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Trade as Engine of Political Change: A Parable

Alessandra Casella

University of California at Berkeley; National Bureau of Economic Research, Cambridge, Massachusetts; Centre for Economic Policy Research, London

February 1993

Department of Economics

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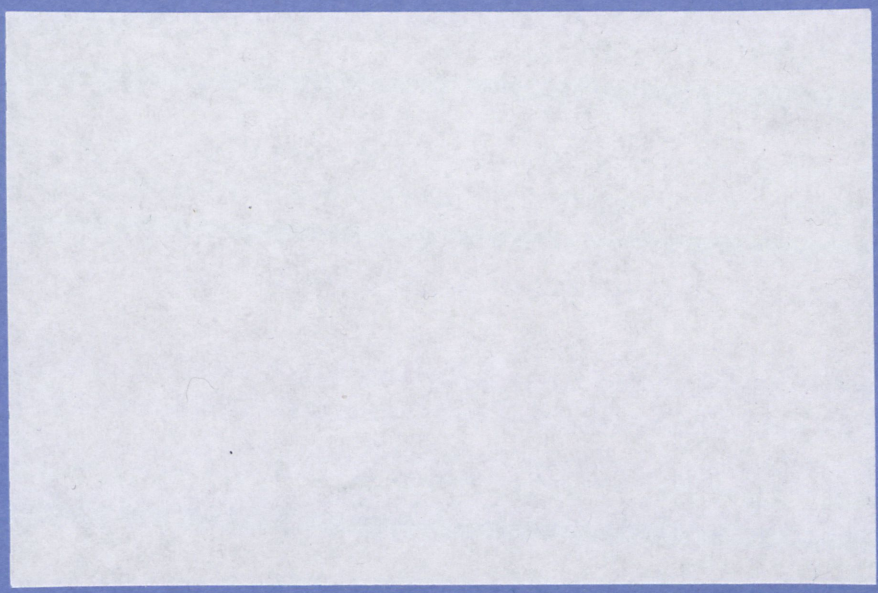

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Trade as Engine of Political Change: A Parable

Abstract

If efficient economic activity requires appropriate public goods, then changes in the volume and flow of trade will induce changes in the demand for these public goods. In general, if people disagree over their preferred levels of public goods, the expansion of trade may affect the structure of jurisdictions responsible for their provision. This paper presents a simple example meant to illustrate the general principle. It studies a general equilibrium model where the size of the market is easily parametrized and welfare depends on private exchange and two public goods. Preferences over one of them are heterogenous, but administrative costs initially make the formation of two separate jurisdictions too expensive. However, as the market expands, reliance on the public goods increases and with it the importance of having access to the correct public good. A federal system becomes optimal when the market is sufficiently large.

1. INTRODUCTION

In a recent paper, Hirschman discusses how different societies in different historical periods have regarded capitalism and free trade (Hirschman, 1982). Talking of French Enlightment in the XVIII century, he describes what he calls the doctrine of the "doux commerce" ("sweet trade"): the view that trade acts as agent of civilization and peace. According to the philosophers of the Enlightment, by bringing into contact people from different cultures with a common interest in concluding their exchanges peacefully, trade overcomes barriers and prejudices and sets the foundation for understanding, for cooperation and for peace. The opinion that economic innovations and trade are important instruments of political change recurs often in the history of ideas, even though not always with the positive connotation of the "sweet trade" doctrine. It continues to be a basic theme in sociology and political science (see, for example, Gellner (1983) and Deutsch (1956)). However, with notable exceptions (for example, North (1981)), contemporary economists have kept their distance from such a problematic question.

Still the question could hardly be more relevant to our times. In Europe, for example, political transformation is taking place at all levels of government: international, national, regional and local. Even if we restrict attention to Western European countries, where the basic political and economic structure can be taken as given, we hear discussions of new international institutions taking over national tasks; of new regional policies representing common interests of communities across national borders, of new local autonomies within each country's frontiers. Again and again, the invoked trigger is economic integration: jurisdictions must be redrawn to satisfy the requirements of unified, more competitive, more sophisticated markets.

This paper focuses on the role of expanding markets in the emergence of new jurisdictions.

An important lesson of the European debate is that economic integration is not simply accompanied by centralization of government functions at supra-national level. While this may occur for specific public goods, what we observe at the moment is pressure towards a much more complex structure of administrative responsibilities. The problem is to guarantee sufficient standardization to insure the smooth functioning of integrated markets, while recognizing the heterogeneity in preferences over public goods that accompanies different economic roles, development levels, cultures. What seems to be taking shape is a pattern of stricter international cooperation under some respects and increased regional differentiation under others. Indeed one is tempted to think that market integration is emphasizing the heterogeneity that somehow had remained hidden under the national cloak. This paper builds a very simple general equilibrium model, really not more than a parable, studying the possibility that increased trade may lead economic agents to recognize differences in their preferences over some, though not all, public goods and result in the formation of new jurisdictions.

The point of departure is a set of standard definitions borrowed from public finance. A "jurisdiction" is a group of agents who finance and share an excludable public good. The set of jurisdictions existing at a given time, their number and composition and the allocation of different public goods to different jurisdictions define the political order.

The model is built around three central assumption. First, we need a structure where the concept of "market size" has precise meaning. This is provided by a monopolistic competition framework, where agents "love variety" in consumption (Dixit and Stiglitz, 1977). In equilibrium, goods have equal prices, and the total

number of goods traded is then a natural index of the extent of the market (see, for example, Helpman and Krugman (1985) and Grossman and Helpman (1991)). Second, to capture at least minimally the complexity of the question there must be a minimum of two public goods with a different "natural constituency", and preferences over at least one of the two public goods must be heterogenous. Finally, there must be a reason why the heterogeneity does not lead to multiple jurisdictions when the market is small. A common objection to the multiplication of jurisdictions, even when such multiplication would be optimal according to standard public finance principles, is the presence of administrative costs. For example, Starrett writes: "Each type of congestible collective good has a "natural" constituency determined by the optimal number of households in a sharing group. Thus [..] we would find each household belonging to a number of overlapping constituencies, potentially one for each collective good. Naturally, this arrangement would be extremely cumbersome..." (Starrett (1988), p. 115). The model presented in this paper analyzes the effect of expanding markets on the trade-off between the administrative costs involved in multiplying the number of jurisdictions, and the heterogeneity in preferences over the public good that makes such a multiplication desirable. As the market grows larger, reliance on the public goods increases, making more imperative the provision of the appropriate public good to each consumer. This effect leads consumers to form a separate jurisdiction for the provision of the second public good and a "federal" system emerges.

