International Trade, Factor Mobility and the Persistence of Cultural-Institutional Diversity

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CESIFO WORKING PAPER NO. 2762
CATEGORY 8: TRADE POLICY
AUGUST 2009

CESifo *Working Paper No. 2762*

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Abstract

Cultural and institutional differences among nations may result in differences in the ratios of marginal costs of goods in autarchy and thus be the basis of specialization and comparative advantage, as long as these differences are not eliminated by trade. We provide an evolutionary model of endogenous preferences and institutions under autarchy, trade and factor mobility in which multiple asymptotically stable cultural-institutional conventions may exist, among which transitions may occur as a result of decentralized and un-coordinated actions of employers or employees. We show that: *i*) specialization and trade may arise and enhance welfare even when the countries are identical other than their cultural-institutional equilibria; *ii*) trade liberalization does not lead to convergence, it reinforces the cultural-institutional differences upon which comparative advantage is based and may thus impede even Pareto-improving cultural-institutional transitions; and *iii*) by contrast, greater mobility of factors of production favors decentralized transitions to a superior cultural-institutional convention by reducing the minimum number of cultural or institutional innovators necessary to induce a transition.

JEL Code: C73, D23, F15, F16.

Keywords: institutions, incomplete contracts, evolutionary game theory, culture, trade integration, factor mobility, globalization.

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Presented at the Allied Social Sciences Association meetings in San Francisco, 3 January, 2009. We would like to thank Pranab K. Bardhan, Ennio Bilancini, Eric Brousseau, Arnaud Costinot, Simone D'Alessandro, Michele Di Maio, Francesco Drago, Maurizio Franzini, Roberto Galbiati, Pierre Garrouste, Peter Grajzl, Sung Ha Hwang, Eric Nilsson, Ugo Pagano, Emmanuel Raynaud, Massimiliano Tancioni, Pietro Vertova, Peyton Young, and Giulio Zanella for helpful comments. Thanks also to the Behavioral Science Program of the Santa Fe Institute, the U.S. National Science Foundation, the University of Siena and the European Science Foundation for support of this project.

1. Introduction

Among history's great puzzles are the many instances of centuries-long persistence of institutional and cultural differences between different populations, often enduring long after their initial causes have disappeared. Institutions and elite cultures that owed their origin to the 16th century exploitation of slaves and coerced Native American labor in the mines and fields persisted long after sugar and gold had lost their central role in the Latin American economies (Sokoloff and Engerman, 2000). Current levels of distrust in distinct African populations reflect the enduring effects of variations in exposure to the slave trade that ended two centuries ago (Nunn and Wantchekon, 2008). Differing levels of cooperation and civic values among Italian urban areas appear to be the legacy of autonomous city-state institutions or their absence half a millennium earlier (Guiso, Sapienza, and Zingales, 2009). The effects of the differing tax and land tenure systems imposed by the British Raj in the 18th and 19th century persisted in post-Independence India (Banerjee and Iyer, 2005).

In epochs and social orders marked by limited contact and restricted competition among geographically separated areas, persistent cultural and institutional differences are readily explained. But this is not the case for connected populations with at least a modicum of competition. Here we explain how the decentralized updating of both preferences and contractual choices supports durable cultural and institutional differences that may provide a basis for specialization, comparative advantage, and hence trade, which in turn stabilizes the cultural and institutional differences. Our model hinges on the codetermination of institutions, cultures, and economic specialization, a nexus long-studied by economists with a historical bent (Gerschenkron, 1944; Kindleberger, 1962; Sokoloff and Engerman, 2000), but only recently modeled by economic theorists (Costinot, 2009; Bardhan, Mookherjee, and Tsumagari, 2009; Levchenko, 2007; Olivier, Thoenig, and Verdier, 2008).

We develop a two-good/two-country model with endogenous preferences and institutions in which employee-employer relations are shaped by social norms and governed by (possibly incomplete) contracts. Goods differ in the extent to which their production and distribution may be subject to complete contracts and consequently in the role of social norms such as reciprocity or a work ethic in facilitating exchange. We refer to differences across economies in the kinds of contracts that are offered as institutional differences, while variations in preferences (including social norms) are termed cultural differences. The main novelty of our approach (one shared with

Greif, 1993, 1994, 2002, Galor and Moav, 2002, and Doepke and Zilibotti, 2008) is that rather than treating institutions and preferences as exogenous or determined by a national-level constitutional bargain, we use evolutionary game theory to model the interacting dynamics of both as the result of decentralized non-cooperative interactions among economic agents. Like Guiso, Sapienza and Zingales (2009), Tabellini (2008) and Spolaore and Wacziarg (2008), we study the economic importance of cultural differences and model cultural evolution (Bowles, 1998; Bisin and Verdier, 2001; Fershtman and Bar-Gill, 2005). In our model, the optimal form of contract to offer depends on the preferences which prevail in a given country, incomplete contracts, for example being more profitable where social preferences like the work ethic or reciprocity are common. The distribution of preferences in turn is based on a cultural updating process in which the payoffs to different preferences (and the behaviors they support) depend on the distribution of contracts in the economy. It is this mutual dependence of preferences and contracts and the differences among goods in the extent that complete contracts are cost-effective that supports the multiplicity of equilibria in our model and the resulting country differences in comparative advantage. The strategic complementarity of preferences and contracts in our model plays a role analogous to technology based economies of scale in Paul Krugman's (1987) model of intra-industry trade among countries with identical endowments and technologies.

Transitions may occur among these cultural-institutional conventions when behavioral or contractual innovators deviate from the status quo convention due to individual experimentation and other forms of idiosyncratic play. We derive three key results.

First, for historical reasons two otherwise identical countries may support different cultural-institutional conventions and these cross-country differences in the institutional and cultural environment are an independent source of comparative advantage, even in the absence of differences in technologies or factor endowments. In the absence of idiosyncratic play, a nation's cultural-institutional convention may persist indefinitely even when a Pareto-superior convention exists and when the status quo convention confers absolute disadvantage with respect to other countries in all goods. The source of persistent inefficiency in this model is the coordination failure arising from the decentralized nature of preference formation and contractual choice.

