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# Do Rent Seeking and Corruption Impede Economic Growth? Evidence from an Application to Bulgaria

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**Abstract**

The propose of this paper is to assess the social cost of "bad" governance and to compare these cots with welfare losses due to distortions of prices. We therefore present a general equilibrium model where producers of final goods finance a rent-seeking system by setting the price for intermediate products in an oligopsonist manner. This model is applied to the Bulgarian economy, in particular to the food chain where we find evidence of this type of market imperfection. From this application we find that as long as resources are allocated towards rent-seeking activities, there will be no significant welfare gains from free trade. Thus, we find "bad" governance to be a strong impediment to economic growth.

## 1 Introduction

Which policy kickstarts economic growth? This question has always been one of the main challenges for development and trade economists. Typically, the importance of trade has been widely recognized and ordinary cross country regressions overwhelmingly find a moderate positive relationship between the ratio of imports or exports and GDP.[1] However, these studies do not really provide an answer to the initial question since first, a simple regression over trade and income suffers from endogeneity—countries with high income levels for reasons other than trade may trade more (Frankel and Romer 1999)—and second, they do not directly identify a unique, policy-based mechanism through which export expansion affects growth. Challenged by these shortcomings, Dollar (1992), Sachs and Warner (1995) or Edwards (1998)—among others—use measures of trade policies as an instrument for its trade share and find a significantly inverse relationship between the extend of policy-caused barriers to trade and the level of economic growth. The policy implication drawn from this results is fundamental: key to higher growth rates is a liberal foreign trade regime! During the past decade, this finding has been widely recognized by economists as well as by policy advisors (see for instance Krueger 1998 and IMF 1997). However, there remains scepticism. Rodriguez and Rodrik (1999) for instance criticize that this inverse relationship does not immediately stand out in the data, at least not if one simply compares country growth rates with standard measures of policy induced trade barriers.[2] Therefore, they argue that indicators for "openness" as used in these studies are "...problematic as measures of trade barriers or are highly correlated with

[1] See Edwards (1993) for a survey on this literature).

[2] Rodriguez and Rodrik (1999) use average tariff rates from the World Bank's World Development Indicators and an index for non-tariff barriers to trade.

other sources of poor economic performance" (p.3). Furthermore, Frankel and Romer (1999, 379) argue that "...countries that adopt free-market trade policies may also adopt free-market domestic policies and stable fiscal and monetary policies. Since these policies are also likely to affect income, countries' trade policies are likely to be correlated with factors that are omitted from the income equation. Thus they cannot be used to identify the impact of trade." Frankel and Romer suggest a measure of the geographic component of countries' trade which still shows the significant positive relation between trade flows and growth levels. However, while this proceeding more convincingly accounts for the endogeneity between income and trade, it does not allow for any conclusion as to which extent an increase in trade flows is explicitly caused by liberal policies rather than by other factors such as changes in transportation costs, external shocks, etc.

More recently, increasing attention has been given to the impact of governance quality and institutional environment on economic performance. Based on well-known arguments by North (1990), Hall and Jones (1999) for instance find empirically that differences in capital accumulation, productivity and, thus, output per worker among countries are significantly driven by differences in the institutional environment, an endogenous factor to which they refer as "social infrastructure." Similarly, Kaufmann et al. (1999) find a significant impact of governance quality[3] on economic performance for both developing and developed countries. Based on this evidence, the quality of governance has been increasingly recognized as one of the main pre-conditions for countries to experience sustainable economic growth (The World Bank, 2000).

To what extent is the importance of trade policy and governance quality recognized in economic policy modeling? While distortions caused by trade policies have always been of high interests, the importance of improvements in governance quality has rarely been addressed in applied modeling so far.[4] Therefore, the objective of this paper is to develop and apply a model that includes all three aspects—trade, governance and growth—in order to empirically evaluate the relative importance of trade stimulating versus governance improving policies on economic growth and performance. However, typical definitions of governance (e.g. "the various traditions and institutions by which authority is exercised" Kaufmann et al., 1999, p.1) are fairly broad. Thus, different ways are possible to translate the impact of low governance quality into well-specified behavior. Furthermore, "bad" governance does not necessarily create a unique type of distortion. Thus, depending on the type of behavior that dominates, the effects on welfare and growth can be ambiguous.[5] Nevertheless, it is our purpose to derive first-best policy implementations. Consequently, we will concentrate our analysis on the case of one single country, Bulgaria, and a single sector, the agri-food chain, where we can identify a clear picture of the prevailing institutional failure and the distortions it creates.

The paper is organized as follows. In section II we will present a brief overview of recent economic developments in Bulgaria and describe the specific behavior of food-processing firms in response to the prevailing, low level of governance quality. In section III , we will develop a general equilibrium framework that incorporates distortions caused by taxes

[3] Kaufmann et al. (1999a, p.1) define governance as *"the traditions and institutions by which authority in a country is exercised. This includes (1) the process by which governments are selected, monitored and replaced, (2) the capacity of the government to effectively formulate and implement sound policies, and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them."*

[4] Clearly, trade models of imperfect competition in the light of Harris (1984) and many others incorporate market power and thus, aspects of governance. However, these studies exclusively consider the case of natural monopolies, e.g. caused by fixed setup or R&D costs. Therefore, they focus exclusively on studying the resulting imperfections, but they do not consider a change in governance itself.

[5] In section 4 we will discuss these points in more detail. For a discussion of several contradictory effects of rent seeking on welfare see e.g. Bliss and di Tella (1997) and for an empirical study of corruption and growth see Mauro (1995).

and tariffs as well as the non-competitive behavior of firms. Imbedding this framework into a Ramsey-model of economic growth will enable us to analyze the consequences of "bad" governance and price distortions on welfare and growth. Section IV will study three experiments: the partial elimination of tariff distortions, the partial shift to competitive behavior—we will call this the simulation of "good" governance—and the combination of both scenarios. Our results will show a significant impact of both experiments with a higher importance for improvements of governance quality. However, the highest welfare effect can only be achieved once policies act at both margins.

# 2 Recent Developments in Bulgaria

The process of post-communist transition in Bulgaria started in the early nineties with the liberalization of nearly all prices. This action was followed by a sharp decline in GDP by roughly 25 per cent between 1989 and 1992. The next three years were characterized by moderate growth, mainly from large export-oriented firms and a small but growing private sector. In 1995, a sharp decline in agricultural output again led to a contraction of GDP. With the partial reintroduction of price setting policies by the government and two major waves of inflation in 1994 and 1996, the economy has stagnated at a level far below its initial performance. In 1997, the exchange rate peg to the Deutsche Mark has led to a significant stabilization, but it still remains to be seen whether recent attempts to improve privatization and restructuring will be able to support this artificial stabilization.

To keep food prices at a low level the government established price ceilings for most agricultural products. This policy, combined with restrictions on exports, allowable price margins and cost-plus pricing practices of food processors, lowered farm gate prices, but it failed to provide incentives for food processing enterprises to decrease costs and to increase efficiency (Davidova 1994). Instead, it strongly distorted production incentives in agriculture and thus, even created reverse economic outcomes such as a major shortage of bread in 1996 (OECD-CEET).

In 1991, the government started a general privatization process but despite these efforts, large monopolies continued to exist, in particular in wholesale, foreign trade and food processing. In order to privatize former-socialist, agro-industrial production plants, a land law restored the right of former owners (The World Bank, 1993). However, due to enormous legislative and administrative problems, this redistribution resulted in a severe fragmentation of land and poorly established property rights that did not provide a sufficient basis for a land-lease system. In addition, farmers suffered from limited access to machinery in barely restructured cooperatives and the weak sanction mechanisms for contract enforcement. As a consequence, the agricultural sector has lost most of its talented people (Hanisch and Pavel, 2000) and those who are left rely on the small piece of land that belongs (or presumable belongs) to them, and are thus unable to produce in large, cost-efficient scales. In response to the severe economic conditions during the last decade, subsistence production of food in small, rural household plots has increased substantially.