The paper proceeds as follows. Section 2 presents the basic model, assuming homogenous preferences, and section 3 describes its solution. Heterogeneity is introduced, and its effect discussed, in section 4. Section 5 extends the discussion to international trade, and section 6 concludes.

2. THE BASIC MODEL

The economy is represented by a circle of radius r. A continuum of consumers is distributed uniformally along the length of the circle, and each agent's location is an index of his initial endowment. (See Figure 1). All consumers have one unit of endowment of their respective good and identical utility functions:

$$U = \int_{\Omega} c(i)^{\theta} \, di \qquad \theta \in (0,1) \qquad (1)$$

where c(i) is consumption of good i, Ω is the set of all goods in the economy and θ is a parameter capturing the substitutability of different goods in consumption. The elasticity of substitution is $1/(1-\theta)$: the smaller is θ the less substitutable goods are or, alternatively, the closer θ approaches 1, the closer the equilibrium will approach autarky.

To be able to trade, consumers need to carry their endowment to the market, located in the "piazza" at the center of the circle, at distance r from each consumer. If no roads are built, goods depreciate during transport, at rate δ for unit distance. A consumer leaving home with one unit of his endowment good will arrive at the market holding $e^{-\delta r}$ units.

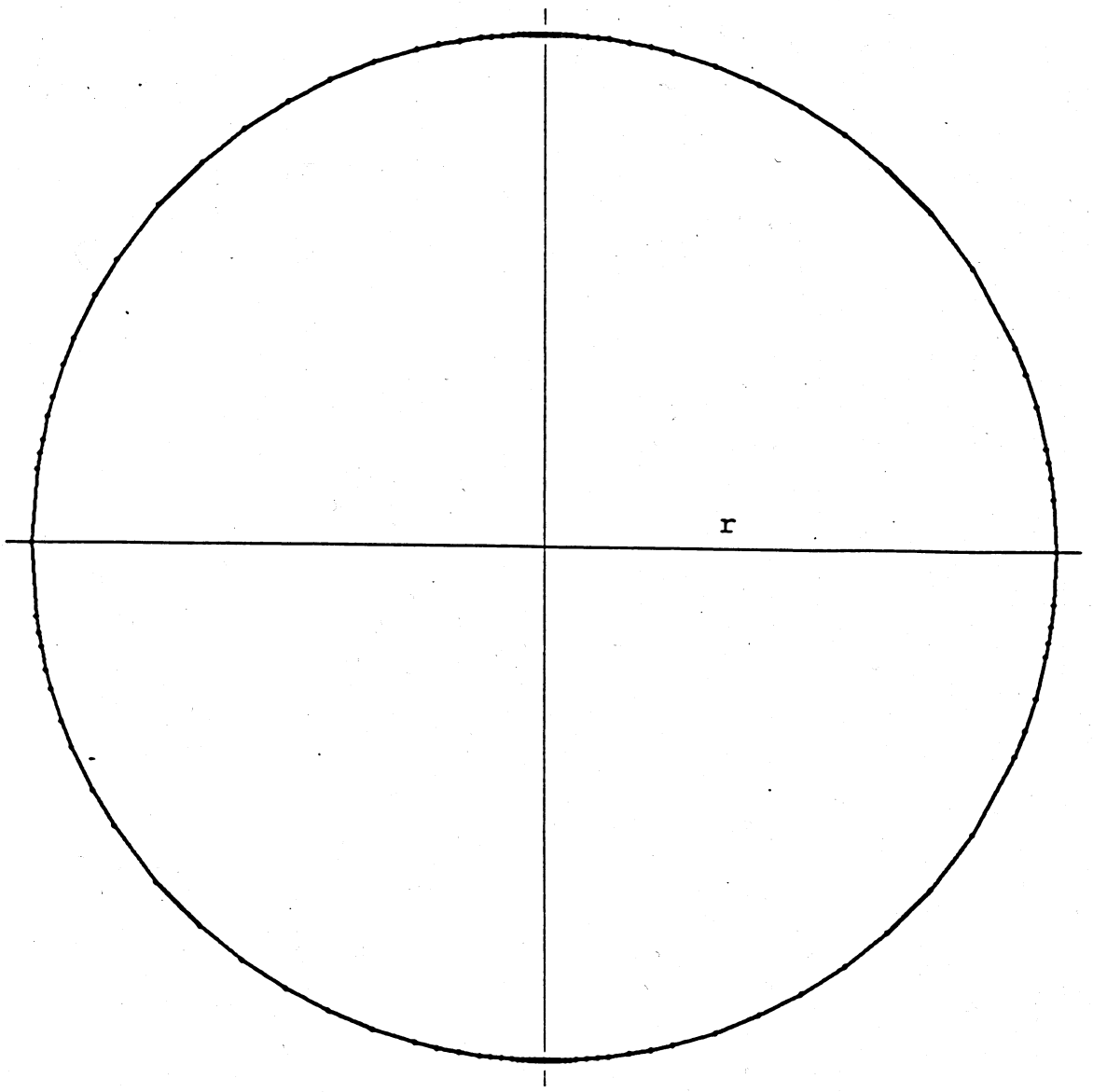
Spending resources on roads will decrease the rate of depreciation, at the expense of taxes collected on consumers' endowments. I assume that all goods can be immediately converted into resources necessary for road construction, and all consumers must pay an equal proportion of their endowment in taxes. A consumer being taxed a fraction t of his endowment will arrive at the market holding

$$(1-t)e^{-\delta r(1-t)} \qquad (2)$$

units of his good. The specification chosen in (2) has two implications: (1) There

Figure 1

The Closed Economy



involved in trading with them (the lower is g) and the higher is the elasticity of substitution among different goods.