Second, economic integration reinforces rather than destabilizes institutional and cultural diversity and may impede transitions even to Pareto-improving conventions. This second result contradicts the view, popular since John Maynard Keynes (1933), that trade will lead to institutional and cultural convergence. This is especially thought to be true when one nation's

cultural-institutional equilibrium confers absolute advantage in both products. But since countries specialize in the goods that are relatively more advantaged by their institutions and preferences, trade increases the joint surplus in the cultural-institutional status quo, thereby also raising the cost of local deviations from the prevalent preferences and contracts. It also increases the number of behavioral or contractual innovators required to induce a transition to the superior convention.

Third, in contrast to trade, factor market integration facilitates convergence to superior institutions The reason is that factor mobility lowers the expected costs of deviating from one's nations' status quo and reduces the minimum number of innovators necessary to induce Pareto-improving cultural-institutional transitions.

We begin with the basic assumptions of our model and the empirical evidence motivating them (Section 2). We then develop a model of endogenous preferences and contractual choice showing that multiple asymptotically stable cultural-institutional equilibria may exist (Section 3). We embed this model of the co-evolution of preferences and institutions in a standard 2x2 model of international exchange, illustrating cultural-institutional comparative advantage (Section 4). We explore the persistence of cultural and institutional differences following trade integration (Section 5), and factor mobility (Section 6). Section 7 discusses related literature and concludes.

2. Goods, preferences and contracts

Our model is based on four assumptions with broad empirical validity. First, goods differ in the extent that their production and distribution can be cost-effectively governed by complete contracts, varying along a continuum from those on which verifiable information is readily available at zero cost, to goods on which costly monitoring is insufficient to render all of the relevant information verifiable. We refer to goods at the first pole as *transparent* and those at the second as *opaque*. Second, the production and exchange of goods for which complete contracting is costly or ineffective – opaque goods in our terminology – is facilitated by such social preferences as trust, truth telling, reciprocity and a positive work ethic. Where exchange-supporting social norms are absent, the costs of producing goods for which complete contracting is infeasible will be elevated. Thus one may expect the distribution of preferences to influence the product composition of output via its influence on the cost-effectiveness of complete and

incomplete contracts. We illustrate the first two assumptions before proceeding to the third and fourth.

In Thailand the wholesale rice market approximates a standard economic textbook impersonal exchange among parties whose identity is effectively irrelevant to the transaction (Siamwalla, 1978). The raw rubber market, by contrast, is highly personal and is based on longstanding relationships of trust. The difference is explained by the fact that the quality of rice is readily assayed by the buyer, while the quality of raw rubber is impossible to determine when it is purchased. In the absence of trust among Thai buyers and sellers, trade in raw rubber would be more expensive. Raw rubber is an opaque good, rice is transparent. Another example is Eric Nilsson's (1994) study of the effects on comparative advantage and specialization resulting from the emancipation of slaves at the time of the U.S. Civil War. Cotton, according to Nilsson, was a "slave commodity" for which effort levels beyond that which could be coerced from the worker were of little importance. For other commodities – manufactures and tobacco in Nilsson's empirical study – variations in the quality of effort were more important, and impossible to secure by coercion. Nilsson exploited the natural experiment provided by the end of slavery to study the effect of an exogenous institutional shock on production specialization in 169 counties in the Confederacy. He found that the end of slavery brought about a significant shift away from the "slave commodity" (cotton) and towards manufactures and tobacco. Stefano Fenoaltea's (1984) study of slave and non-slave production makes a similar distinction between "care intensive" and "effort intensive" productive activities. A similar distinction between sugar and tobacco was made in the much earlier study of Cuba by Fernando Ortiz (1963) who contrasted the coerced labor and hierarchical and authoritarian culture of the sugar plantation regions with the self-motivated labor and liberal culture of the tobacco family-farming areas.

The third assumption is that social preferences and incomplete contracts are complements. Attempts to render contract more complete by the imposition of explicit incentives appealing to self-interested preferences may be counter-productive if they crowd out social preferences essential to mutually beneficial exchange. This is found in a large number of natural environments (Bewley, 1999) and experimental studies (surveyed in Bowles, 2008, and Bowles and Polania, 2009). Important for our model is a well-documented form of crowding out: when agents are offered incentives that if responded to in a self-interested way would distribute all or most of the joint surplus to the principal, they prefer taking a loss to accepting the offer (Fehr, Klein, and Schmidt, 2007; Falk and Kosfeld, 2006). This is clearly evident in the common

rejection of positive offers in the Ultimatum Game when the respondent regards these as "unfair" and particularly in the willingness of Ultimatum Game respondents to sustain a larger loss in order to avoid participating in a transaction in which the proposer stands to make a larger payoff (Cameron, 1998).

The fourth assumption is that cultures and institutions are inertial. While both are endogenous, they are not the result of instantaneous individual maximization or collective choice. Rather they are durable characteristics of individuals and organizations that evolve in a decentralized environment under the influence of long-run society-wide payoff differences. Institutions and preferences are acquired and abandoned by a trial and error process often taken place at critical times, the birth of a firm, for example for contractual forms, or early childhood or adolescence for preference formation. Because childhood socialization and the other processes by which preferences are acquired take place under the influence of religious values, schooling and other effects operating at the national level, we represent this process of cultural evolution by a society-wide dynamic operating prior to economic matching for production. Thus individuals do not condition their preferences on the kind of contract they are offered in any period, and firms do not condition their contractual offers on the type of the employees with whom they are paired in a given period.

Opaque goods make up a substantial fraction of the output of the more advanced economies. Examples are the production and distribution of information-intensive goods and many services ranging from health care to entertainment and other recreational services. By contrast poorer nations produce large shares of agricultural and manufactured goods that are closer to the transparent pole of the opaque-transparent continuum. Consistent with our assumption of complementarity between social preferences and incomplete contracts there is some evidence that reciprocal social preferences are more prevalent in the higher income countries. Among subjects in 15 countries, the level of cooperation sustained in a public goods experiment in which the altruistic punishment of free riders was possible was much higher in wealthier nations (Herrmann, Thoni, and Gaechter, 2008).

