pi_1\lambda)^{2-\rho}} \frac{\psi p_a \pi_1}{\omega} \right]^{1/(1-\rho)} A. \quad (4.8)$$

Clearly, the optimal coalition membership size is smaller the higher the farm sector wage  $\omega$ :

$$\frac{\partial N_x}{\partial \omega} < 0.$$

A higher agricultural wage makes it harder for the new entrant to profitably hire labor, thus reducing the minimum coalition membership size needed for entry of a rival firm into the industrial sector to be successfully deterred. As an implication of Proposition 2, we prove the following result in the Appendix section:

**Proposition 3.** *Given  $\omega$ , the level of per capita monopoly rent  $r_c$  is given by*

$$r_c = \left( \frac{\phi^3 \pi_1}{\omega \pi_0} \right)^{1/2} - \left( \frac{\pi_1 - \pi_0}{\pi_1} \right) \omega. \quad (4.9)$$

Again, from (3.5), substituting (4.9), yields the net gain from opposing the use of MRAs in the industrial sector as follows:

$$\vartheta(0) = \left[ \left( \psi^{\frac{1}{1-\rho}} + \left[ \frac{(1-\psi)}{\pi_1^\rho} \right]^{\frac{1}{1-\rho}} \right)^{(1-\rho)/\rho} p_a \pi_1 - \frac{\pi_0}{\pi_1} \omega - \phi \left( \frac{\phi \pi_1}{\omega \pi_0} \right)^{1/2} \right] \gamma \quad (4.10)$$

To complete the characterization of this net gain, it therefore remains to determine the equilibrium level of  $\omega$  under the MRA institutional regime.

### 4.3. Existence of an Equilibrium under MRA

Let  $N_x$  denote the membership size of the coalition that successfully deters entry in the industrial sector by competitors using the superior technology  $\pi_1$ . Since entry is deterred under MRA, the level of production of the intermediate good is  $Q_x = \pi_0 N_x = X_a$ . Since  $N_a = 1 - N_x$  in equilibrium, we have that total cash crop production solves the following equation:

$$A = [\psi (\pi_0 N_x)^\rho + (1 - \psi) (1 - N_x)^\rho]^{1/\rho}. \quad (4.11)$$

where  $N_x$  is an increasing function of  $A$ , given  $\omega$ , as can be seen from (4.8). Let  $\Lambda(\omega)$  be the value of  $A$  that solves Eq.(4.11). Then substituting it into (4.8), using (2.10), yields the equilibrium farm sector wage as a solution to the following equation:

$$\omega = p_a \psi \left( \frac{\Lambda(\omega)}{1 - N(\omega)} \right)^{1-\rho}, \quad (4.12)$$

where  $N(\omega)$  is the value of  $N_x$  as specified in (4.8) and evaluated at  $A = \Lambda(\omega)$ . Given  $\omega$ , the relative price of the intermediate good will then be obtained as follows:

$$p_x = p_a \psi \left( \frac{\Lambda(\omega)}{\pi_0 N(\omega)} \right)^{1-\rho}.$$

Therefore, a general equilibrium under MRA exists if and only if Eq.(4.11) admits at least one solution. Clearly an equilibrium exists, although given the non-linearity of this equation, a multiplicity of equilibria cannot be ruled out. Fig.1 below illustrate the unicity of the equilibrium coalition membership size  $N_x$ . Numerical values used for this simulation

are presented in Table 1 also below.