The maximization yields the demand functions:

$$x_s(i) = \frac{E(s)\, p(i)^{-1/(1-\theta)}}{\int_{\Phi(s)} p(i)^{-\theta/(1-\theta)}\, di + \int_{\Phi^-(s)} [p(i)/g]^{-\theta/(1-\theta)}\, di} \qquad \forall i \in \Phi(s)$$

$$x_s(i) = \frac{E(s)\, p(i)^{-1/(1-\theta)}\, g^{\theta/(1-\theta)}}{\int_{\Phi(s)} p(i)^{-\theta/(1-\theta)}\, di + \int_{\Phi^-(s)} [p(i)/g]^{-\theta/(1-\theta)}\, di} \qquad \forall i \in \Phi^-(s) \tag{7}$$

where E(s) is total nominal expenditure by consumer s and equals the value of his endowment:

$$E(s) = p(s)\, (1-t)e^{-\delta r(1-t)} \tag{8}$$

The equilibrium price for each good must be such that supply equals total demand, the sum of demands by friends and by strangers. For example, the price of good i must be such that:

$$(1-t)e^{-\delta r(1-t)} = \int_{\Phi(i)} x_s(i)\, ds + \int_{\Phi^-(i)} x_s(i)\, ds \tag{9}$$

where the demand functions are given by (7).

The problem is not simple because each consumer weighs his demand by a different price index (the denominator in (7)), constructed to reflect his own set of friends, and the demand functions cannot be easily aggregated. However, the model is essentially symmetric: all goods are in equal supply, and all are demanded by the

same mass of friends (ϕ) and strangers ($2\pi r-\phi$). To each consumer, all friends' goods are equivalent, if they have equal prices, and so are all strangers' goods. We can exploit this symmetry to guess the existence of an equilibrium where all goods have the same price. The Appendix shows that this is indeed an equilibrium.

Setting:

$$p(i) = p(s) \equiv p \qquad \forall i,s \tag{10}$$

and substituting equation (8), the demand functions (7) become:

$$x_s(i) = \frac{(1-t)e^{-\delta r(1-t)}}{\phi + (2\pi r-\phi)g^{\theta/(1-\theta)}} \qquad \forall i \in \Phi(s)$$

$$x_s(i) = \frac{(1-t)e^{-\delta r(1-t)}\, g^{\theta/(1-\theta)}}{\phi + (2\pi r-\phi)g^{\theta/(1-\theta)}} \qquad \forall i \in \Phi^{-}(s) \tag{11}$$

The utility function (1) can be rewritten distinguishing explicitly between friends' and strangers' goods:

$$U_s = \int_{\Phi(s)} c_s(i)^{\theta}\, di + \int_{\Phi^{-}(s)} c_s(i)^{\theta}\, di \tag{12}$$

Recalling (4) and substituting (11), we finally derive indirect utility:

$$U = (1-t)^{\theta} e^{-\delta\theta r(1-t)} \left[\phi + (2\pi r-\phi)g^{\theta/(1-\theta)}\right]^{1-\theta} \tag{13}$$

where g is given by equation (3). In the symmetrical equilibrium, all consumers in the economy have identical utility.

Having solved the private optimization problem, we can now find the optimal tax rate t and legal rules m. Substituting (3) in (13) yields:

$$U = (1-t)^{\theta} e^{-\delta\theta r(1-t)} \left[\phi + (2\pi r - \phi)(1-|m-\mu|)^{\theta/(1-\theta)}\right]^{1-\theta} \qquad (14)$$

Maximizing (14) with respect to t and m, and constraining t to be non-negative, we obtain:

$$m^* = \mu$$

and (15)

$$t^* = \begin{cases} 0 & \text{if } r \leq 1/\delta \\ 1 - 1/(\delta r) & \text{if } r > 1/\delta \end{cases}$$

Since everybody agrees on the optimal set of legal rules and since they are costless, they are naturally provided. Roads, on the other hand, will be supplied only if there is sufficient need, since they must be financed by withdrawing resources from private trade. The radius r is the distance that traders must travel to reach the market, and investing in roads will be advantageous only if this distance is sufficiently large. If r is larger than the threshold required for the provision of roads, taxation will increase monotonically with r, approaching 1 asymptotically as r approaches infinity. In this model, r is also an index of the extension of the market, since $2\pi r$, the circumference of the circle, is the measure of the varieties of goods being traded. The double function fulfilled by r is a literal representation of the increased need for communication (and for public goods aimed at improving communication) that accompanies expanding markets.

Given the optimal choices for m and t, realized utility is:

$$U = e^{-\delta\theta r} (2\pi r)^{1-\theta} \qquad \text{if } r \leq 1/\delta$$

$$U = (\delta r e)^{-\theta} (2\pi r)^{1-\theta} \qquad \text{if } r > 1/\delta \qquad (16)$$

To complete the characterization of the equilibrium, we want to investigate the link between realized utility and the radius r. An increase in the size of the

market, as captured by a larger r, has two contrasting effects: it implies more variety in consumption, but it also means an increase in the distance to the market, and therefore in the need for roads. The first effect is positive, the second negative. It is easy to verify that the final result depends on the value of the parameter θ: the positive effect always dominates if $\theta < 1/2$. In this case, goods are bad substitutes for one another, and more variety has a larger effect on utility than the increased taxation required to provide the necessary roads.[2] (See Figure 2).