For these reasons we represent an economy whose cultural-institutional equilibrium is characterized by incomplete contracts and extensive social preferences such as trust and the work ethic as having a "good" cultural-institutional environment and, as a result, enjoying absolute advantage with respect to other countries in which complete contracts may elicit low (but not high) quality contributions from entirely self-interested economic agents. Here we depart from

the common practice in the institutions and trade literature (e.g. Bardhan, Mookherjee, and Tsumagari, 2007) where complete contracts are characteristic of the rich "North" while incomplete contracts prevail in the "South". Thus the use of incomplete contracts need not reflect a nation's deficient institutional environment; rather it may be a profit maximizing choice in a society where reciprocal and other social preferences are common. Given societal differences in the composition of output it is not surprising that the norms and preferences influencing economic behavior differ significantly among societies (Inglehart, 1977; Herrmann, Thoni, and Gaechter, 2008; Henrich, Boyd, Bowles et al., 2005).

These assumptions motivate the following model.

3. Cultural-institutional equilibrium under autarchy

An economy is populated by employers and employees. Employers hire employees to produce one of two goods: the opaque good (denoted by the superscript *o*) and the transparent good (denoted by *t*). Markets are competitive in the sense that employers take the price of the good as exogenously given. There is only one factor of production, labor, which is perfectly mobile across industries but (initially) immobile across countries. Each employee is endowed with one unit of labor that can be provided in production with two different qualities: low quality effort (referred to by subscript *L*) and high quality effort (subscript *H*), one unit of high effort producing more (in either good) than one unit of low effort. The employment relationship is a random employee-employer pair for a single interaction and is regulated by a contract. High quality effort cannot be contractually enforced because it is not verifiable due to information asymmetries or other reasons.

The production process of the opaque good is more intensive in quality: the increase in production obtained employing high rather than low quality effort is relatively greater in the *o*-sector than in the *t*-sector. Denoting by Q_H^i and Q_L^i the quantity of good *i* (*i* = *t*,*o*) obtained using one unit of respectively high and low quality effort, we therefore have:

$$\frac{Q_H^o}{Q_L^o} > \frac{Q_H^t}{Q_L^t}. \tag{1}$$

Employers maximize profits, while employees maximize utility.

The employer may offer the employee one of two contracts: complete (*C*) or incomplete (*I*).

If the complete contract is offered, the employee receives a fixed compensation ($w > 0$) just sufficient to offset the cost of providing low quality effort ($\eta > 0$). These are *C*-type employers. Employers offering a *C*-contract must also pay a cost of μ (> 0) for monitoring and contractual enforcement. According to the incomplete contract, the employer pays the employee half of the output resulting from the transaction and does not monitor the employee. These are *I*-type employers.

Employees are also of two types: reciprocal (*R*) or selfish (*S*). *S*-type employees are completely self-regarding and provide low effort irrespective of the contract. *R*-type employees interpret the *I*-contract as a sign of trust on the part of the employer, and reciprocate by providing high effort, incurring a subjective cost of high quality effort $\delta (>\eta)$ as a result. However, when offered a *C*-contract (in which case the employer garners the whole of the joint surplus) *R*-type employees feel that the employer is distrusting and seeking to exploit them. As a result, they experience a subjective cost and reject the contract, no production taking place. The extent of the subjective cost is proportional to the profits the employer would have made had the contract been accepted (with a proportionality factor γ). For example, if competitive conditions constrain the employer to a zero-surplus payoff, the *R*-type worker would feel no insult if she also were to receive a wage that just compensated the subjective cost of her effort.

Agents consume a composite bundle (indicated by *c*) of the two goods produced. For simplicity, we assume that the composite good is made up of one unit of the transparent and one unit of the opaque good, and prices have no effect on consumption proportions. Denoting by p^t and p^o the price of the *t*-good and the price of the *o*-good, we define $\rho^o = p^o/(p^t+p^o)$ and $\rho^t = p^t/(p^t+p^o)$ respectively as the value of the opaque good in terms of the composite good (how many units of the *c*-good one can purchase with one unit of the *o*-good) and the value of the transparent good in terms of the composite good (how many units of the *c*-good one can purchase with one unit of the *t*-good). The utility function is additive in consumption of the composite good and subjective utility associated with the contract and effort quality.

Table 1 reports the matrix of payoffs measured in number of units of the composite good commanded. Since in autarchic equilibrium both goods are produced and labor is mobile among sectors within a country, $\rho^o_A Q^o_H$ must be equal to $\rho^t_A Q^t_H$ and $\rho^o_A Q^o_L$ must be equal to $\rho^t_A Q^t_L$, the subscript "*A*" referring to autarchy. Thus the entries in Table 1 are invariant across sectors. We assume that employers and employees update their contracts and preferences with regard to these

payoffs (that is, on the basis of inter-sectoral competitive equilibrium prices).

To exclude cases where cultural-institutional differences could not occur in equilibrium we assume that $\rho^i Q_L^i > 2(w+\mu)$ and $\rho^i (Q_H^i - Q_L^i) > 2(\delta - \eta)$, with $i = t,o$. From these assumptions we know that $\{I,R\}$, that is, the *I*-contract matched with the *R*-employee, is the joint surplus maximizing outcome. But that does not guarantee that $\{I,R\}$ will be observed in practice in a dynamic setting because the "inferior" convention $\{C,S\}$ is also asymptotically stable.