To analyze the market structure in the agri-food chain, Buckwell (1997) argues that when state monopolies are turned into private monopolies, the more fragmented farming sector is still in large disadvantage and if farmers can not choose to whom they sell their products, there is little scope for exploiting the benefits of a market economy. To measure the effects of income redistribution under such imperfections, Ivanova et al. (1995) and Gorton et al. (1999) estimate protection levels for farmers, food processors, traders and consumers (the Producer and Consumer Subsidy Equivalents, PSEs/CSEs). Their finding is that between 1990 and 1996, consumers did not receive the benefits from low farm gate

prices as they were accrued by processors and traders at the expense of agricultural producers. Gorton et al. (1999) generally explain their observations by the high costs of transactions in Bulgaria. Others, such as Leath et al. (1993) or Swinnen (1998), stress the importance of collusive rent-seeking behavior by certain agents in the food chain who have been able to control big parts of relevant distribution channels such as storage facilities or who have redistributed financial assets through "transfer pricing" between state-owned and private firms.

Based on these observations we formulate the following assertion:

**Assertion 1:** *The institutional environment in which food processors operate forces them to use economic resources to pay a certain amount of their revenue—which we assume to be fixed at the firm level—to corrupt rent-seeking agents.*[6] *In turn, this forces each firm to generate a surplus. Since the scope for non-competitive price-setting behavior on the final-good side is limited,*[7] *but at the same time, suppliers—agricultural farmers—mainly produce in small scale and rely on sector specific assets, food processors generate this profit by setting the price of intermediate agricultural raw products in an oligopsonistic manner.*[8]

In this paper we will refer to this situation as "food processors financing a rent-seeking system." In the next section we will present a framework that incorporates this assertion in an applied general equilibrium model.

# 3 The Model: Environment, Equilibria and Application

We describe an open economy. There is a representative consumer and two final good sectors (manufacturing ($m$) and food processing ($f$)). The food processing sector procures an intermediate good from the agricultural sector ($a$). Manufacturing and agriculture behave competitively in both factor and output markets, but food processors behave non-competitively in the procurement of agriculture's output. Finally there is a financial sector that transforms intermediate inputs into units of investment goods that can be used to increase the capital stock of the economy $k$. Let $S = \{a,\ f,\ m\}$ denote the set of goods and sectors in the economy.

## 3.1 Households

There is an infinitely lived representative consumer who at each period of time $t$ derives satisfaction from the consumption of agricultural goods $c_{a,t}$, processed food $c_{f,t}$and manufactured goods $c_{m,t}$. The consumer has preferences over domestically produced goods ($c_{sD,t}$) and imported goods ($c_{sM,t}$) for $s \in S$ which she treats as imperfect substitutes (Armington assumption). Preferences are given by

$$\sum_{t=0}^{\infty} \left(\frac{1}{1+\rho}\right)^t \frac{c_t^{1-\theta}-1}{1-\theta},\ \theta > 0 \tag{1}$$

$$c_t = c_{a,t}^{\beta_a} c_{f,t}^{\beta_f} c_{m,t}^{\beta_m}, \qquad 0 < \beta_{s\in S} < 1,\ \sum_{s\in S} \beta_s = 1 \tag{2}$$

$$c_{s,t} = \left(\mu_s c_{sD,t}^{\rho_s} + (1-\mu_s)\, c_{sM,t}^{\rho_s}\right)^{\frac{1}{\rho_s}}, \qquad 0 < \mu_s < 1,\ \rho_s \leqq 1,\ s \in S$$

[6] These agents can, but do not necessarily have to be owners or shareholders of food-processing plants.

[7] For Bulgaria, this is mainly due to an already high share of subsistence production which can be increased further, and to some extent due to competition through imports.

[8] The view that corruption can generate a surplus where none previously existed is taken from—among others—Bliss and di Tella (1997).

where $\rho > 0$ is the rate of consumer's time preference. $c_t$ denotes an aggregate composite good which embodies agricultural goods, processed food and manufactured goods. These three goods are in turn composites of home and foreign goods. The representative consumer has an initial capital endowment of assets and at each period she is endowed with labor $\bar{l}$ and the agricultural sector specific factor $\bar{v}$. The consumer solves the problem of maximizing (1) subject to an intertemporal budget constraint

$$p_t c_t + S_t = w_t \left(1 - \tau_l\right) \bar{l} + r_t \left(1 - \tau_k\right) p_{k,t} k_t + r_{b,t} \left(1 - \tau_k\right) b_t + p_{v,t} \bar{v} + T_t$$

where $S_t = p_{k,t} \left(k_{t+1} - \left(1 - \delta\right) k_t\right) + b_{t+1} - b_t$ is the households savings, expenditure $p_t c_t$ is defined as

$$p_t c_t \equiv \min \sum_{s \in S} p_{i,t} \left(1 + \tau_{c_i}\right) c_{i,t}$$

subject to (2) , and, to eliminate the possibilities of Ponzi games, to the constraint

$$b_t \geqq = -\bar{b} \text{ for sufficiently large } \bar{b} > 0$$

and initial conditions

$$k_0 = \bar{k}_0 \text{ and } b_0 = \bar{b}_0$$

where $b_{t+1}$ denotes the holdings of bonds from period $t$ to $t+1$. $p_t$ denotes the price of the aggregate consumption composite $c_t$, $p_{k,t}$ and $r_t$ are the price and interest rate of capital respectively ($p_{k,t} r_t$ is the rental rate of capital), $\tau_k$ is a tax on capital income and $\delta$ is the constant depreciation rate of capital. $w_t$ is the labor wage rate and $\tau_l$ is a tax on labor income, $p_{v,t}$ is the rental rate of the sector specific factor $v$, the price of bonds is fixed to unity and $r_{b,t}$ is the interest rate of bonds at period $t$. $T_t$ denotes a lump-sum transfer. $p_{i,t}$ is the Armington composite price of good $i$ and $\tau_{c_i}$ is a consumption tax on good $i$.

The Euler conditions for an optimal solution to the consumer problem are, first, the marginal rate of substitution between consumption at time $t$ and $t+1$, which equals

$$\left(\frac{c_{t+1}}{c_t}\right)^{\theta} = \frac{\left(1 + r_{t+1} - \delta\right)}{\left(1 + \rho\right)} \frac{p_{k,t+1}}{p_{k,t}} \frac{p_t}{p_{t+1}},$$

and second, the non-arbitrage condition between capital and bonds,

$$r_{b,t+1} = \frac{p_{k,t+1} - p_{k,t} + \left(r_{t+1} - \delta\right) p_{k,t+1}}{p_{k,t}},$$

which together with the transversality condition

$$\lim_{t \to \infty} \frac{p_t k_{t+1} + b_{t+1}}{\prod_{s=0}^{t} \left(1 + r_{b,s+1}\right)} = 0$$

are necessary and sufficient for a global maximum.

## 3.2 Competitive sectors

At each period of time sectors $a$ and $m$ solve static profit maximization problems. The production of agricultural raw products $y_a$ uses intermediate products $x_{s,a}$ $s \in S$ which are Armington composites of domestically produced $x_{sD,a}$ and foreign goods $x_{sM,a}$ for

$s \in S$, and employs labor $l_a$, capital $k_a$, a sector specific factor $v$ and a nested constant elasticity of substitution-Leontief technology;

$$\begin{aligned} y_a &= \min\left\{\theta_a k_a^{\alpha_k} l_a^{\alpha_l} v^{\alpha_v},\ B_{a,a}x_{a,a},\ B_{f,a}x_{f,a},\ B_{m,a}x_{m,a}\right\} \\ 0 &< \alpha_{i\in\{k,\ l,\ v\}} < 1,\quad \sum_{i\in\{k,\ l,\ v\}} \alpha_i = 1 \text{ and } \theta_a,\ B_{s,a} > 0 \text{ for } s \in S \\ x_{s,a} &= \left(\mu_s x_{sD,a}^{\rho_s} + (1-\mu_s)\, x_{sM,a}^{\rho_s}\right)^{\frac{1}{\rho_s}},\ s \in S \end{aligned} \tag{3}$$

The agricultural sector sells raw agricultural goods to food processors. Perfect competition within agriculture implies that its gross domestic product, $GDP_a$, can be stated as:

$$p_v v = GDP_a = \max\left(p_{aD}y_a - rp_k k_a - wl_a - \sum_{s\in S} p_s^d x_{s,a}\right) \tag{4}$$

subject to (3) where $p_{aD}$ denotes the domestic price of the agricultural commodity, and $p_s^d$ for $s \in S$ is a demand Armington composite price of domestic $p_{sD}$ and import $p_{sM}$ prices for $s \in S$.

The net supply function of agricultural goods $y_a^{net}$ equals total agricultural supply minus intermediate agricultural demand, and is given by

$$y_a - x_{aD,a} = y_a^{net}\left(p_{aD},\ p_{aM},\ p_f^d,\ p_m^d,\ rp_k,\ w,\ v\right) \tag{5}$$

We assume that agricultural producers can not export their output from the farm gate but instead sell their output to down stream dealers such as food processors and retailers. Retailers, which activity is modeled as part of the food processors activity, carry on the exports of agricultural goods.