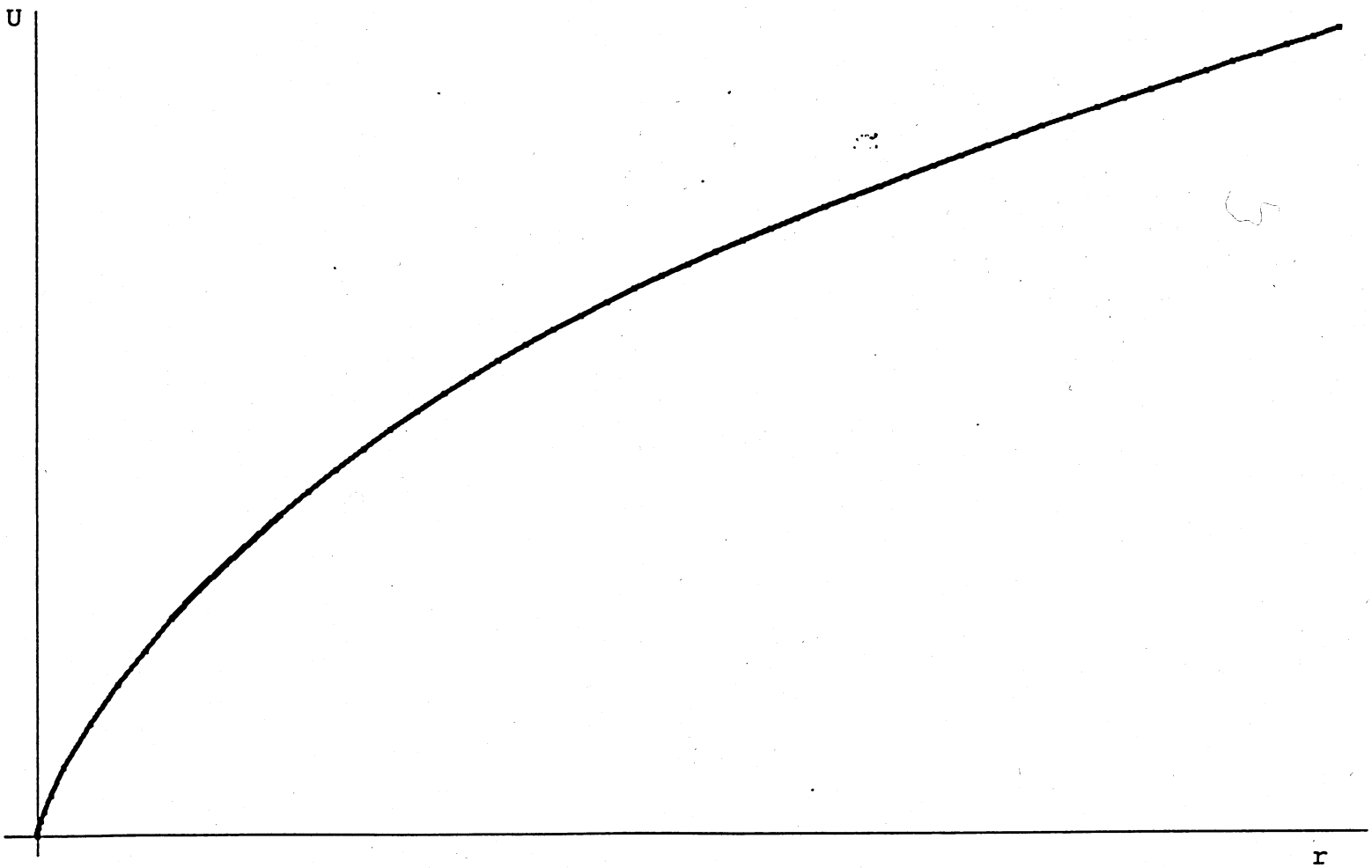
4. HETEROGENEITY

Suppose now that consumers disagree over the optimal set of legal rules. As discussed in Casella (1992), businessmen are wary of the ordinary courts' lack of familiarity with the "usages of trade", and recur to arbitration in part to have their disputes decided by peers knowledgeable in the practices of their industry. The requirements in terms of sophistication, rapidity of judgement, privacy and procedure vary across different industries, professions and markets. While the heterogeneity should be derived endogenously, in this very stylized model I simply posit that such heterogeneity exists, a result of different underlying characteristics of the endowment goods. So, for example, the technical tests required to verify that the good fulfills the conditions of the contract may differ across different goods, leading to different desired rules. The different preferences are summarized in the parameter μ: for half of the traders the ideal set of legal rules is μ_1, for the other half is μ_2, where:

$$\mu_1 - \sigma = \mu_2 + \sigma \qquad \sigma > 0 \qquad (17)$$

Figure 2

Utility and Market Size



The parameter σ, the half-distance between the two preferred points, measures the extent of heterogeneity. The first type of traders is called type 1, the second type 2. As before, contracts between friends do not need enforcement, but given existing rules m, a trader of type 1 purchasing one unit of a good from a stranger will be able to consume only g_1 units, and a trader of type 2 only g_2 units[3], where:

$$g_1 = 1 - |m-\mu_1|$$
$$g_2 = 1 - |m-\mu_2| \qquad (18)$$

Finally, I assume that each trader's friends are equally divided between type 1 and type 2 traders. This assumption preserves the symmetric structure of the model, and greatly simplifies the solution.

Given the disagreement over the optimal set of rules, the two groups of traders would be better off if they could decentralize the choice of m: type 1 traders would then be free to choose μ_1 rules, and type 2 rules μ_2. In this model, we can think of the disagreement as an extreme and straightforward form of congestion. To capture the presence of administrative costs preventing decentralization, I assume that the collection of taxes becomes more costly when the two decisions over t and m are not taken by the same agency. More precisely, if the decision over m is decentralized, individual after-tax endowment equals:

$$\alpha\,(1-t) \qquad \alpha < 1 \qquad (19)$$

while only t can be spent on road construction. The fraction $(1-\alpha)(1-t)$ is lost in administrative costs. In what follows, I call "national" the regime in which both roads and legal rules are decided together for the entire economy; "federal" the regime in which roads are decided for entire economy, but the choice of rules is decentralized.[4]

The model is solved by following the same strategy described in the previous section. Consider consumer s, of type 1. Recalling that only g_1 of each unit of good purchased from strangers can be consumed, we can derive the demand functions:

$$x_s(i) = \frac{E(s)\, p(i)^{-1/(1-\theta)}}{\int_{\Phi(s)} p(i)^{-\theta/(1-\theta)}\, di + \int_{\Phi^-(s)} [p(i)/g_1]^{-\theta/(1-\theta)}\, di} \qquad \forall i \in \Phi(s)$$

$$x_s(i) = \frac{E(s)\, p(i)^{-1/(1-\theta)}\, g_1^{\theta/(1-\theta)}}{\int_{\Phi(s)} p(i)^{-\theta/(1-\theta)}\, di + \int_{\Phi^-(s)} [p(i)/g_1]^{-\theta/(1-\theta)}\, di} \qquad \forall i \in \Phi^-(s) \tag{20}$$

where E(s) is total nominal expenditure by consumer s and equals the value of his endowment:

$$E(s) = p(s)\, \alpha^I (1-t) e^{-\delta r(1-t)} \tag{21}$$

The exponent I is an indicator function, equal to 0 if t and m are decided together, equal to 1 otherwise. If consumer s were of type 2, g_1 in (20) would be replaced by g_2.

In equilibrium, the market for each good clears and supply equals total demand. Total demand is the sum of demands by friends, of type 1 and type 2, and strangers, again of type 1 and type 2. Call $\Phi_1(i)$ the set of type 1 friends of the trader selling good i, $\Phi_2(i)$ the set of type 2 friends, and conversely $\Phi_1^-(i)$ the strangers of type 1 and $\Phi_2^-(i)$ the strangers of type 2. In equilibrium p(i) must be such that:

$$\alpha^I (1-t) e^{-\delta r(1-t)} = \int_{\Phi_1(i)} x_s(i)\, ds + \int_{\Phi_2(i)} x_s(i)\, ds \int_{\Phi_1^-(i)} x_s(i)\, ds + \int_{\Phi_2^-(i)} x_s(i)\, ds \tag{22}$$

As before, the problem is complicated by the different price indexes used to weigh individual demands, but the symmetry of the set-up allows us to guess that an equilibrium exists where all prices are equal. The Appendix shows that this is indeed the case.