	Employee/Preferences	
Employer/Contract	Reciprocator	Selfish
Incomplete	$\boldsymbol{\rho^i Q_H^i/2},\ \boldsymbol{\rho^i Q_H^i/2 - \delta}$	$\rho^i Q_L^i / 2,\ \rho^i Q_L^i / 2 - \eta$
Complete	$0,\ -\gamma[\rho^i Q_H^i - (w+\mu)]$	$\boldsymbol{\rho^i Q_L^i - (w+\mu)},\ \boldsymbol{w - \eta = 0}$

***Table 1*: Matrix of payoffs.** (NOTE: Payoffs in bold type indicate pure stable Nash equilibria)

Writing the fraction of the employees who were reciprocators in the previous period as ω and recalling that in competitive equilibrium the payoffs in Table 1 are invariant across sectors, the expected payoffs to employers offering the *I*- and *C*-contracts are:

$$\begin{aligned} v_I &= \omega \frac{\rho^i Q_H^i}{2} + (1-\omega)\frac{\rho^i Q_L^i}{2}, \\ v_C &= \omega \times 0 + (1-\omega)[\rho^i Q_L^i - (w+\mu)]. \end{aligned} \tag{2}$$

Similarly, writing the fraction of the employers offering incomplete contracts in the previous period as ϕ, the expected payoffs to the *R*- and *S*-employees are respectively:

$$\begin{aligned} v_R &= \phi\left(\frac{\rho^i Q_H^i}{2} - \delta\right) + (1-\phi)(-\gamma)[\rho^i Q_L^i - (w+\mu)], \\ v_S &= \phi\left(\frac{\rho^i Q_L^i}{2} - \eta\right) + (1-\phi)\times 0. \end{aligned} \tag{3}$$

These expected payoff functions are illustrated in Figure 1, the vertical intercepts being taken from Table 1.

To model the mutual dependence of preferences and contracts, we represent the updating of new preferences as a now standard cultural evolution process in which individuals periodically

update their behavioral norms (perhaps only during adolescence) after having taken into account information about the frequency distribution of various behaviors in the population, the payoffs associated with various behaviors in recent periods, or other facts (Bowles, 2004; Bisin and Verdier, 2001). Suppose that both employers and employees periodically update their preferences and the behavioral types by best responding to the distribution of play in the other class in the previous period.

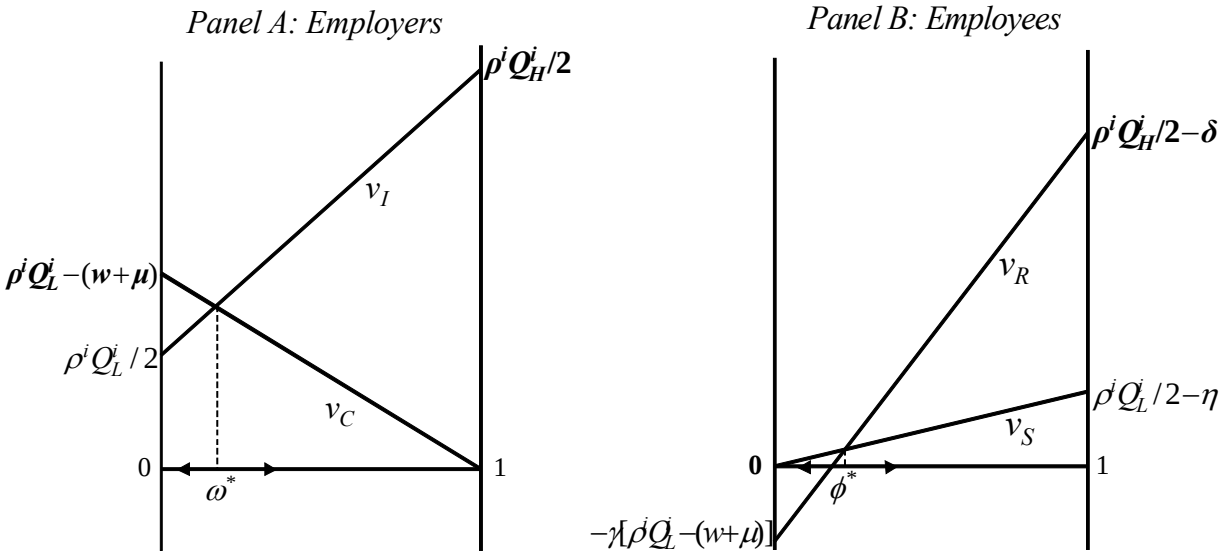

***Figure 1*: Expected payoffs under autarchy to *I*- and *C*-employers (*panel A*) and to *R*- and *S*-employees (*panel B*).** (NOTE: ϕ is the fraction of the employers offering incomplete contracts and ω the fraction of the employees being reciprocators in the previous period. Payoffs in bold type refer to the stable pure Nash equilibria in Table 1)

The updating process works as follows. At the beginning of each period, individuals are exposed to a cultural model randomly selected from their class: for instance, an employee, named A, has the opportunity to observe the behavior of another employee, named B, and to know her payoff. If the employee B is the same type as the employee A, A does not update. But if B is a different type, A compares the two payoffs and if B has the greater payoff, A switches to B's type with a probability equal to β (>0) times the payoff difference, retaining her own type otherwise. It is easily shown (Bowles, 2004) that this process gives the replicator dynamic equations:

$$\begin{aligned} \frac{d\phi}{d\tau} &= \phi(1-\phi)\beta[v_I(\omega)-v_C(\omega)], \\ \frac{d\omega}{d\tau} &= \omega(1-\omega)\beta[v_R(\phi)-v_S(\phi)], \end{aligned} \tag{4}$$

where τ denotes time. Notice that, reflecting our fourth assumption, people do not condition their updating on an already known kind of employment contract in which they will engage. We are now interested in the stationary states, such that $d\phi/d\tau=0$ and $d\omega/d\tau=0$. It is easy to see that (see appendix):

$$\begin{aligned}
&\frac{d\phi}{d\tau} = 0 \text{ for } \phi = 0,\ \phi = 1 \text{ and } \omega^* = \frac{\frac{\rho^i Q_L^i}{2} - (w+\mu)}{\frac{\rho^i Q_H^i}{2} + \frac{\rho^i Q_L^i}{2} - (w+\mu)}, \\
&\frac{d\omega}{d\tau} = 0 \text{ for } \omega = 0,\ \omega = 1 \text{ and } \phi^* = \frac{\gamma[\rho^i Q_L^i - (w+\mu)]}{\left(\frac{\rho^i Q_H^i}{2} - \delta\right) - \left(\frac{\rho^i Q_L^i}{2} - \eta\right) + \gamma[\rho^i Q_L^i - (w+\mu)]}.
\end{aligned} \tag{5}$$

The resulting dynamical system is illustrated in Figure 2 where the arrows indicate the out-of-equilibrium adjustment given by the replicator equations. The states where $d\phi/d\tau=0$ and $d\omega/d\tau=0$ are *cultural-institutional equilibria*. The state (ϕ^*,ω^*) is stationary, but it is a saddle: small movements away from ϕ^* or ω^* are not self-correcting. (Two additional unstable stationary states, namely (ϕ = 1, ω = 0) and (ϕ = 0, ω = 1) are of no interest.) The asymptotically stable states are (1,1) (hereafter referred to as $\{I,R\}$) and (0,0) (hereafter denoted by $\{C,S\}$).