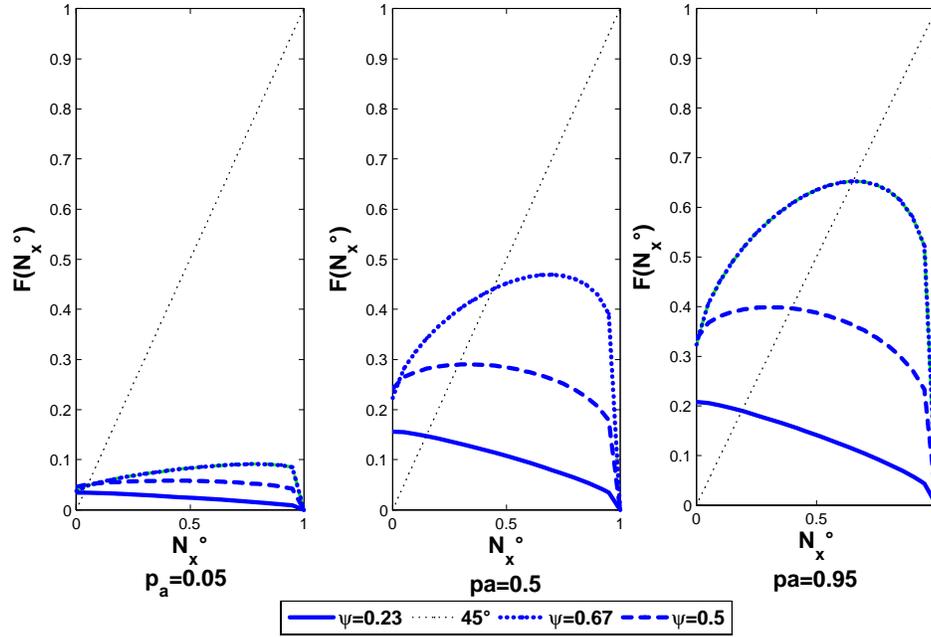


Fig. 1. Existence of an Equilibrium under MRAs

In Fig.1, the equilibrium coalition's membership size is obtained as a fixed point, for various level of the cash crop's terms of trade  $p_a$ , and three different values for the share of the intermediate good in the farm sector output  $\psi$ . Clearly, as terms of trade for the cash crop improve it takes a higher memberships size in order to effectively block entry of superior competitors in the industrial sector. The same is true for the share of the intermediate good in the farm sector output.

#### 4.4. The Coalition Game

This game corresponds to the first stage of the institutional choice game. Players in this non-cooperative game are households. Each household has a binary strategy set: he must decide whether or not to enter the pool from which coalition members are recruited. Entering this pool can be interpreted as political support to the use of MRAs in the industrial sector, while not entering is be interpreted as opposing MRAs (alternatively supporting institutionalization of FE).

From (4.12), we know that any equilibrium farm sector wage will be given by  $\omega = W(p_a)$ . As a result, from (4.10), substituting in  $\omega = W(p_a)$  yields the net gain from opposing the use of MRAs in the industrial sector solely as a function of the terms of trade for the cash crop  $p_a$ :

$$\bar{v}(p_a) = \left[ \left( \psi^{\frac{1}{1-\rho}} + \left[ \frac{(1-\psi)}{\pi_1^\rho} \right]^{\frac{1}{1-\rho}} \right)^{(1-\rho)/\rho} p_a \pi_1 - \frac{\pi_0}{\pi_1} W(p_a) - \phi \left( \frac{\phi \pi_1}{W(p_a) \pi_0} \right)^{1/2} \right] \gamma. \quad (4.13)$$

Likewise, we obtain the equilibrium coalition membership size solely as a function of the terms of trade for the cash crop  $p_a$  by substituting  $\omega$  by its value in (4.8):

$$\bar{N}(p_a) = \left[ \frac{(\pi_0 + \rho \pi_1 \lambda) \psi p_a \pi_1}{(\pi_0 + \pi_1 \lambda)^{2-\rho} W(p_a)} \right]^{1/(1-\rho)} \Lambda [W(p_a)]. \quad (4.14)$$

Finally, we obtain the per capita rent accrued to each member by substituting  $\omega$  by his value in (4.9):

$$R(p_a) = \left[ \frac{\phi^3 \pi_1}{W(p_a) \pi_0} \right]^{1/2} - \left( \frac{\pi_1 - \pi_0}{\pi_1} \right) W(p_a). \quad (4.15)$$

To illustrate the effects of the terms of trade for the cash crop, we simulate the model using numerical values derived from Parente and Prescott (1999), except for  $\psi$ , the intermediate good share in farm output. For this parameter, we consider three possible values:  $\psi \in \{0.23, 0.5, 0.67\}$ . The first of these three values (i.e., 0.23) is derived from Parente and Prescott (1999) and implies a relatively smaller share for the intermediate good. The value of all parameters is summarized in the table 1 below:

Table 1. Numerical values for relevant parameters		
Preference parameters	Industrial sector parameters	Farm sector parameters
$\gamma = 0.169$	$\pi_0 = 1.00$	$\psi \in \{0.23, 0.5, 0.67\}$
	$\pi_1 = 3.00$	$\rho = 0.71$
	$\phi = 0.14$	

Counterfactual simulations thus yields a number of effects associated with a secular change in terms of trade.

#### 4.4.1. The Effects of Terms of Trade on Coalition Membership Size

In this subsection, we illustrate the effect a secular change in terms of trade has on the optimal coalition membership size. Fig.2 below is obtained by plotting expression (4.14) as a function of the terms of trade for the cash crop  $p_a$ .