Setting all prices to p and substituting equilibrium consumption levels in utility, we derive indirect utility for type 1 and type 2 consumers:

$$U_1 = \alpha^{I\theta}(1-t)^{\theta}e^{-\delta\theta r(1-t)}\,[\phi + (2\pi r-\phi)g_1^{\theta/(1-\theta)}]^{1-\theta}$$
$$U_2 = \alpha^{I\theta}(1-t)^{\theta}e^{-\delta\theta r(1-t)}\,[\phi + (2\pi r-\phi)g_2^{\theta/(1-\theta)}]^{1-\theta} \qquad (23)$$

where g_1 and g_2 are given by (18).

It is now possible to characterize the optimal choices of tax rate t and legal rules m. Consider first the national equilibrium, where all consumers belong to one single jurisdiction and a single agency is responsible for determining t and m. The agency's goal is to maximize the utility of its constituents; since there is an equal number of type 1 and type 2 consumers, the agency weighs their utility equally and simply maximizes the sum (U_1+U_2). Substituting (17) and (18) in (23), and maximizing the sum of utilities we derive:

$$m^* = \mu_1 - \sigma$$
and $$t^* = \begin{cases} 0 & \text{if } r \le 1/\delta \\ 1 - 1/(\delta r) & \text{if } r > 1/\delta \end{cases} \qquad (24)$$

Since the indirect utility functions are separable in t, the optimal tax rate is not affected by the disagreement over rules m. On the other hand, the existence of such a disagreement leads the central agency to a necessary compromise: the rules that will be enacted are at the mid-point of those preferred by type 1 and by type 2 consumers.

Realized utility is identical for both types of consumers. Recalling the savings in administrative expenses and the optimal choices for t and m, realized utility is given by:

$$\begin{aligned} U_n &= e^{-\delta\theta r}\ [\phi+(2\pi r-\phi)(1-\sigma)^{\theta/(1-\theta)}]^{1-\theta} && \text{if } r \le 1/\delta \\ U_n &= (\delta r e)^{-\theta}\ [\phi+(2\pi r-\phi)(1-\sigma)^{\theta/(1-\theta)}]^{1-\theta} && \text{if } r > 1/\delta \end{aligned} \tag{25}$$

where the subscript "n" denotes the national regime.

Consider now the federal equilibrium, where consumers defer decision on roads and legal rules to two different jurisdictions: while roads are chosen for the entire economy, the choice of legal rules is decentralized, with consumers of type 1 and consumers of type 2 forming two separate clubs. The outcome is:

$$m_1^* = \mu_1 \qquad m_2^* = \mu_2$$

and

$$t^* = \begin{cases} 0 & \text{if } r \le 1/\delta \\ 1 - 1/(\delta r) & \text{if } r > 1/\delta \end{cases} \tag{26}$$

leading to realized utility:

$$\begin{aligned} U_f &= \alpha^\theta e^{-\delta\theta r}\ (2\pi r)^{1-\theta} && \text{if } r \le 1/\delta \\ U_f &= \alpha^\theta (\delta r e)^{-\theta}\ (2\pi r)^{1-\theta} && \text{if } r > 1/\delta \end{aligned} \tag{27}$$

where the subscript "f" denotes the federal regime. Once again, realized utility is identical for every consumer in the economy.

The trade-off between the two regimes is clear. A federal system allows consumers to satisfy their preferences, but requires cumbersome administration. Centralization has lower administrative costs, but forces a unique set of rules on consumers who disagree over the optimal choice. The insight of this model is that the trade-off may depend on the size of the market: the optimal partition into

jurisdictions changes in response to increases in trade. A comparison of (25) and (27) yields immediately the following proposition:

Proposition 1. If $\sigma \leq (1-\alpha)$, the national regime always leads to higher welfare. If $\sigma > (1-\alpha)$, the national regime leads to higher welfare if the size of the market r is smaller than a threshold r^*; the federal regime leads to higher welfare if r is larger than r^*, where

$$r^* = \frac{\phi\,(1-(1-\sigma)^{\theta/(1-\theta)})}{2\pi\,(\alpha^{\theta/(1-\theta)}-(1-\sigma)^{\theta/(1-\theta)})} \tag{28}$$

The parameter σ represents the heterogeneity in preferences between the two groups of consumers, and $(1-\alpha)$ summarizes the administrative costs inherent in decentralization. The first part of Proposition 1 states that if the difference in preferences is sufficiently small, compared to the cost of administering two separate jurisdictions, centralization is always preferred. If this is not the case, however, a unique jurisdiction will be preferred when the market is small, but a federal organization will lead to higher welfare as the size of the market increases.

The intuition is straightforward. When there are two different jurisdictions, an increase in r has the two contrasting effects discussed in the previous section: it implies a larger distance to the market, and therefore a larger expenditure in roads and fewer resources for private trade, but it also implies more varieties of goods available for consumption, in a world where there is a premium on variety. In the case of a single jurisdiction, however, there is a third, negative effect: as trade expands, the proportion of exchanges requiring legal enforcement rises and the lack of appropriate legal rules becomes more acutely felt. The loss deriving from suboptimal rules increases with the size of the market, eventually becomes larger than the administrative costs, and leads to decentralization.[5]

The threshold value of r, r^*, beyond which a federal regime is optimal depends

on the parameters of the model. Proposition 2 summarizes the comparative statics results derived by differentiating equation (28):

Proposition 2. Given $\sigma > (1-\alpha)$, the critical market size at which the switch from a national to a federal regime takes place is smaller the smaller are the administrative costs of decentralization; is larger the larger is the set of transactions that do not require enforcement; is smaller the larger is the heterogeneity in preferences between the two groups of traders; is larger the more easily substitutable are the different goods:

$$dr^*/d\alpha < 0; \quad dr^*/d\phi > 0; \quad dr^*/d\sigma < 0; \quad dr^*/d\theta > 0 \qquad (29)$$

All the signs are as expected.