The production of manufactures $y_m$ uses labor $l_m$ and capital $k_m$ services and intermediate Armington composites similar to ones specified for the agricultural sector and a technology represented by

$$\begin{aligned} y_m &= \min\left\{\theta_m k_m^{\alpha_m} l_m^{1-\alpha_m},\ B_{a,m}x_{a,m},\ B_{f,m}x_{f,m},\ B_{m,m}x_{m,m}\right\} \\ 0 &< \alpha_m < 1,\ \text{and } \theta_m,\ B_{sm} > 0,\ s \in S \end{aligned} \tag{6}$$

The manufacturing sector combines $k_m$, $l_m$ and intermediate inputs to solve the problem of maximizing profits,

$$\max\left[p_m^s y_m - rp_k k_m - wl_m - \sum_{s\in S} p_s^d x_{s,m}\right] \tag{7}$$

subject to (6) . Following the standard Armington specification in trade models (see Diao et al. 1998) the output composite $y_m$ is specified as an aggregate of goods produced for domestic $y_{mD}$ and export $y_{mX}$ markets. Accordingly, the supply price faced by sector $m$ ($p_m^s$) is a composite price of the domestic $p_{mD}$ and export $p_{mX}$ prices of good $m$.

### 3.3 Food processing and oligopsonist behavior

In contrast to the agricultural and manufacturing sectors, the procurers of agricultural output behave non-competitively in that market. We model the processing activity and assume that the retail activity of firm $j$ consist of only buying and selling $x_{a,r_j}$ agricultural goods (exports plus domestic demand), and the marginal revenue minus the marginal cost

of this activity equals zero. We specify this activity by using an Armington specification for the sales in the domestic and foreign markets.

There is a finite number of food processing firms indexed by $j$ who enter and exit the market until profits equal zero. The number of firms operating at period $t$ is denoted by $n_t$. Firm $j$ combines capital $k_{f_j}$ and labor $l_{f_j}$ services and intermediate goods specified as Armington composites of domestic and foreign goods (similar to the ones specified above) and uses a technology of the form

$$y_{f_j} = \min\left\{\max\left\{\theta_f\left(k_{f_j} - \Gamma_{kj}\right)^{\alpha_f}\left(l_{f_j} - \Gamma_{lj}\right)^{1-\alpha_f}, 0\right\},\ A_{a,f}x_{a,f_j},\ A_{f,f}x_{f,f_j},\ A_{m,f}x_{m,f_j}\right\}, \tag{8}$$

$$0 < \alpha_f < 1,\ \theta_f,\ A_{s,f} > 0 \text{ for } s \in S$$

total capital and labor are

$$k_{f_j} = k^V_{f_j} + k^F_{f_j} \text{ and } l_{f_j} = l^V_{f_j} + l^F_{f_j}$$

where parameters $\Gamma_{kj} > 0$ and $\Gamma_{lj} > 0$ cause firms to incur fixed costs. That is, at each instant of time, these resources must be committed before production can take place. Following assertion 1, we think of these fixed costs as payments to rent-seeking agents. Thus, the total fixed cost faced by processing firm $j$ equals

$$TFC_j = rp_k k^F_{f_j} + wl^F_{f_j}$$

and the total cost associated with the employment of capital and labor by firm $j-th$ is

$$g^{f_j}\left(rp_k, w\right) y_{f_j} + rp_k\Gamma_{kj} + w\Gamma_{lj} = \min\left(rp_k k_{f_j} + wl_{f_j}\right)$$

subject to (8) . In the presence of fixed costs, marginal cost pricing does not lead to total cost recovery. Thus, food processors are presumed to have some form of market power. Since food processors face an upward-sloping supply curve in agriculture—as the result of the agricultural specific factor— we assume that as the only direct buyers of agricultural goods, they engage in Cournot competition in the procurement level of agricultural goods. Using the Cournot specification implies that each firm believes that the others will not change their intermediate demand (see Francois and Roland-Holst 1997, p.341) as the firm $j$ changes its intermediate demand, that is firm $j$ behaves as if

$$\frac{\partial y^{net}_a}{\partial x_{aD,f_j}} = 1$$

Firm $j-th$, taking the decision of other agents as given, solves the problem of maximizing profits $\pi_{f_j}$. Firm $j-th$ direct profit function is

$$\pi_{fj} = (p^s_f y_{f_j} - g^{f_j}\left(rp_k, w\right) y_{f_j} - \sum_{s\in S} p^d_s x_{s,f_j} - TFC_j) \tag{9}$$

where $y_{f_j}$ is an Armington composite of domestic and export sales, and $p^s_f$ is a composite price of domestic and export prices similar to the one specified for the manufacturing sector. No waste on intermediate inputs implies $y_{f_j} = A_{a,f}x_{a,f_j} = A_{f,f}x_{f,f_j} = A_{m,f}x_{m,f_j}$, substituting into profits implies,

$$\pi_{fj} = \left(\left(p^s_f A_{a,f} - g^{f_j}\left(rp_k, w\right) A_{a,f} - \sum_{s\in S} p^d_s \frac{A_{a,f}}{A_{s,f}}\right) x_{a,f_j} - TFC_j\right)$$

where $x_{a,f_j}$ is an Armington composite of domestically $x_{aD,fj}$ produced and imported $x_{aM,fj}$ agricultural goods. Denote this Armington as

$$x_{a,f_j} = \mathbf{x}_{a,f_j}\left(x_{aD,fj},\ x_{aM,fj}\right)$$

expressing the domestic price of agriculture's output as the inverse of (5)

$$p_{aD} = y^{-net}\left(y_a^{net},\ p_{aM},\ p_f^d,\ p_m^d,\ rp_k,\ w,\ v\right) \tag{10}$$

then, substituting in for the inverse demand function and behaving as is Cournot in the procurement of domestically produced agricultural goods, firm $j-th$ chooses domestically produced and imported agricultural goods to solve

$$\max_{x_{aD,fj},\ x_{aM,fj}} \left( \left( \left(p_f^s - g^{f_j}\left(rp_k, w\right)\right) A_{a,f} - \sum_{s=f,m} p_s^d \frac{A_{a,f}}{A_{s,f}} \right) \mathbf{x}_{a,f_j}\left(x_{aD,fj},\ x_{aM,fj}\right) \right.$$
$$\left. - y^{-net}\left( \sum_{i=1}^{n} \left(x_{a,r_j} + x_{aD,f_j}\right),\ p_{aM},\ p_f^d,\ p_m^d,\ rp_k,\ w,\ v \right) x_{aD,fj} - p_{aM} x_{aM,fj} - TFC_j \right)$$

maximizing this function yields the Lerner condition that marginal revenue equals marginal cost:

$$\left( \left(p_{fj} - g^f\left(w, rp_k\right)\right) A_{af} - p_m \frac{A_{af}}{A_{mf}} - p_f \frac{A_{af}}{A_{ff}} \right) \frac{\partial \mathbf{x}_{a,f_j}\left(x_{aD,fj},\ x_{aM,fj}\right)}{\partial x_{aD,fj}}$$
$$= \quad p_{aD} + \frac{\partial y^{-net}(\cdot)}{\partial y_a^{net}} \frac{\partial y_a^{net}}{\partial x_{aD,f_j}} x_{aD,fj}$$