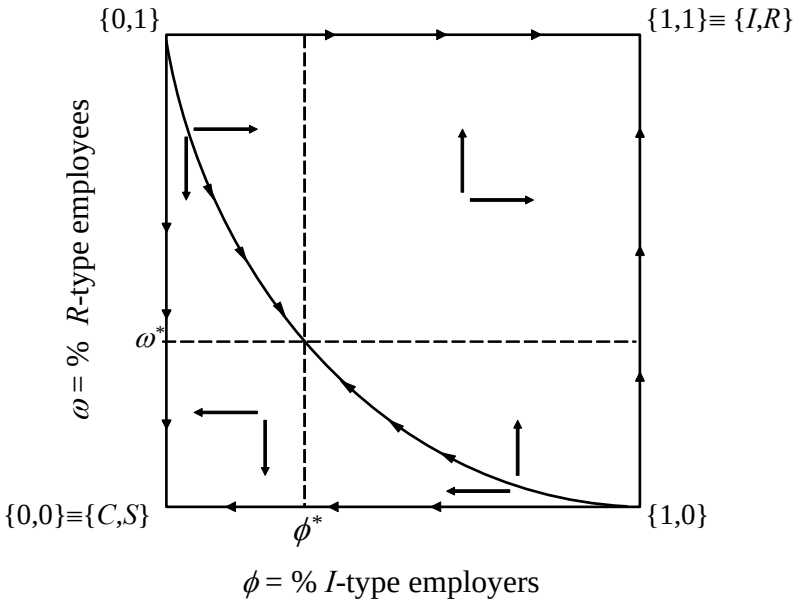

***Figure 2*: Co-evolution of institutions and preferences, and persistence of two institutional-cultural equilibria in a given country.**

In this deterministic setting, the initial state determines which of these two asymptotically stable states occurs. Of course institutions may be altered by a joint decision of a hypothetical representatives of one or both classes (Acemoglu and Robinson, 2006). But non-cooperative (that is decentralized, bottom-up) transitions are also possible. To study such a process we assume that occasional idiosyncratic (non-best response) updating of both preferences and contractual offers occurs (Kandori, Mailath, and Rob, 1993; Young, 1993, 1998). Suppose that with probability $1-\varepsilon$ myopic best response updating occurs as described above, but with a small probability ε (< 1/2) the employee chooses randomly from the two behavioral traits and the employer likewise randomizes her contractual offer. The behavioral or contractual innovations represented by idiosyncratic play may be due to deliberate experimentation, error, or any other reason for non-best response play. We assume throughout that the rate of idiosyncratic play is sufficiently small that the equilibrium conventions described above are persistent, defined as having an expected duration of more than one period (i.e. $\varepsilon <$ critical number that would induce a transition to the other convention), that is for the $\{I,R\}$ equilibrium $\varepsilon < 1-\omega^*$ and $\varepsilon < 1-\phi^*$, whereas for the $\{C,S\}$ equilibrium $\varepsilon < \omega^*$ and $\varepsilon < \phi^*$.

In a plausible version of this process (e.g. Young, 1998), the resulting perturbed Markov process is ergodic, so over the long run both $\{I,R\}$ and $\{C,S\}$ will occur, with infrequent transitions between the basins of attraction of these two equilibria. In the absence of system-level exogenous shocks, for even moderately large populations and plausible rates of idiosyncratic play institutional-cultural equilibria will persist over very long periods and the system will spend more time at the convention with the larger basin of attraction. Thus the $\{I,R\}$ equilibrium will be more persistent if $\phi^* \omega^* < (1-\phi^*)(1-\omega^*)$ that is, if $\{I,R\}$ is the risk-dominant equilibrium, and conversely for the $\{C,S\}$ equilibrium.

4. Cultural-institutional comparative advantage

Assume now that the world economy comprises two countries, 1 and 2, identical in all relevant respects (same labor endowment, same technology, same demand function), except for their recent histories, which have given them different cultural and institutional conventions. As a result their production possibility frontiers differ, and the two countries enjoy comparative advantage in the production of different goods.

Let us suppose that country 1 is near the $\{I,R\}$ equilibrium so that virtually all pairs except

those including an innovator are reciprocal types working under incomplete contracts, while country 2 is near the {*C*,*S*} equilibrium. As it is evident from Figure 3 (where the slope of the dashed lines indicates the international terms of trade), because $Q_H^o > Q_L^o$ and $Q_H^t > Q_L^t$, the {*I*,*R*} country enjoys an absolute advantage in the production of both goods. In autarchic equilibrium there will be only one relative price in each country such that both goods are produced equal to the marginal rate of transformation (*MRT*) in the two countries, namely: $p_{1A}^o / p_{1A}^t = Q_H^t / Q_H^o = MRT_1$ and $p_{2A}^o / p_{2A}^t = Q_L^t / Q_L^o = MRT_2$, where p_{1A}^o / p_{1A}^t and p_{2A}^o / p_{2A}^t are the autarchic relative prices in the two countries. Therefore, given (1), we have:

$$\frac{p_{1A}^o}{p_{1A}^t} = \frac{Q_H^t}{Q_H^o} < \frac{Q_L^t}{Q_L^o} = \frac{p_{2A}^o}{p_{2A}^t}, \tag{7}$$

so that country 1 has a comparative advantage in the production of the opaque good, whereas country 2 has a comparative advantage in the production of the transparent good.