A final remark. In this model, the influence of market size on the optimal number of jurisdictions depends on the parameter ϕ. If all exchanges required legal enforcement (if ϕ were equal to 0), or if the number of friends were a constant share of the total number of traders (if ϕ were proportional to r) then the choice between one or two jurisdictions would not change as the market expands. It is clear then that the result is quite special. Nevertheless, it should not be dismissed: the parameter ϕ captures the increased need for public goods, and specifically legal enforcement, accompanying the expansion of anonymous markets. If markets evolve from exchanges between members of small, closed communities to anonymous transactions between large numbers of agents, ϕ can be taken quite literally, as the small set of contracts that can be enforced by reputation alone. Think for example of an economy where at the beginning ϕ equals $2\pi r$: all transactions are among people who know and trust each other. Since there is no need for enforcement, there is no problem of heterogenous needs and centralization is trivially optimal. Imagine, however, that over time the market expands: people from the small community begin to bring their goods and their talents to the city. At times, they still trade with their friends, but this happens more and more rarely. The difference in their preferences over legal rules becomes important, eventually

important enough to lead to decentralization.

More generally, the modelling of ϕ should be seen a first step towards a wider question. If there are heterogenous preferences over some public goods, and if the heterogeneity does not disappear as markets expand, but on the contrary becomes more pronounced or more acutely felt, then increases in trade will give shape to changing coalitions: as markets integrate, jurisdictions will change structure.

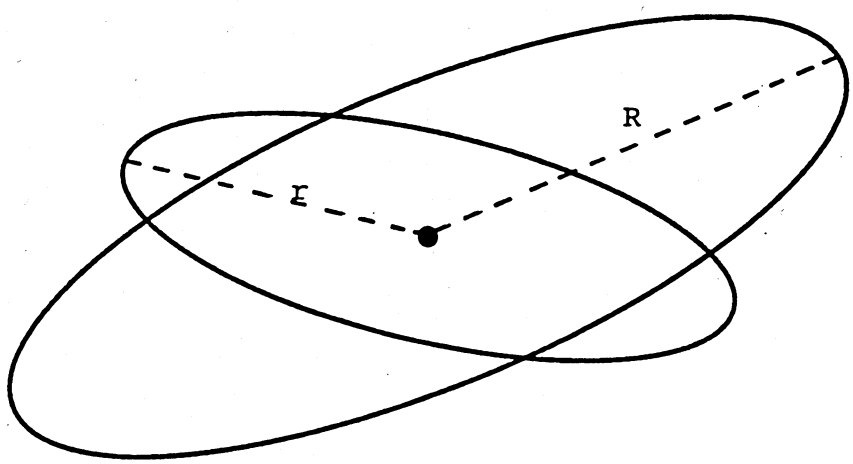
5. INTERNATIONAL TRADE

So far the effect of larger markets on political organization has been studied within the boundaries of a closed economy. In this section I ask whether opening the country to international transactions has results equivalent to those following an expansion of domestic trade. The focus is narrow, and the model abstracts from several important issues: it does not address questions of policy coordination between different countries, and it does not contribute to the discussion on the welfare implications of international trade. Both types of questions have been thoroughly analyzed in the literature.

Suppose that a second country exists, identical to the one described in the previous sections, but with radius R. The two countries share the same market, situated at the common center of both economies. As shown in Figure 3, they can be represented by two circles of different radius intersecting in three-dimensional space.[6] Each consumer in each economy must bring his endowment to the market and needs roads to arrive there without wastying too much of his endowment; roads are nationally provided. Once at the market, consumers are free to trade with both domestic and foreign partners. As before, trade with strangers requires legal enforcement, while trade with friends can take place on the basis of trust alone.

Figure 3

Two Countries



In both countries, half of the traders have ideal legal rules μ_1, and the other half μ_2, and the loss from a suboptimal legal system is once again captured by equation (18). I assume that all consumers, in both countries, have the same number of friends ϕ among nationals and among foreigners. While it would be natural to assume a higher number of friends among nationals, the symmetry is essential for a closed-form solution of the model, and, as we will see, the difference in size between the two countries is sufficient to capture a possible bias towards home trade.[7] Finally, in both countries decisions over roads and legal rules can be taken by the same agency, or can be allocated to different agencies. In the latter case, administrative costs have to be faced, summarized by the loss of $(1-\alpha)$ of each trader's endowment.

As before, the first step in solving the model is deriving individual demand functions, and aggregating them to obtain the market equilibrium. Following the logic descibed in detail in the previous sections, we can show that an equilibrium exists where all foreign goods have the same price P, all domestic goods the same price p, and the relative price is given by:

$$P/p = (z/Z)^{1-\theta} \tag{30}$$

where z is the supply of each domestic good reaching the market, and Z the supply of each foreing good:

$$z = \alpha^I(1-t)e^{-\delta r(1-t)} \qquad Z = \alpha^I(1-T)e^{-\delta R(1-T)} \tag{31}$$

Upper-case letters represent foreign variables.

Indirect utility of domestic consumers of type 1 and type 2 is then:

$$\begin{aligned} U_1 &= z^{\theta^2}\,[\,(\phi+(2\pi r-\phi)g_1^{\theta/(1-\theta)})z^{\theta} + (\phi+(2\pi R-\phi)g_1^{\theta/(1-\theta)})Z^{\theta}\,]^{1-\theta} \\ U_2 &= z^{\theta^2}\,[\,(\phi+(2\pi r-\phi)g_2^{\theta/(1-\theta)})z^{\theta} + (\phi+(2\pi R-\phi)g_2^{\theta/(1-\theta)})Z^{\theta}\,]^{1-\theta} \end{aligned} \tag{32}$$

Indirect utility of foreign consumers can be obtained from (32), substituting the first term z^{θ} with Z^{θ}.

The optimal choice of policy variables is not modified by the presence of international trade. Given (32), it is simple to show that a decision maker maximizing domestic welfare will set:

$$t^* = \begin{cases} 0 & \text{if } r \leq 1/\delta \\ 1 - 1/(\delta r) & \text{if } r > 1/\delta \end{cases} \tag{33}$$

in both a national and a federal regime. Optimal legal rules m are:

$$m = \mu_1 - \sigma \tag{34}$$

if the regime is national;

$$m_1 = \mu_1 \qquad m_2 = \mu_2 \tag{35}$$

if the regime is federal. Equivalent results hold for the foreign country. Notice that the assumptions of the model guarantee that all cross-country externality from the provision of roads is perfectly internalized and that there is no externality from the choice of rules m.