From the first order conditions for an optimal solution to producer $j-th$ problem and assuming symmetry across firms we obtain the price $p_{aD}$ consistent with oligopsonist behavior

$$p_{aD} = \frac{\left( \left(p_f^s - g^{f_j}\left(rp_k, w\right)\right) A_{a,f} - \sum_{s=f,m} p_s^d \frac{A_{a,f}}{A_{s,f}} \right) \frac{\partial \mathbf{x}_{a,f_j}\left(x_{aD,fj},\ x_{aM,fj}\right)}{\partial x_{aD,fj}}}{\left[1 + \frac{1}{\varepsilon_{p_{aD}}} \frac{1}{n}\right]} \tag{11}$$

where $\varepsilon_{p_{aD}}$ is the elasticity of agricultural supply. Let the Armington aggregate $\mathbf{x}_{a,f_j}(x_{aD,fj},$ $x_{aM,fj})$ be equal to

$$\mathbf{x}_{a,f_j}\left(x_{aD,fj},\ x_{aM,fj}\right) = \left(\mu_f \left(x_{aD,fj}\right)^{\rho_f} + \left(1-\mu_f\right)\left(x_{aM,fj}\right)^{\rho_f}\right)^{\frac{1}{\rho_f}} \tag{12}$$

the domestic intermediate demand of good $a$ is:[9]

$$x_{aD,fj} = \frac{1}{\frac{\partial y^{-net}(\cdot)}{\partial y_a^{net}}} \left( \frac{\left[ \left(p_f^s - g^{f_j}\left(rp_k, w\right)\right) A_{a,f} - \sum_{s=f,m} p_s^d \frac{A_{a,f}}{A_{s,f}} \right]}{p_{aM} \left( \mu_f^{\frac{1}{1-\rho_f}} p_{aM}^{\frac{\rho_f}{1-\rho_f}} + \left(1 + \frac{1}{\varepsilon_{p_{aD}}} \frac{1}{n}\right)^{\frac{\rho_f}{1-\rho_f}} \left(1-\mu_f\right)^{\frac{1}{1-\rho_f}} p_{aD}^{\frac{\rho_f}{1-\rho_f}} \right)^{\frac{\rho_f - 1}{\rho_f}}} - p_{aD} \right) \tag{13}$$

and the intermediate demand of imported agricultural goods is given by

$$x_{aM,fj} = x_{aD,fj} \left( \frac{1-\mu_f}{\mu_f} \frac{p_{aD}}{p_{aM}} \left(1 + \frac{1}{\varepsilon} \frac{1}{n}\right) \right)^{\frac{1}{1-\rho_f}} \tag{14}$$

[9] Ask authors for the derivation of this result by e-mailing to gait0005@tc.umn.edu

**Number of firms** Substituting (13) into the profits of firm $j$, using (11) , (14) and setting profits equal to zero we can obtain implicitly an expression for the number of firms $n$

$$n\left(p_{a\,M},\ p_f^s,\ p_f^d,\ p_m^d,\ rp_k,\ w,\ v,\ TFC_j\right)$$

## 3.4 Government

Next we introduce a government agent who receives income from taxes and tariffs, provides public goods and services at a given level $G$. In the provision of public goods the government employs a Leontief technology using intermediate Armington composites $G_{i,t}$ similar to the ones specified above. Finally, it pays a transfer $T^G$ to the representative consumer. The public budget constraint, is given by

$$\sum_{s\in S} p_{i,t}G_{i,t} + T_t^G = \sum_{s\in S} \tau_{c_i} p_{i,t}c_{i,t} + \sum_{s\in S} t_i^{IM} p_{i,t}^{IM} IM_{i,t} + \tau_L \bar{L} + \tau_K r_t k_t \text{ for all } t \qquad (15)$$

where $p_{i,t}^{IM}$ and $IM_i$ denote the import pre-tariff price and total imports of commodity $i$ and $t_i^{IM}$ is the import tariff rate for commodity $i$. Since we do not consider explicitly the impact of public goods provision on consumers' welfare, in our simulations, we endogenize the rate of consumption tax ($\tau_{c_i}$) subject to an equal yield constraint ($G_t = \bar{G}$). Thus, any change in tariff or tax policy affects the consumption tax rates such that the real value of government expenditures remains constant.

## 3.5 Investment

In our model, investment is specified as in Diao et al. (1997). To obtain a shadow price of the investment good we separate pricing decisions for investment and capital from consumers' consumption and savings decisions. Therefore, an independent investor decides on investment and passes profits to the representative consumer. The problem of this investor is to maximize discounted profits over the infinite horizon:

$$\max \sum_{t=1}^{\infty} \frac{\left(r_t p_{k,t} k_t - \mu_t inv_t\right)}{\prod_{s=0}^{t} \left(1 + r_s - \delta\right)} \qquad (16)$$

subject to the constraint that capital stock in $t+1$ equals capital stock in $t$ minus depreciation plus investment.

$$k_{t+1} = \left(1 - \delta\right) k_t + inv_t \qquad (17)$$

where $\mu_t$ is the value of one unit of the investment good at time $t$. New physical capital ($inv_t$) is produced by a Leontief technology using intermediate $x_{i,inv,t}$ Armington composites for $i \in S$. At equilibrium, for $inv_t > 0$, the value of each unit of capital equipment equals its unit cost $p_t^{inv}$ $\left(\mu_t inv_t = p_t^{inv} inv_t\right)$. from the first order conditions to this problem we obtain the non arbitrage condition

$$r_t p_{t-1}^{inv} = r_t p_{k,t} + \delta\left(p_{t-1}^{inv} - p_t^{inv}\right) + p_t^{inv} - p_{t-1}^{inv} \qquad (18)$$

Thus, in equilibrium, the return from one investment good at time $t-1$ ($r_t p_{t-1}^{inv}$) equals total returns from one unit of capital at time $t$. This returns include "dividends" from capital ownership in $t$ ($r_t p_{kt}$) minus losses from depreciation ($\delta p_{t-1}^{inv} - \delta p_t^{inv}$) plus an additional capital gain if costs to produce capital change over time ($p_t^{inv} - p_{t-1}^{inv}$).

### 3.6 Market clearing

The economy must satisfy the following feasibility conditions. In factors of production

*labor*

$$l_{a,t} + \sum_{j=1}^{n_t} l_{f_j,t} + l_{m,t} = \bar{l} \tag{19}$$

*capital*

$$k_{a,t} + \sum_{j=1}^{n_t} k_{f_j,t} + k_{m,t} = k_t \tag{20}$$

In final goods and intermediate good $a$, the total supply of good $i$ ($Q_i$) equals private, public plus intermediate demand

$$Q_{i,t} = c_{i,t} + G_{i,t} + \sum_{s \in \{a,m\}} x_{i,s,t} + \sum_{j=1}^{n_t} x_{i,f_j,t} + x_{i,inv,t} \text{ for } i \in S \tag{21}$$

The capital stock at $t+1$ equals

$$k_{t+1} = (1-\delta)\, k_t + inv_t \tag{22}$$

and the lump-sum transfer to consumers equals

$$T_t = T_t^G + T_t^F = T_t^G + \sum_{j=1}^{n_t} TFC_j \tag{23}$$

we impose a balance of payments constraint, such that exports $EX_i$ of good $i$ minus imports equals savings minus investment plus service on foreign debt[10];

$$S_t - p_{k,t}\left(k_{t+1} + (1-\delta)\, k_t\right) + r_{b,t} FD_t = \sum_i p_{iX,t} EX_{i,t} - \sum_i p_{i,t}^{IM}\left(1 + t_i^{IM}\right) IM_{i,t} \tag{24}$$

where savings equal;

$$S_t = p_{k,t} k_{t+1} - (1-\delta)\, p_{k,t} k_t + (b_{t+1} - b_t)$$

$FD$ denotes foreign debt. A negative $b_t$ indicates a positive net claims of foreigners on the domestic economy, while a positive $b_t$ indicates net claims of nationals in foreign countries[11].

[10] For a steady state solution we also impose the conditions:

$$S_t = \delta K_t$$

and

$$r_{b,t} FD_t + \sum_i p_{i,t+1}^{IM}\left(1 + t_i^{IM}\right) IM_{i,t+1} - \sum_i p_{i,t+1} EX_{i,t+1} = \mathbf{0}$$

[11] Despite the free capital markets assumption, our model can still exhibit transitional dynamics rather than immediate convergence to the steady state after imposing a shock. This is because strictly speaking, assuming home and foreign goods to be imperfect substitutes gives some market power even to the smallest country. Thus, the marginal value of capital is not determined by world market prices only but also becomes a function of domestic commodity prices (see Diao et al. 1997 for a further study of transition dynamics under the Armington specification).