Providing that the international terms of trade, p_T^o / p_T^t (the subscript "*T*" refers to trade), falls strictly between the autarchic relative prices of the two countries, specialization and trade will take place. Given the linearity of the two production possibility frontiers, country 1 will specialize entirely in the production of (and will export) the opaque good, while country 2 will specialize in the production of (and will export) the transparent good. Furthermore, compared to autharchy, trade benefits both classes of individuals in country 1 and employers in country 2. The resulting gains from trade are illustrated below.

When cross-country barriers to trade are removed and in absence of transport costs, the relative price of the opaque (transparent) good increases in country 1 (country 2), whereas the relative price of the transparent (opaque) good decreases. It follows that $\rho_T^o > \rho_{1A}^o$ and $\rho_T^t > \rho_{2A}^t$, where $\rho_T^o = p_T^o /(p_T^o + p_T^t)$ and $\rho_T^t = p_T^t /(p_T^o + p_T^t)$: in both countries the good in which the country specializes becomes relatively more valuable in terms of the *c*-good (with one unit of the *o*-good (*t*-good) in country 1 (country 2) one can purchase a greater number of units of the *c*-good under trade than in autarchy). Thus, as expected, $\rho_T^o Q_H^o > \rho_{1A}^o Q_H^o$ and $\rho_T^t Q_L^t > \rho_{2A}^t Q_L^t$: the *c*-good value of output in the two countries increases. All the other terms (δ, η, w, μ and γ) in the payoff matrix (Table 1) are measured in units of the composite goods and so remain unaltered.

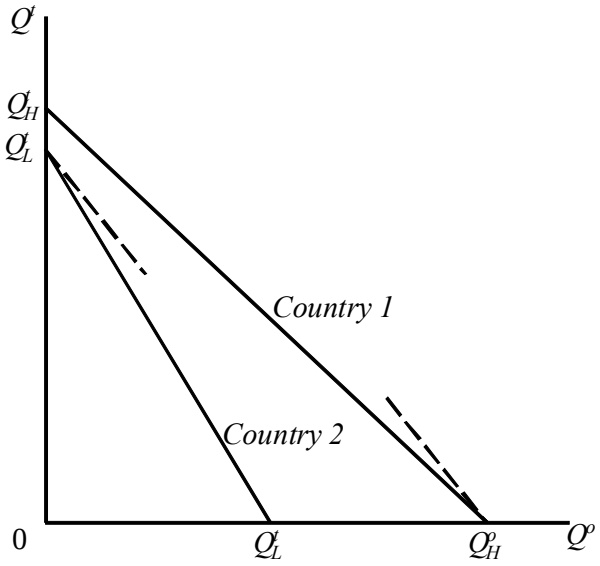

***Figure 3*: Production possibility frontiers in the two countries.**
(NOTE: Each country has a normalized labor endowment of 1)

5. Trade integration and the persistence of inefficient equilibria

Thus differences in the preferences and institutions prevailing in each country are a source of comparative advantage, and opening up to trade enables the two otherwise identical countries to enjoy welfare gains. But how does trade exposure affect the cultural and institutional environment in a given country? First, will the two countries different cultural-institutional equilibria persist after the two countries open up to international exchange? Second, does economic integration make cultural and institutional convergence more likely? These two questions may be translated as follows: will integration eliminate one of or both the critical values, ϕ^* and ω^*? If the answer is no, so that both asymptotically stable equilibria persist following integration, will trade decrease the costs of deviating from the status quo contract and preference, thereby facilitating a convergence to the other cultural-institutional equilibrium?