We can now ask whether there exists a market size such that a switch between one regime and the other is desirable. Think of the game between the two countries as a repeated game, where each period the two countries move simultaneously, deciding the political order they prefer, given the extent of the market. If one country alone opts for a federal regime, administrative costs distort international relative prices. Since this complication only distracts from the substance of the story, I focus on an equilibrium where the distortion does not take place. Suppose that each

country expects that a change in political regime at home will be matched abroad next period. Then it can be shown that there exists a perfect equilibrium such that the expectation is rational, and two countries are either both national or both federal, and Proposition 1 becomes:

Proposition 3. If $\sigma \leq (1-\alpha)$, the national regime leads to higher welfare in both countries. If $\sigma > (1-\alpha)$, both countries will switch from a national to a federal regime if and only if:

$$\frac{rz^{\theta} + RZ^{\theta}}{z^{\theta} + Z^{\theta}} \geq \frac{\phi\,(1-(1-\sigma)^{\theta/(1-\theta)})}{2\pi\,(\alpha^{\theta/(1-\theta)}-(1-\sigma)^{\theta/(1-\theta)})} \tag{36}$$

While the equilibrium described in Proposition 3 is not unique, it has three desirable properties. First, it coordinates the actions of the two countries and avoids the distortion in relative prices. Second, under a reasonable restriction it is Pareto superior to the one-shot Nash equilibrium.[8] Finally, if there were economies of scale in the provision of public goods, the two "clubs" devoted to the choice of legal rules in the federal regime should include all consumers of the same type, across borders, and there would be a stronger case for international coordination. While this aspect of the problem is ignored in the model, the formation of clubs across traditional administrative borders is one of the most interesting phenomena accompanying economic integration.[9]

Notice that:

$$\text{if } R > r, \quad \text{then} \quad \frac{rz^{\theta} + RZ^{\theta}}{z^{\theta} + Z^{\theta}} > r \tag{37}$$

Therefore, comparing condition (36) to the equivalent condition derived in the closed-economy case (equation (28)), we can conclude that if the foreign country is larger than the domestic country, in the presence of international trade the switch

to a federal regime takes place at smaller domestic economic size. In other words, opening the economy to international trade may trigger a political reorganization: the increase in market size causes a switch to a federal system that would not have been optimal given the extent of domestic trade only. The intuition is immediate: if the foreign country is larger than the domestic country, the proportion of transactions requiring legal enforcement increases when markets are open, and the importance of having access to the correct set of legal rules is magnified. The intuition goes beyond the very special example described by the model: if international trade requires a larger reliance on public goods than domestic trade, then opening markets to foreign exchange will emphasize the importance of correct public goods provision. In a world of heterogeneous preferences, opening trade may be an important stimulus towards a more specialized and richer system of jurisdictions.[10]

6. CONCLUSIONS

This paper has presented a simple general equilibrium model studying the relationship between the expansion of trade and the organization of jurisdictions for the provision of public goods. The problem is important because economic integration appears to trigger everywhere a reorganization of administrative functions, even in economies long accustomed to free and capitalistic markets. The current debate about reform and creation of new Western European institutions is a natural example of what are finally political implications of expanding markets.

The discussion taking place within the European Community makes clear that the response to economic integration cannot be simply increased centralization. What seems to hold the best promise for the future is a complex structure of

jurisdictions acknowledging the different needs of the different regions and possibly creating new coalitions. This model was built to begin addressing the conjecture that heterogeneity in preferences over some public goods may become more important as markets expand.

Since there is a large and important literature on federalism, the specific contribution of this paper may be made more clear by stating precisely what the model does not do. The model does not address the question of the optimal allocation of functions to different levels of government; it simply begins by assuming different natural constituencies for different public goods. Similarly, the paper does not focus on the relative amounts of public expenditure concentrated at different levels of government, for a given structure of jurisdictions; it addresses the prior question of how such a structure can be made endogeneous. Finally, the paper ignores the distortions that specific political institutions can cause on the supply of public goods; it studies instead the effect of trade on the distribution of demand, and thus the emergence of new coalitions. All of these questions are obviously interesting and relevant. This paper simply suggests an additional, complementary approach to a very complex problem.

FOOTNOTES

1. The cost of inappropriate legal rules is modeled like "iceberg"-type transport costs. See, for example, Krugman (1980).

2. More precisely, if $r > 1/\delta$, sign (dU/dr) = sign $(1-2\theta)$; if $r \leq 1/\delta$, sign (dU/dr) = sign $(1-\theta-\delta\theta r)$. Therefore, if $r > 1/\delta$, utility increases with r if and only if $\theta < 1/2$. If $r \leq 1/\delta$, $\theta < 1/2$ is sufficient to guarantee $dU/dr > 0$. A second observation: Equations (16) describe realized utility in equilibria with trade. Notice however that, for $\theta < 1/2$, at very low r autarky is optimal: the market is too small to justify expenditure on roads, and the combined effect of large transport costs and scarce variety of goods makes the trip to the market not worthwhile. Since realized utility in autarky equals 1, the threshold r below which there is no trade is defined implicitly by the condition: $e^{-\delta\theta r}(2\pi r)^{1-\theta} = 1$ or:

$$\delta \frac{\theta}{1-\theta} r - \ln(r) = \ln(2\pi) \qquad \text{(F1)}$$

3. It is assumed that the resources lost in transactions depend on the distance between the existing type of enforcement and the buyer's ideal set of rules. More generally, both the buyer's and the seller's ideal points should influence the outcome of the exchange.

4. Two observations: (1) In a closed economy administrative costs are non-distortionary, since they do not affect the optimal choice of t. They are effectively equivalent to lump-sum costs, as becomes clear if the utility function is rewritten in logarithms; (2) It is interesting to ask whether the provision of roads could also be decentralized. It can be shown that in this model any subset of consumers deciding independently its own expenditure on roads, taking other groups' decisions as given, would choose the optimal level of taxation: all benefits are internalized. However, the conclusion is not robust: economies of scale in the supply of roads would make decentralization sub-optimal. For this reason, in the text I examine only the case in which roads' supply is centralized.

5. In the federal regime, the final influence on utility of an increase in r will be positive if the elasticity of substitution between goods is sufficiently small ($\theta < 1/2$). In the national regime, utility increases monotonically with r only if:

$$\frac{(1-2\theta)}{\delta\theta} > \frac{\phi[1-(1-\sigma)^{\theta/(1-\theta)}]}{2\pi(1-\sigma)^{\theta/(1-\theta)}} \qquad \text{(F2)}$$

a condition that is more restrictive than $\theta < 1/2$. If $\theta < 1/2$, but (F2) is not satisfied, utility increases with r if r is sufficiently small or sufficiently large, but not in an intermediate interval of r values.