## 3.7 Equilibria

In this section we define a sequential markets and an equilibrium were variables have ceased to change (a steady state equilibrium)

**Definition 1** *A sequential markets equilibrium is a sequence of quantities* $\left\{\hat{X}_t\right\}_{t=0}^{\infty} = \{\hat{c}_t,$ $\hat{c}_{a,t},\ \hat{c}_{f,t},\ \hat{c}_{m,t},\ \hat{k}_{t+1},\ \hat{b}_{t+1},\ \{\hat{y}_{a,t},\ \hat{y}_{m,t},\ \{\hat{y}_{fj,t}\}_{j=1}^{\hat{n}_t}\},\ \{\hat{k}_{a,t},\ \hat{k}_{m,t},\ \{\hat{k}_{fj,t}\}_{j=1}^{\hat{n}_t}\},\ \{\hat{l}_{a,t},\ \hat{l}_{m,t},$ $\{\hat{l}_{fj,t}\}_{j=1}^{\hat{n}_t}\},\ \{\hat{x}_{s,a,t}\ \hat{x}_{s,m,t},\ \{\hat{x}_{s,fj,t}\}_{j=1}^{\hat{n}_t},\ x_{i,inv,t}\}_{s\in S}\}_{t=0}^{\infty}$ , *prices* $\left\{\hat{P}_t\right\}_{t=0}^{\infty} = \{\hat{p}_t,\ \hat{p}_{a,t},\ \hat{p}_{f,t},$ $\hat{p}_{m,t},\ \hat{p}_{k,t},\ ,\hat{p}_{v,t},\ \hat{r}_t,\ \hat{r}_{b,t},\ \hat{w}_t\}_{t=0}^{\infty}$ *the number of firms* $\{\hat{n}_t\}_{t=0}^{\infty}$ *and transfer* $\{\hat{T}_t\}_{t=0}^{\infty}$*, such that:*

1. *Given prices, and lump sum transfer* $\hat{T}_t$*, the sequence of quantities* $\{\hat{c}_t,\ \hat{c}_{a,t},\ \hat{c}_{f,t},\ \hat{c}_{m,t},$ $\hat{k}_{t+1},\ \hat{b}_{t+1}\}_{t=0}^{\infty}$ *solves the representative consumer's utility maximization problem* (1) ;
2. *At time t given prices, quantities* $\hat{y}_{a,t},\ \hat{k}_{a,t},\ \hat{l}_{a,t},\ \{\hat{x}_{s,a,t}\}_{s\in S}$ *solve the agricultural sector* $GDP_a$ *maximization problem* (4) ;
3. *At time t given prices, quantities* $l_{m,t},\ l_{m,t},\ \{\hat{x}_{s,m,t}\}_{s\in S}$ *solve the manufacturing sector profit maximization problem* (7)
4. *At time t given prices, quantities* $k_{fj,t},\ l_{fj,t},\ \{\hat{x}_{s,fj,t}\}_{s\in S}$ *solve the profit maximization problem* (9) *of firm j for* $j = 1,...,\hat{n}_t$*;*
5. *The number of firms* $\hat{n}_t$ *producing processed food is such that the profits of each firm equals zero;*
6. *The sequence* $\{\hat{c}_t,\ \hat{c}_{a,t},\ \hat{c}_{f,t},\ \hat{c}_{m,t},\ \hat{k}_{t+1},\ \hat{b}_{t+1},\ \{\hat{y}_{a,t},\ \hat{y}_{m,t},\ \{\hat{y}_{fj,t}\}_{j=1}^{\hat{n}_t}\},\ \{\hat{k}_{a,t},\ \hat{k}_{m,t},$ $\{\hat{k}_{fj,t}\}_{j=1}^{\hat{n}_t}\},\ \{\hat{l}_{a,t},\ \hat{l}_{m,t},\ \{\hat{l}_{fj,t}\}_{j=1}^{\hat{n}_t}\},\ \{\hat{x}_{s,a}\ \hat{x}_{s,m},\ \{\hat{x}_{s,fj}\}_{j=1}^{\hat{n}_t}\}_{s\in S},\ \hat{n}_t,\ \hat{T}_t\}_{t=0}^{\infty}$ *satisfies the feasibility conditions* (19) − (24)*.*

**Definition 2** *An steady state equilibrium are quantities* $c^{ss},\ c_a^{ss},\ c_f^{ss},\ c_m^{ss},\ k^{ss},\ b^{ss},\ \{y_a^{ss},$ $y_m^{ss},\ \{y_{fj}^{ss}\}_{j=1}^{n^{ss}}\},\ \{k_a^{ss},\ k_m^{ss},\ \{k_{fj}^{ss}\}_{j=1}^{n^{ss}}\},\ \{l_a^{ss},\ l_m^{ss},\ \{l_{fj}^{ss}\}_{j=1}^{n^{ss}}\},\ \{x_{s,a}^{ss}\ x_{s,m}^{ss},\ \left\{x_{s,fj}^{ss}\right\}_{j=1}^{n^{ss}}\}_{s\in S},$ *prices* $p^{ss},\ p_a^{ss},\ p_f^{ss},\ p_m^{ss},\ p_k^{ss},\ p_v^{ss},\ r^{ss},\ r_b^{ss},\ w^{ss}$ *the number of firms* $n^{ss}$ *and transfer* $T^{ss}$*, such that, for some initial* $k_0$*, equilibrium quantities* $\{\hat{X}_t,\ \hat{n}_t,\ \hat{T}_t\}_{t=0}^{\infty}$*, and equilibrium prices* $\left\{\hat{P}_t\right\}_{t=0}^{\infty}$ *satisfy the definition of sequential markets equilibrium above and are constant for all t.*

## 3.8 Empirical Application

To compute the model we use the General Algebraic Modeling System (GAMS). We follow an implementation of Ramsey-type growth models with approximation to the infinite time horizon as proposed by Lau et al. (1997). The model is calibrated to a *Social Accounting Matrix* (SAM) of the Bulgarian economy of 1994. These data report trade margins of retailers in the food account and include adjustments for hidden economy activities. Furthermore, they explicitly report production and consumption of subsistence food so that we need to extend our model framework. We therefore assume that agricultural output includes agricultural raw products as well as food for own consumption or for sales on local markets. To capture this simultaneous production we specify total output in agriculture as a constant-elasticity-of-substitution composite of raw products $y_a$ and food subsistence

$y_{sub}$. We modify the consumers preference so that they also include subsistence food by introducing a composite good between subsistence food $c_{sub}$ and $c_f$ (food produced by domestic food processors and imported food) and adjust the budget constraint so as to reflect the expenditure on subsistence food. Furthermore, market clearing on subsistence food requires:

$$y_{sub} = c_{sub}.$$

In general, the calibration follows standard procedures in applied general equilibrium models (see Pavel 2001 for details). To calibrate the two parameters that cause food-processing firms to incur fixed costs, $\Gamma_{kj}$ and $\Gamma_{lj}$, we recall that—because of the zero-profit, free-entry condition—these parameters determine the surplus from oligopsonist behavior—which is used to finance the rent-seeking system—at the firm level. To estimate this surplus, we follow Assertion 1 and assume that part of the positive rents to food processors which Gorton et al. (1999) find are due to oligopsonist market power. To start with a careful guess, we assume that in the benchmark equilibrium, the food sector generates a surplus of fifteen percent of its domestic sales value (which corresponds to an income loss for farmers of about minus ten percent).[12] Next, we divide the surplus into costs of labor and capital using the capital value share in the food sector (with prices equal unity). Then, we divide these sector values by the number of firms ($n$) to obtain the values of parameters $\Gamma_{kj}$ and $\Gamma_{lj}$ for the representative firm $j$.

Finally, we estimate the variable costs of labor and capital in food production ($\sum_{j=1}^{n} k_{f_j}$ and $\sum_{j=1}^{n} l_{f_j}$ ) by subtracting $n \cdot \Gamma_{kj}$ and $n \cdot \Gamma_{lj}$ from factor return as given in the SAM.

# 4 Policy simulations

In the previous section, we developed a model that explicitly considers price distortions due to tariffs and taxes as well as imperfect competition. The purpose of this section is to study and compare the impact of price policies with that of institutional reform policies that result in the improvement of governance quality. What do we expect from these policies?

Liberalization of tariffs and taxes has been widely recommended for developing countries as well as for economies in transition. The underlying common wisdom is that trade liberalization increases welfare and favors economic growth. The reduction of tariffs lowers domestic consumption prices and induces an income and a substitution effect. The former arises from the lower price level itself, the latter from the substitution of domestic goods by cheaper imports. Furthermore, this effect also reduces the domestic costs of capital goods, what may lead to an increase in investment and thus, higher future growth rates. Finally, models with imperfect competition such as Harris (1984) suggest that after liberalization, a fewer number of firms produce the same amount of output. Hence, formerly fixed resources become available to the rest of the economy. This reduces the corresponding deadweight losses and therefore, generates additional welfare gains.