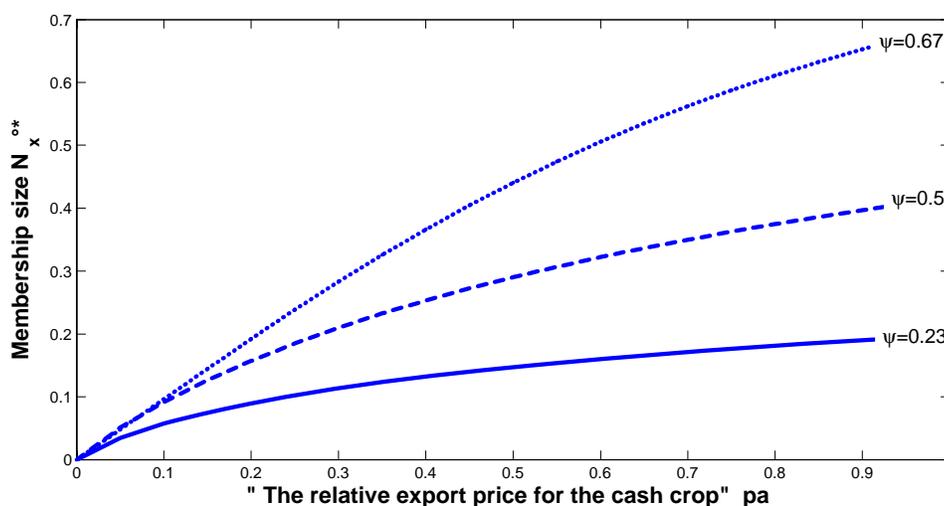


Fig. 2. Effects of terms of trade on the coalition's membership size

Fig.2 suggests that improvements in the terms of trade for the cash crop tends to raise the minimum number of coalition members needed to provide the coalition with effective political leverage to obtain protected monopoly rights. Since coalition members must share the total monopoly rents, unless these rents increases with an increase in membership size, per capita rents will decrease, thus reducing the incentive to join the coalition.

#### 4.4.2. The Effects of Terms of Trade on Per Capita Monopoly Rents

Fig.3 below is obtained by plotting expression (4.9) as a function of the terms of trade for the cash crop.

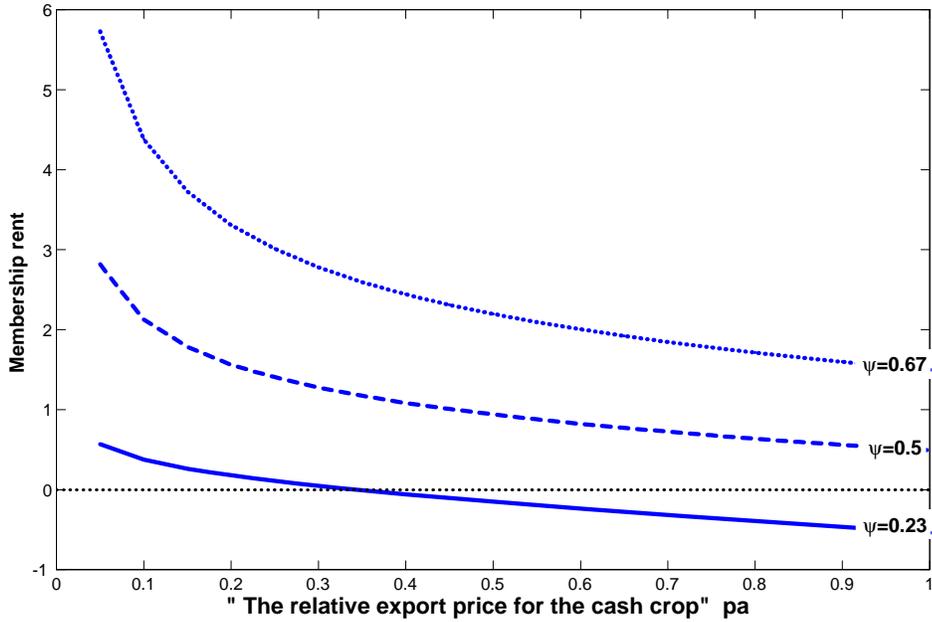


Fig. 3. Effect of terms of trade on the per capita coalition rent

Fig.3 shows that per capita rents decreases with improvements in the terms of trade for the cash crop. This decline is a direct implication of the positive effect an improvements in the terms of trade has on the optimal coalition membership size as illustrated in Fig.2 above.

#### 4.4.3. The Effects of Terms of Trade on The Net Gain From Opposing MRAs

Fig.4 below is obtained by plotting expression (4.13). It shows that there exists a threshold level for the terms of trade above which the net gain from opposing the MRAs is positive. Above this threshold, there is no political support for the use of MRAs in the industrial sector, because free enterprise guarantees better economic prospects through technical progress in the industrial sector as well as structural transformation of the farm sector.