6. It is clear that the model can be easily extended to describe trade between any number of countries.

7. Two remarks: (1) If the two countries were of the same size (R=r), foreign trade would have no effect on the optimal partition in jurisdictions, because the second country would simply replicate the domestic economy. With both the size of the market and the number of friends doubling, there would be no new stimulus towards political reorganization. (2) With R different from r and all traders having ϕ friends abroad, the exchange of trust across borders is not balanced: there must be some friendships that are not reciprocated.

8. If R > r, a sufficient restriction is:

$$\frac{rz^{2\theta}}{RZ^{2\theta}} \geq \frac{1-\alpha^{\theta}}{\alpha^{\theta}(1-\alpha)} \qquad \text{(F3)}$$

(F3) will be satisfied if the difference in size between the two countries is not too large and the administrative costs are not too big (α sufficiently close to 1). The effect of market size on the choice of regime can also be studied in the sequence of one-shot Nash equilibria. The main logical link is identical to the one discussed in the text for the coordinated equilibrium, but it is needlessly complicated by the distortion in relative prices caused by administrative costs.

9. In the United States, a well-known example is the emergence of "special districts", local government units devoted to the provision of a single public good and cutting across county and state lines. Special districts have multiplied in recent decades, mostly in response to the growth of metropolital areas and the inadequacy of traditional administrative jurisdictions in addressing their needs. In Europe, the growing importance of regional associations, often across national borders, is an example of the same mechanism.

10. The evolution of international arbitration provides a fitting example. Businessmen are often wary of courts judgements in domestic disputes, because they fear the court may lack sufficient business experience. However, it is in international litigation that judicial awards are particularly problematic because there is large uncertainty over their enforcement abroad. The response of the business community has been to promote international arbitration agreements that give them both lower uncertainty and more sophisticated and specialized judgements. International agreements over the recognition of judicial awards have been much less successful. See the discussion in Casella (1992).

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APPENDIX

1. Market Equilibrium without Heterogeneity

The scope of this Appendix is to verify the existence of an equilibrium where all goods' prices are equal. Consider the market for good i. The supply of good i is $(1-t)e^{-\delta r(1-t)}$. Its demand is the sum of demands by friends and demands by strangers. Total demand by friends is given by:

$$\int_{\Phi(i)} x_s(i)\, ds = \int_{\Phi(i)} \frac{(1-t)e^{-\delta r(1-t)} p(s)\, p(i)^{-1/(1-\theta)}}{\int_{\Phi(s)} p(i)^{-\theta/(1-\theta)}\, di + \int_{\Phi\text{-}(s)} [p(i)/g]^{-\theta/(1-\theta)}\, di}\, ds \qquad (A1)$$

Total demand by strangers is given by:

$$\int_{\Phi\text{-}(i)} x_s(i)\, ds = \int_{\Phi\text{-}(i)} \frac{(1-t)e^{-\delta r(1-t)} p(s)\, p(i)^{-1/(1-\theta)} g^{\theta/(1-\theta)}}{\int_{\Phi(s)} p(i)^{-\theta/(1-\theta)}\, di + \int_{\Phi\text{-}(s)} [p(i)/g]^{-\theta/(1-\theta)}\, di}\, ds \qquad (A2)$$

Setting $p(i) = p(s) \equiv p$, (A1) becomes:

$$\phi \frac{(1-t)e^{-\delta r(1-t)}}{\phi + (2\pi r-\phi)g^{\theta/(1-\theta)}} \qquad (A3)$$

and (A2):

$$(2\pi r-\phi) \frac{(1-t)e^{-\delta r(1-t)}\, g^{\theta/(1-\theta)}}{\phi + (2\pi r-\phi)g^{\theta/(1-\theta)}} \qquad (A4)$$

Summing (A3) and (A4), we obtain that total demand equals $(1-t)e^{-\delta r(1-t)}$, or total demand equals supply, as desired.

2. Market Equilibrium with Heterogeneity

When there are two types of consumers, the problem is complicated by the need to distinguish between them. However, the assumption that each trader's friends are equally divided between type 1 and type 2 consumers allows us to replicate the previous equilibrium without substantial changes. Consider the demand for good i by friends of type v (v=1,2):

$$\int_{\Phi v(i)} x_s(i)\, ds = \int_{\Phi v(i)} \frac{(1-t)e^{-\delta r(1-t)} p(s)\, p(i)^{-1/(1-\theta)}}{\int_{\Phi(s)} p(i)^{-\theta/(1-\theta)}\, di + \int_{\Phi^-(s)} [p(i)/g_v]^{-\theta/(1-\theta)}\, di}\, ds \qquad (A5)$$

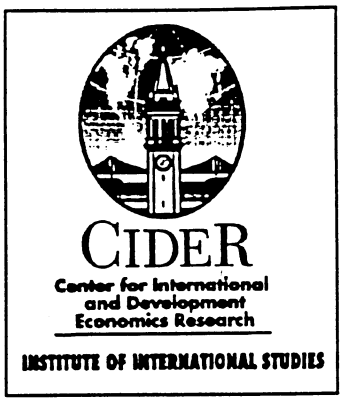
and the demand by strangers of type v:

$$\int_{\Phi v^-(i)} x_s(i)\, ds = \int_{\Phi v^-(i)} \frac{(1-t)e^{-\delta r(1-t)} p(s)\, p(i)^{-1/(1-\theta)} g_v^{\theta/(1-\theta)}}{\int_{\Phi(s)} p(i)^{-\theta/(1-\theta)}\, di + \int_{\Phi^-(s)} [p(i)/g_v]^{-\theta/(1-\theta)}\, di}\, ds \qquad (A6)$$

Setting $p(i) = p(s) \equiv p$, and accounting separately for friends and strangers of both types, we can write total demand as:

$$\frac{(1-t)e^{-\delta r(1-t)}[\phi+(2\pi r-\phi)g_1^{\theta/(1-\theta)}]/2}{[\phi+(2\pi r-\phi)g_1^{\theta/(1-\theta)}]} + \frac{(1-t)e^{-\delta r(1-t)}[\phi+(2\pi r-\phi)g_2^{\theta/(1-\theta)}]/2}{[\phi+(2\pi r-\phi)g_2^{\theta/(1-\theta)}]} \qquad (A7)$$

Thus total demand equals $(1-t)e^{-\delta r(1-t)}$, which equals supply.



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