However, trade liberalization also bears some shortcomings. First, tariff revenue has become a major source of public income for many developing countries. Therefore, liberalization either requires the reduction of public expenditures, or a sufficient revenue replacement policy, or both. Since in many cases, a reduction of public spending, for example through firing of civil servants or lowering social contribution payments, is not politically feasible, the most commonly used replacement policy is to rise domestic taxes.

[12] In section 4.3, we will also test for the sensitivity of this assumption.

This, however, implies important trade-offs with the efficiency goals of liberalization, for instance, when the positive income effect is offset by a rise of domestic consumption taxes.

What are the expected welfare effects from institutional reform policies? Recent contributions to the impact of rent seeking and growth such as Romer (1994), Mauro (1995) and Shleifer and Vishny (1998) discuss various channels through which the presence of rent-seeking activities may affect economic growth. They all conclude that these activities are fairly harmful to growth as they distort incentives and the allocation of factors and assets. In our model, the negative effect of rent-seeking activities is brought about by the fixed costs which cause deadweight losses and reduce output since factors are "wasted" for unproductive activities. Consequently, we expect that improving governance quality comes along with a significant improvement of welfare and economic performance.[13]

## 4.1 Experiments

To study the partial impact of both kinds of distortions on production and welfare we start with liberalizing the economy under the present level of "bad" governance and thus, imperfect competition. Then, we simulate a "good" governance, strong property rights and a switch to perfect competition under the initial level of policy distortions by eliminating the fixed expenditure in the food sector. Finally, in order to capture the full potential of excluding all kinds of distortions, we run a third simulation with an undistorted economy. These experiments are defined as follows:

1. **trade liberalization**: we liberalize foreign trade by setting tariffs equal to zero and replace consumption tax rates by commodity with a uniform rate.
2. **"good" governance**: we eliminate oligopsonist competition in the food chain under pre-existing tax and tariff rates by setting the fixed costs equal to zero.
3. **total reform**: we combine scenarios 1 and 2.

In all three scenarios we shock the model in the first period and do not consider any exogenous shocks in latter periods. Thus, the endogenous variables jump to a new level and then, move along the transition path towards their new steady state. The intention for the choice of this strategy is to highlight the effects on growth and allocation following an unanticipated reform. We believe that this strategy reflects the specific situation of the Bulgarian case, where various changes of policies and governments in the 1990s have caused a high degree of uncertainty about future policy directions.

## 4.2 Results

Table 1 allows for a first assessment of our experiments. We start with discussing the effects on welfare, GDP and output. Under *trade liberalization*, welfare increases by one percent, whereas the new steady state level of GDP shows a slight decline. Output in the agricultural sector also increases, however just to a small extent, whereas we observe a drop in output for nonfood production. Somehow surprisingly, the output of food processors increases significantly, although initial tariffs on food imports are the highest in our model

[13] This result, however, is not necessarily the case if we apply economic theory to activities such as corruption or rent seeking. Take for instance the case of an economy with oligopolistic competition and free entry. Then, rent-seeking activities that simply re-distribute existing profits will not cause any change in allocation and production decisions and thus, will have no impact on welfare at all. Moreover, if rent seeking leads to exits of firms as it demands some of their profits, this can even have positive welfare effects if there has been an excess number of firms before (see Bliss and di Tella, 1997). However, the intention of this remark is not to argue in favor of rent seeking, but rather to stress the importance of the specific setting of the model, which has to be justifiable by empirical evidence and observations.

| | trade liberalization | "good" governance (deviation in percent) | total reform |
|---|---|---|---|
| welfare[1] | 1.10 | 6.30 | 6.70 |
| GDP | -0.78 | 5.57 | 4.68 |
| output of... | | | |
| ...agriculture[2] | 1.46 | 12.20 | 13.81 |
| ...subsistence | -12.95 | -25.74 | -34.17 |
| ...food[3] | 17.81 | 53.18 | 69.49 |
| ...nonfood | -3.21 | -3.36 | -6.85 |

[1] equivalent variation in income

[2] raw products

[3] output of food processing firms (domestic sales + exports)

source: own projections

Table 1: welfare, GDP and output (steady state effects)

and thus, food production is the most protected activity. However, this is due to a drop in demand for (and thus, production of) subsistence food following the reduction of prices after liberalization.

In the *good governance* scenario we observe much stronger effects. When policy rules out rent-seeking activities, formerly fixed factors become available to the most efficient industries. This induces dramatic positive output effects for food (by more than 50 percent) and agriculture as well as a significant reduction of subsistence production which exceeds the one in the previous experiment. Furthermore, output in nonfood industries decreases only by about three percent such that we finally observe an economy-wide increase in GDP by almost six percent (table A-1). The combination of the two previous scenarios in *total reform*, that is the simulation of a undistorted, full competitive economy, combines the results of the two previous experiments. Welfare, GDP and agricultural output change slightly compared with the market scenario, and output in the nonfood sector declines by about twice the level of the previous runs. The apparently most significant effect however is the dramatic rise in output of marketed food where two effects matter. First, zero tariffs reduce domestic food prices which causes a drop in the demand of subsistence food up to a level which is entirely based on consumers preferences. Second, also the shift towards a competitive equilibrium has a significant impact on production in the food industry.

To understand these results, we look at the transitional dynamics for the first 25 periods as well as on the steady state effects of consumption (figure A-1) and aggregate investments (figure A-2). High consumption and increasing investment levels are consistent with large effects on welfare and GDP (*good governance*), whereas low consumption and declining investment levels explain the small effects on welfare and the negative implication for GDP in the *trade liberalization* experiment. However, looking at the patterns of prices that determine these variables, the results appear to be contradictory. According to figure A-3, the Consumption Price Index (CPI) decreases for all scenarios, and this decline is even stronger in the *trade liberalization* than in the *good governance* experiment. Furthermore, it appears to be striking that the price for investment goods increases when tariffs are abolished (*trade liberalization*) and thus, imports become cheaper (figure A-4). Moreover, why do aggregate investments fall in the *trade liberalization* but rise in the *good governance* scenario (figure A-2) although for both experiments, the price for investment goods exceeds its benchmark? To understand this puzzle, we need to recall

that the model is based on an intertemporal utility function and the hypothesis of perfect foresight. Thus, these results are driven by income-type of behavior. Accordingly, real income of representative households depends not only on consumption prices, but also on prices of factor endowments, on the domestic capital stock as well as on the holdings of foreign capital assets. Consequently, the answer to the puzzle lies in the performance of these variables.

Aggregate investments depend on the price for the investment composite and the rental rate of capital . Under *trade liberalization*, the price of investment goods increases despite zero tariffs because the government's budget constraint causes consumption tax rates to increase in order to replace the losses from tariff revenue. This increases the price of the nonfood composite gross of consumption tax, and since aggregate investment goods mainly consists of nonfood commodities, it also explains the increase in their price. Furthermore, the transitional pattern of this price determines the rental rate of capital since non-arbitrage conditions for investments imply that as the price of investment goods declines along the transition path, than—at a constant world interest rate—the rental rate of capital in period $t$ has to be above this price. As figures 5 and 6 confirm, this condition holds for all three scenarios. The incentive or disincentive to invest arises from the difference of both prices: as long as the price of investment composites is higher (lower) than the rental rate of capital, there is no (a strong) incentive to further invest and thus, the capital stock decreases (increases) as it is the case for the *trade liberalization* (*good governance*) experiment (figure A-7). As a result, income from capital declines under *trade liberalization* and increases with *good governance*. Furthermore, low incentives for new installation of capital (*trade liberalization*) also reduce import demand such that the trade deficit falls below its initial level (figure A-8). This in turn allows households to expand their holdings of foreign capital assets (figure A-9) since they have no incentive to expand the domestic capital stock. However, along the transition path, the higher returns from these capital assets increases import demand such that the trade deficit in the new steady state even exceeds its benchmark level. In turn, the opposite effect reduces the steady state levels of foreign capital assets and the trade deficit when investment incentives are stronger (*good governance*).

While this provides a sufficient explanation for the development of aggregate investments, capital and GDP, income effects from endowments of domestic and foreign capital are ambiguous and thus, do still not provide a straightforward explanation for the low welfare effects of *trade liberalization* when compared with the *good governance* experiment. However, looking at the output effects in an undistorted economy (*total reform*), we find a comparative advantage in labor intensive (agriculture) rather than in capital intensive production (nonfood). Moreover, the liberalization of the foreign trade regime also lowers the price for agricultural raw products, whereas when food processors offer a competitive price in the market and the total reform experiment, the price increases (figure A-10). Therefore, we can explain the drop of the wage rate below the benchmark in the *trade liberalization* scenario and the rise in the *good governance* and the *total reform* scenario (figure A-11) by a Stolper-Samuelson effect. Since the labor endowment is by far the biggest source of private income, this eventually determines real income such that it almost offsets the positive income effect resulting from lower domestic prices in policy, whereas it supports low prices for the market and the total reform experiment.