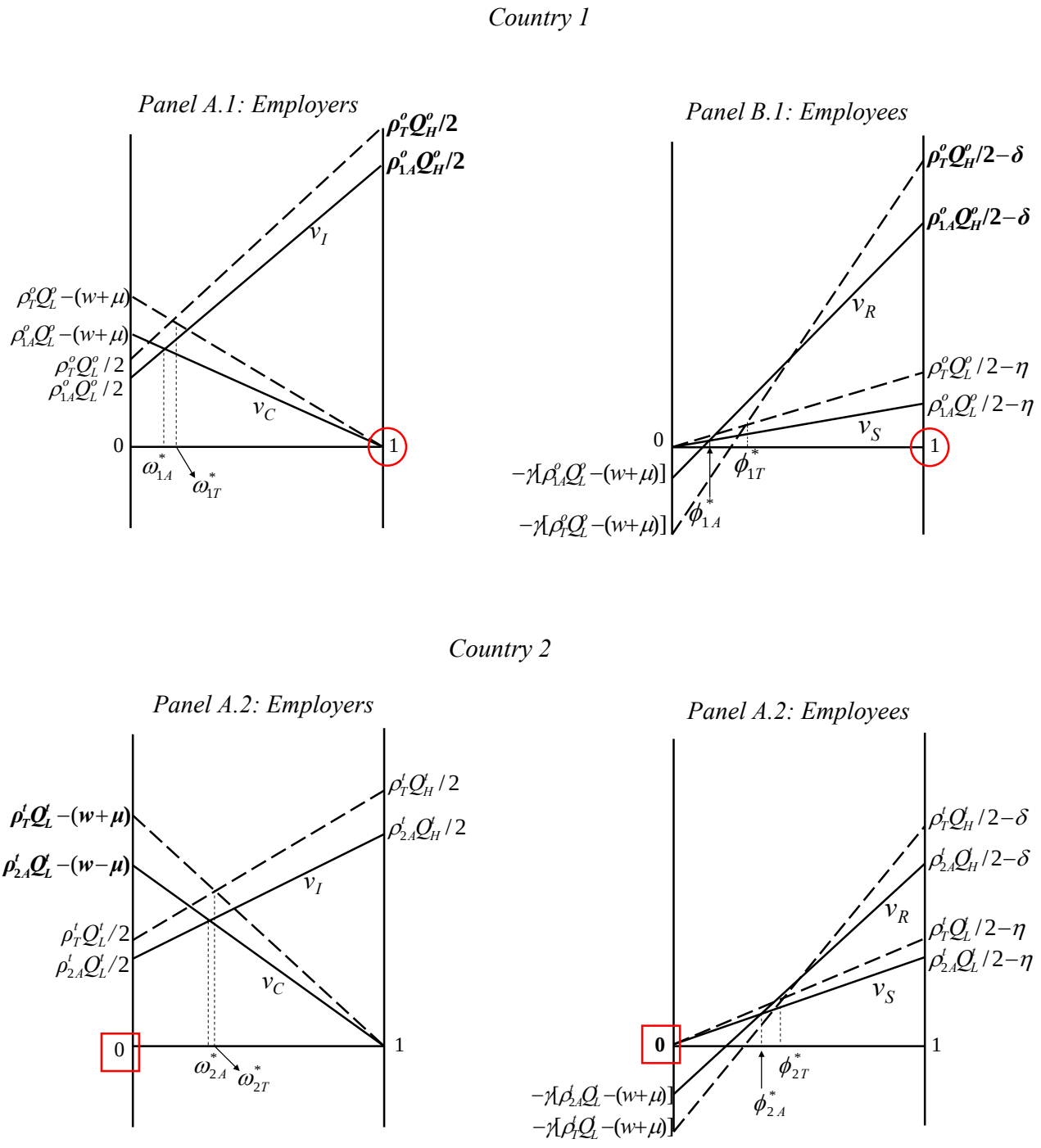

***Fig. 4*: Payoff changes to *I*- and *C*-employers (*panel A*) and *R*- and *S*-employees (*panel B*) after trade openness.** (NOTE: ϕ is the fraction of the employers offering incomplete contracts and ω the fraction of the employees being reciprocators in the previous period)

Figure 4 shows how the expected payoffs for each group of individuals change in the two countries as a result of trade. The circle (square) around the one (zero) on the horizontal axis in *panel A* indicates that the entire population of employers (except idiosyncratic players) in the given country is of the *I*-type (*C*-type); the circle (square) around the one (zero) on the horizontal axis in *panel B* signifies that the entire population of employees (except idiosyncratic players) in the given country is of the *R*-type (*S*-type). Payoffs received by the individuals in equilibrium before and after trade are emphasized in bold fonts in the relevant panel. It is easy to verify that trade integration does not destroy the cultural institutional differences upon which specialization is based. After trade, the critical values of ϕ and ω (ω_1^* (ϕ_1^*) and ω_2^* (ϕ_2^*) referring respectively to country 1 and country 2) remain within the unit interval.

Moreover, trade increases the cost of deviating from the status quo cultural-institutional convention for both groups in both countries. This is because deviating almost always entails a mismatch, the result being forgoing some or all of the surplus, the value of which is higher after trade integration. Thus the cost of deviating is increasing in ρ^i (*i=t,o*), and trade increases the amount of the composite good that may be purchased with one unit of the good in which the country specializes (i.e. increases ρ^i, where *i=o* in country 1 and *i=t* in country 2). Though we do not pursue this extension here, in a more complete model with state dependent rates of idiosyncratic play (Bergin and Lipman, 1996), the increased cost of innovating plausibly would reduce the rate of innovation, thereby prolonging the expected duration of each of the conventions.

The fact that the cost of deviating increases may not only discourage the experimentation and error on which idiosyncratic play is based; it will also increase the selection pressures operating against individuals and firms that have innovated as long as these innovators constitute less than the critical values ϕ^* and ω^*. This can be seen from equations (4), along with the fact that trade increases both $[v_I(\omega) - v_C(\omega)]$ and $[v_R(\phi) - v_S(\phi)]$ when $\omega = 1 = \phi$ and increases both $[v_C(\omega) - v_I(\omega)]$ and $[v_S(\phi) - v_I(\phi)]$ when $\omega = 0 = \phi$. Thus trade will not induce a non-cooperative transition from the {*C,S*} to the {*I,R*} equilibrium despite the fact that the {*I,R*} institutions and culture confer absolute advantage in both goods.

In addition to increasing the incentive not to innovate and the selection pressures operating against those who do, trade may even increase the number of innovators necessary to induce a

transition from the {*C*,*S*} to the {*I*,*R*} equilibrium. To see this we study the effect of trade (that is, the increase in ρ^i with *i*=*t*,*o*) on ϕ^* and ω^*. In the case of ω^* the result is unambiguous: trade increases the critical fraction of reciprocal workers necessary to induce the *C*-type employers to best respond by adopting *I*-contracts (see appendix):

$$\frac{\mathrm{d}\omega^*}{\mathrm{d}\rho^i} = \frac{(w+\mu)\dfrac{\rho^i Q_H^i}{2}}{\left[\dfrac{\rho^i Q_H^i}{2} + \dfrac{\rho^i Q_L^i}{2} - (w+\mu)\right]^2} > 0. \tag{8}$$

The reason can be seen by noting that the critical values ϕ^* and ω^* are simply given by the cost (for respectively employees and employers) of deviating from the {*C*,*S*} equilibrium divided by the sum of this cost and the cost of deviating from the {*I*,*R*} equilibrium. While the costs of deviating from both equilibria increase for the employers, trade increases the cost of deviating from the {*C*,*S*} equilibrium of country 2 proportionally more.

The effect of trade on ϕ^* cannot be signed in general, but (under plausible conditions) it too may increase following integration. We have (see appendix)

$$\frac{\mathrm{d}\phi^*}{\mathrm{d}\rho^i} = \frac{\gamma\left[\left(\dfrac{Q_H^i}{2} - \dfrac{Q_L^i}{2}\right)(w+\mu) - Q_L^i(\delta-\eta)\right]}{\left\{\left(\dfrac{\rho^i Q_H^i}{2} - \delta\right) - \left(\dfrac{\rho^i Q_L^i}{2} - \eta\right) + \gamma[\rho^i Q_L^i - (w+\mu)]\right\}^2}, \tag{9}$$

from which we see that $\mathrm{d}\phi^*/\mathrm{d}\rho^i > 0$ iff $(Q_H^i/2 - Q_L^i/2)(w+\mu) > Q_L^i(\delta-\eta)$.