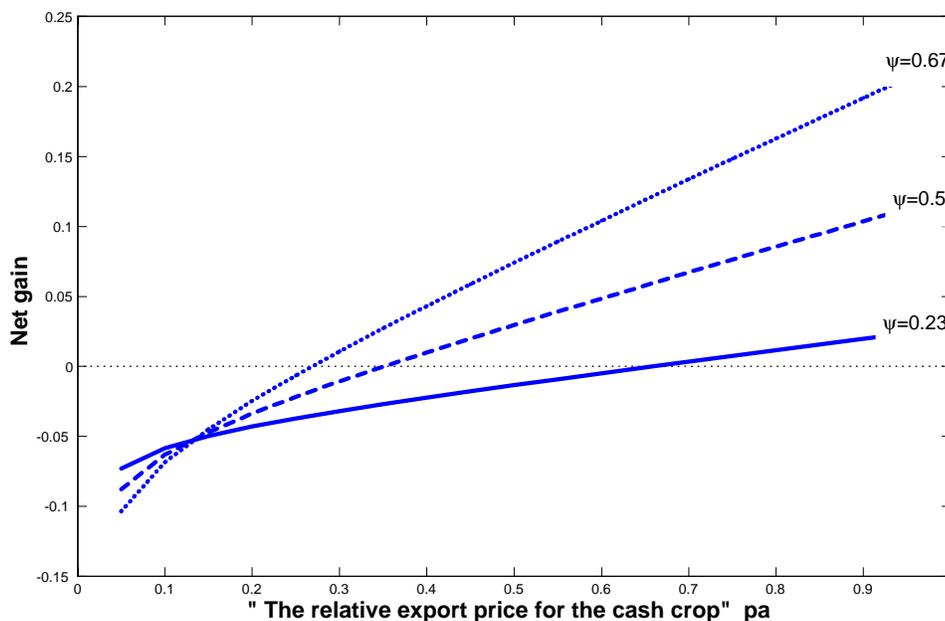


Fig. 4. Effect of Terms of Trade on the Net Gain From Opposing MRAs

However, below this threshold, all households will, ex ante, support the use of MRAs in the industrial sector, because terms of trade for cash crop are too poor to substantially raise households' economic prospects, thus making the lure of monopoly rents attractive them.

Furthermore, given the terms of trade, political support for MRAs is higher, the lower the share of the intermediate good in the farm sector output. A lower share of the intermediate good in the farm sector output reduces the magnitude of the trade-induced structural transformation of the farm sector.

## 5. Concluding Remarks

We used a two-sector general equilibrium model to explore the effects of primary commodities' terms of trade on the level of political support for the use of monopoly rights arrangements that impede economic progress in exporting countries. The main feature

of this model is the introduction of the political economy of institutional change, in the context of a small economy with a comparative advantage in the export of primary commodities. We show that this political economy highlights a three-stage game of institutional choice involving households, a coalition of entrepreneurs and their potential competitors. We restricted the choice of institutions to those organizing the structure of the industrial sector. One such institution involves state protection of monopoly-rights arrangements that create a monopoly in the industrial sector. The other involves free enterprise which makes it possible for firms using superior technologies to enter the industrial sector. Incorporating this political economy in a two-sector general equilibrium model allow us to endogenize the gains (alternatively, losses) to households from entering the pool from which the coalition of entrepreneurs opposing free enterprise in the industrial sector recruit their members. We show that the level of these gains (alternatively, losses) are determined by the terms of trade of the primary commodity. Our main result is that poor terms of trade may be to blame for the inability of primary commodities' exporters to adopt better institutions and sound policies.

Obviously, the mechanisms responsible for this result are met within the bounds of our simple model, which limits the relevance of institutions only to the well-functioning of the industrial sector. It is clear that institutions are relevant for the organization of the structure of any economic activity, not just industrial activities. Restriction to the industrial sector can therefore only reflects our aim to keep up with the existing literature (e.g., Parente and Prescott 1999, Acemoglu and Robinson 2000) regarding the important role this sector plays in the process of technological change. We do not pretend that poor institutions are caused only or primarily by poor terms of trade, nor are we claiming that primary commodities' exporting countries must necessarily look away from the heavy reliance on exports of primary commodities for a better development strategy. We only want to make the point that the debate on the causes of institutional stagnation in poor countries should include conditions in the international market, as poor countries are often exporters of primary products. We therefore want to draw attention to need for an appro-

appropriate international mechanism for redressing the downward trends of the terms of trade for these products. Unless such mechanism exists and is implementable, these countries may have no choice but to look elsewhere to find a better development strategy.

## 6. Appendix

In this section, we will provide proofs of the results stated in the main text. All proofs are forthcoming at this stage.

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