## 4.3 Sensitivity Analysis

In how far do these results rely on critical assumptions? Table A-1 shows the steady state effects of selected variables under different levels of Armington and subsistence elasticities (the grey columns in the middle shows results of parameter values as used in the previous

discussion). The figures suggest that although the levels of variables in the model change depending on the choice of various elasticities, the ranking of the three scenarios in terms of welfare and output effects remains constant. In other words, although the assumed elasticities have a significant impact on the steady state levels of the variables in our model, we do not observe changes in the relative impact of one policy for different combinations of elasticities. It is in particular remarkable that not only for welfare, but also for almost all other variables, steady state effects are stable relative to the other scenarios.

Furthermore, we have shown that our results are mainly driven by Stolper-Samuelson like effects on wages that arise from the switch to perfect competition. Since the specification of the initial redistribution of income in the agri-food chain is rather stylized, it is important to analyze the stability of our results with regard to changes of these rents. Initially, we have assumed that food processors and traders receive a rent of fifteen percent of their domestic sales value. Therefore, we now re-compute our simulations for alternative initial levels of income transfers for an interval between zero and twenty percent. As the main intention of this study is to obtain a stable ranking of the three policies depending on their relevant welfare effects, we focus the following discussion on the different welfare implications which we calculate for different level of initial income transfers. Figure 1 summarizes the results. Our first finding is that welfare effects for all three scenarios increase with the assumed level of initial income transfers. For *trade liberalization*, this is because of rationalization gains similar to the ones predicted by other studies of trade liberalization and imperfect competition in a general equilibrium setting. The general intention is that when tariffs are eliminated, fewer firms are necessary to produce a given amount of output and the higher the initial level of imperfect competition, the higher the gains from liberalization . For the *good governance* scenario, the positive impact on welfare is driven by the Stolper-Samuelson effect on wages as discussed above. The higher the initial income transfer, the higher the initial price discrimination against agricultural raw products but also, the higher the rise of this price when rent seeking is eliminated and thus, the larger the Stolper-Samuelson effect on the wage rate. This in turn rises consumers' income. Finally, the (always) higher welfare gains in the *total reform* experiment are caused by a combination of the two previous effects. As figure 2 clearly shows, both, the market as well as the total reform scenario already lead to higher welfare gains than the policy experiment when the initial level of income transfers accounts for only 2.5 percent. Thus, with regard to the assumption which we test in this section (fifteen percent) we conclude, that our welfare based policy ranking is stable for a fairly wide range around our initial assumption.

# 5 Conclusions

The focus of this paper is on assessing the contribution of liberalization and governance improvements on economic growth. To do so, we turn to a specific case study, the agri-food chain in Bulgaria, for which we argue that under low governance quality, food processing firms need to finance a rent-seeking system and that these firms are able to generate positive profits from oligopsonistic competition to make up for rent-seeking expenditures. Although this specification does not explicitly simulate the underlying rent-seeking behavior, it still allows us to incorporate the consequences for welfare and allocation. We include it into a dynamic general equilibrium model and use it to assess the partial impact of policies such as trade liberalization or institutional reforms on economic growth. The results demonstrate that the initial distortions caused by redistributive activities are fairly large and that they push resources out of activities where the economy has a comparative advantage. Furthermore, we find that given the low quality of governance, there will be no

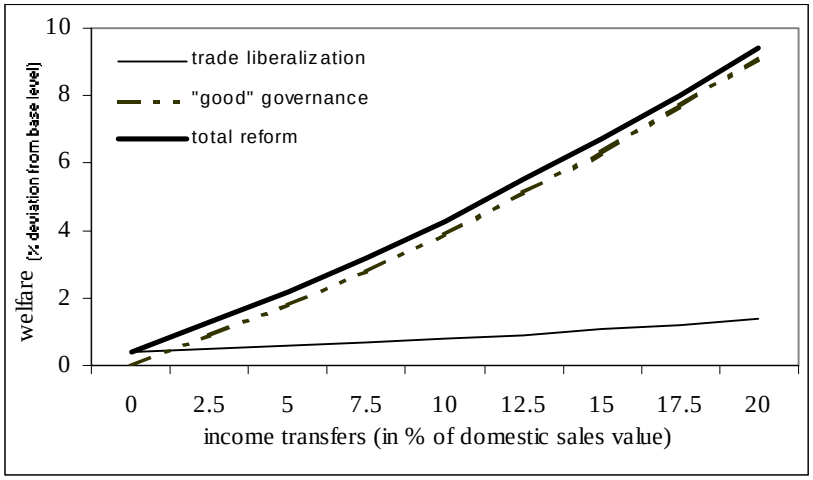


Figure 1: welfare changes by different levels of initial income transfers

significantly positive impact from liberalization on welfare and growth. Moreover, since these policies lower incentives to invest in the country, they cause an outflow of capital as well as a decline of GDP and the domestic capital stock. Finally, we find that among the analyzed policies only the betterment of governance and the institutional framework can potentially lead to a significant improvement in the allocation of resources and thus, to a positive effect on welfare. We explain these results by the dramatic impact of oligopsonist behavior of food processors that distorts the equilibrium wage rate of labor, the biggest endowment in the economy, through a *Stolper-Samuelson* effect. Consequently, as long as rent-seeking activities and oligopsonistic competition prevail, there will be no significant improvement in welfare and growth. Finally, based on a sensitivity analysis we find our results to be stable with regard to changes in critical assumptions of the calibration procedure.

The paper provides an idea about the priority of different aspects of reform policies based on a formal framework. However, assuming the rules of the rent-seeking game as exogenously given by a fixed costs certainly represents an important drawback. Instead, a more careful specification of the behavior of the beneficiaries of rent seeking and corruption should consider an endogenization of the rules of the game. Some examples how this can be achieved are Grossman and Helpman (1994), who model the optimal level of protection, Grossman and Kim (1995) who endogenize attempts to secure own property, or Angeletos and Kollintzas (2000) who solve for the optimal level of corruption in the spirit of Grossman and Helpman. However, all these suggestions are related to very specific cases, and we have argued that economic theory—just as reality—does not provide a unique perspective on corruption, rent seeking, and other activities which tend to be beneficial under low governance quality. In modeling terms, severe problems such as non-convexities in the objective functions are likely to occur and to distort the explanatory power of general approaches. For this reason, we have limited our study to an exogenous type of behavior and leave a further endogenization of our specific case up to future research.

From policy makers' view, our results suggest that for the case of Bulgaria, it would require much deeper reforms than a simple liberalization to achieve an improvement of economic performance and sustainable growth rates. Instead, policy makers should strongly

focus on the improvement of governance quality through the elimination of noncompetitive behavior and market imperfections. For instance, a sufficient legal framework and an independent jurisdiction with strong courts are necessary to strengthen property rights or to enforce contracts. Furthermore, an efficient anti-corruption agency but also several NGOs could help to reduce the extend of unproductive and redistributive activities. However, breaking up a well established rent-seeking system will certainly cause the resistance of its beneficiaries and thus, will be a fairly difficult task to achieve. Therefore, it can not just be seen as the task of some policy makers or the government but will instead require the general commitment of the society as a whole. To achieve this, Hellman et al. (2000) suggest to make the social costs at which such a system operates transparent to the population, pro-reform groups and NGOs. In this context, our results could play an important role for the case of Bulgaria as they show that the social costs of rent-seeking activities financed by the food chain are about six times higher than the welfare losses due to economy-wide policy distortions.

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# Appendix

**Figure A-1: aggregate consumption**

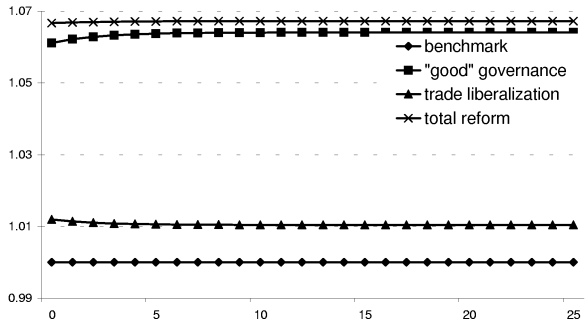


**Figure A-2: aggregate investments**

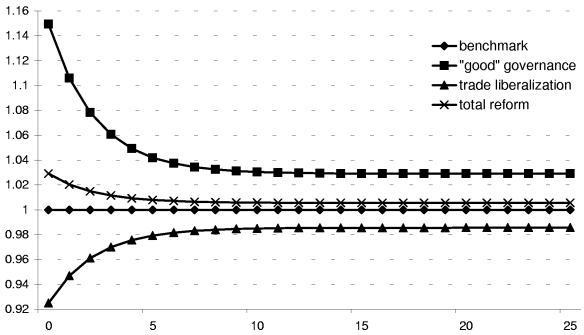


**Figure A-3: consumption price index**

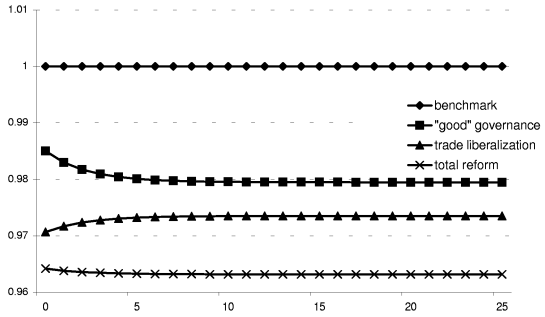


**Figure A-4: price of aggregate investments**

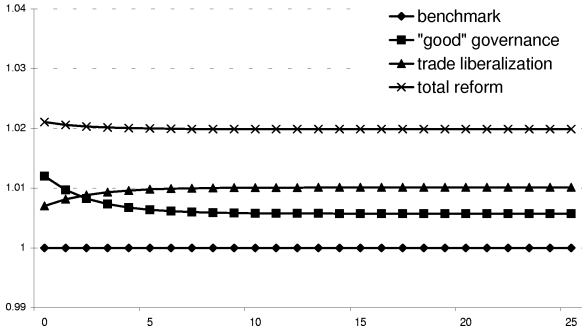


**Figure A-5: rental rate of capital**

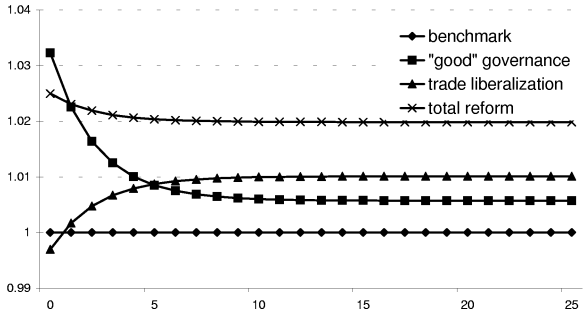


**Figure A-6: capital**

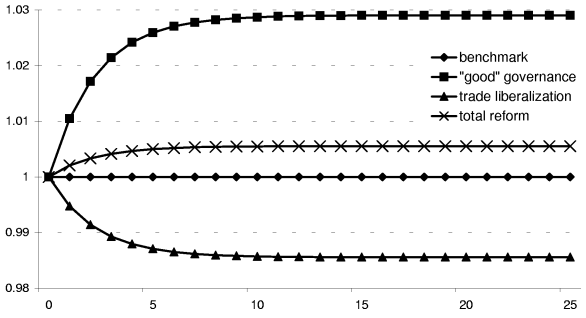

Figure A-7: trade deficit

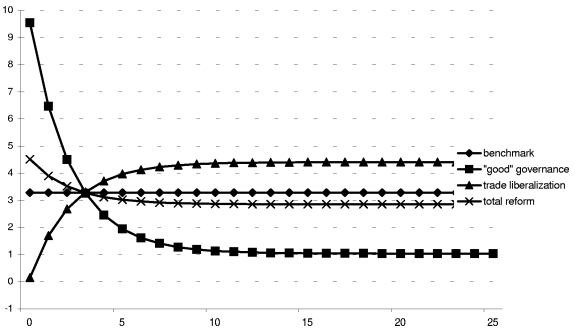


Figure A-8: foreign asset

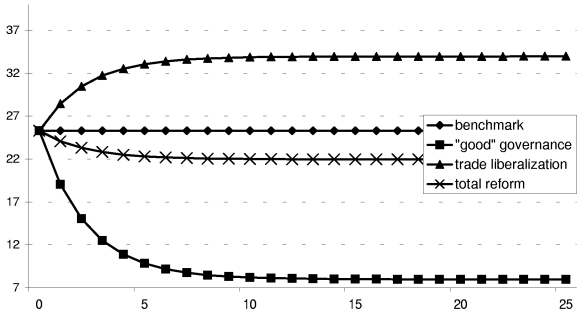


Figure A-9: price of agricultural raw products

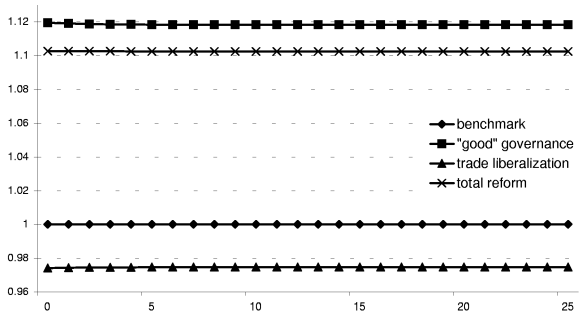


Figure A-10: wage rate

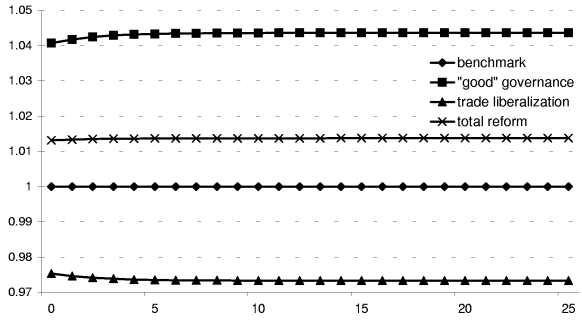


Table A-1: Sensitivity Analysis

| | Armington elasticities ($s^A$) / subsistence elasticity ($s_s$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | $s^A = 1 / s_s = 2$ | | | $s^A = 2 / s_s = 4$ | | | $s^A = 4 / s_s = 6$ | | |
| | trade liberalization | "good" governance | total reform | trade liberalization | "good" governance | total reform | trade liberalization | "good" governance | total reform |
| | deviation in percent | | | | | | | | |
| welfare | 0.70 | 5.50 | 5.80 | 1.10 | 6.30 | 6.70 | 1.70 | 7.40 | 8.00 |
| GDP | -0.59 | 5.01 | 4.36 | -0.78 | 5.57 | 4.68 | -0.63 | 6.66 | 5.74 |
| Household's income | 0.34 | 5.31 | 5.19 | 0.69 | 5.97 | 6.02 | 1.33 | 6.91 | 7.04 |
| Consumption | 0.59 | 5.65 | 5.78 | 0.96 | 6.37 | 6.71 | 1.67 | 7.47 | 7.98 |
| Household's savings | -1.57 | 2.64 | 0.58 | -1.45 | 2.84 | 0.54 | -1.36 | 2.47 | -0.32 |
| Capital stock | -1.62 | 2.71 | 1.01 | -1.48 | 2.90 | 0.55 | -1.38 | 2.51 | -0.32 |
| Output of... | | | | deviation in percent | | | | | |
| ... agriculture | 0.38 | 7.52 | 8.17 | 1.46 | 12.20 | 13.81 | 3.78 | 20.49 | 23.72 |
| ... subsistence food | -3.97 | -8.80 | -12.09 | -12.95 | -25.74 | -34.17 | -23.80 | -43.54 | -54.66 |
| ... processed food | 12.13 | 31.76 | 43.75 | 17.81 | 53.18 | 69.49 | 28.33 | 89.01 | 111.38 |
| ... nonfood | -2.56 | -0.21 | -2.96 | -3.21 | -3.36 | -6.85 | -4.89 | -9.48 | -14.33 |
| Imports of ... | in billion of levs | | | in billion of levs | | | in billion of levs | | |
| ... food | 24.96 | 22.55 | 27.10 | 27.47 | 21.94 | 29.12 | 31.80 | 20.29 | 32.53 |
| ... nonfood | 215.58 | 223.52 | 222.94 | 218.46 | 226.27 | 228.71 | 225.05 | 232.58 | 241.03 |