Thus removing impediments to international exchange need not destabilize and, indeed may fortify the preexisting cultural and institutional differences on which specialization and trade is based even if there exists an alternative cultural–institutional equilibrium that confers absolute advantage and to which a transition would be Pareto-improving. Trade impedes cultural-institutional convergence because it raises the costs of deliberate or accidental experimentation with uncommon preferences and contracts. Under plausible conditions it also increases the number of cultural or institutional innovators necessary to induce a decentralized transition from the high productivity equilibrium.

A transition to the superior culture and institutions, however, can be induced by a tariff. It is readily shown that there exists a one-time tariff protecting the opaque good in country 2 such

that a cultural-institutional transition will occur, country 2 adopting the {*I*,*R*} cultural-institutional nexus. Assuming that the international price ratio is not affected by the tariff, θ_{ω}^{*} and θ_{ϕ}^{*} are the ad-valorem tariff rates on the opaque good (imported good) which will implement an (after tax) domestic price ratio in country 2 such that, respectively, $\omega_2^{*} = 0$ and $\phi_2^{*} = 0$. The transition-inducing tariff is given by $\theta^{*} = \min[\theta_{\omega}^{*}, \theta_{\phi}^{*}]$. Using equations (5) it can be seen (see appendix) that:

$$(1+\theta_{\omega}^{*}) = \left[\frac{Q_L^t}{2(w+\mu)} - 1\right]\frac{p_T^t}{p_T^o} \text{ and } (1+\theta_{\phi}^{*}) = \left[\frac{Q_L^t}{(w+\mu)} - 1\right]\frac{p_T^t}{p_T^o}.$$

Since it is readily seen that $\theta_{\omega}^{*} < \theta_{\phi}^{*}$, it follows $\theta^{*} = \theta_{\omega}^{*}$.

The logic of the transition-inducing tariff is exactly the opposite of the mechanism underlying the fact that trade liberalization is transition-impeding. The tariff makes the transparent good less valuable in terms of the units of the composite good it can command and hence reduces the joint surplus available to the employer and the employee. So rather than increasing the cost of deviation from the {*C*,*S*} convention as in the case of trade liberalization, the tariff reduces the cost of deviation. The level that eliminates the cost of deviation for either of the two classes is the transition inducing tariff, θ^{*}. Since $\theta_{\omega}^{*} < \theta_{\phi}^{*}$, it is the employers who induce the transition because under this tariff the real cost (in terms of *t* goods) of wages and monitoring have risen to such an extent that they do no better by offering complete contracts than by offering incomplete contracts. Any tariff greater than this makes the incomplete contract a strict best response for the employers. An even higher tariff that reduced profits under the complete contract to zero would make employees indifferent to being reciprocal or selfish (if the employer is making zero profits the reciprocal employee is not offended by a complete contract). But this is unnecessary for a transition once employers have switched to offering incomplete contracts, under which reciprocity is a strict best response for employees.

6. Factor market integration and transitions to efficient equilibria

As Samuelson's factor price equalization theorem showed (Samuelson, 1949), the effects of the removal or reduction of the economic importance of national boundaries may be independent of whether integration is accomplished through the elimination of barriers to trade in commodities

or through the mobility of factors of production. Where comparative advantage is based on country differences in culture and institutions, however, this is not the case.

In contrast to trade integration, factor market integration facilitates a Pareto-improving cultural-institutional transition in country 2. It does this by having the opposite of the two effects of trade integration: it reduces the number of innovators required to induce a transition; and, in the neighborhood of the equilibrium, it reduces the costs of the idiosyncratic play that induces transitions. Under factor market integration, cultural and institutional innovators may enjoy an advantageous match not only with rare innovators from their own economy but also with the prevalent type of agent from the other country. Thus factor market integration provides a kind of innovation insurance, in contrast to commodity market integration which makes possible gains from trade that heighten the opportunity costs of the frequent mismatches that innovators may expect when paired with agent from their own country.

As we are interested in convergence to superior cultural-institutional conventions, we model the effect of factor market integration on the stability of country 2's inferior $\{C,S\}$ conventions. Suppose that some matches are made entirely with one's own nationals while others are made randomly in the global population. As pictured in Figure 5, there are now three factor markets, two of them national-specific and the third, a common pool without country identification. The common pool is populated by agents drawn at random from the two country-specific pools and hence has the same distribution of types as the meta-population (both countries combined). For both employers and employees in both countries let n be the fraction of matches made with individuals from one's own nation, the complement, $1-n$, being matches in the common pool. In the autarchic factor markets we have thus far assumed, $n = 1$. But if $n < 1$ one's expected match is n times the fraction of agents in one's own country plus $1-n$ times the distribution of types in the common pool. For simplicity we consider countries with equal numbers of employers and employees. It is readily confirmed that if the countries are in the neighborhood of the $\{C,S\}$ and $\{I,R\}$ equilibriums respectively, the expected difference, conditional on being resident in country 1 or country 2, in the likelihood of an employer meeting a reciprocator and a self-interested employee or an employee meeting an incomplete contracting or complete contracting employer is just $n(1-2\varepsilon)$. Thus n is a measure of the degree of national specificity of the factor markets and $1-n$ is the degree of factor market integration.

One may image the two countries as two "villages" within which all production takes place

under autarchy. But with factor market integration some (a random draw from each of the two villages) go to the "city" where they make random matches with members of the other class. In this model n is not chosen by the individual agents; it is a characteristic of the two countries' cultures, language differences, geographical distance, immigration policies and other influences on factor movement that are exogenous from the standpoint of the individual employer or employee. To avoid considerable notational clutter for no additional insight we assume that n does not vary among countries. When factors of production are matched in the pool we assume that the product produced is determined by the nationality of the employer, reflecting the fact that the physical assets of the employer are product-specific while the skills of the worker are less so. In the case of autarchy, the prices at which the output is sold are also determined by the nationality of the employer. Thus, for example, when an employee from country 2 is matched with an employer from country 1, the pair will produce the opaque good to be sold either at the prevailing international prices (in the case of trade integration) or at the autarchic prices of country 1 in the absence of trade integration.

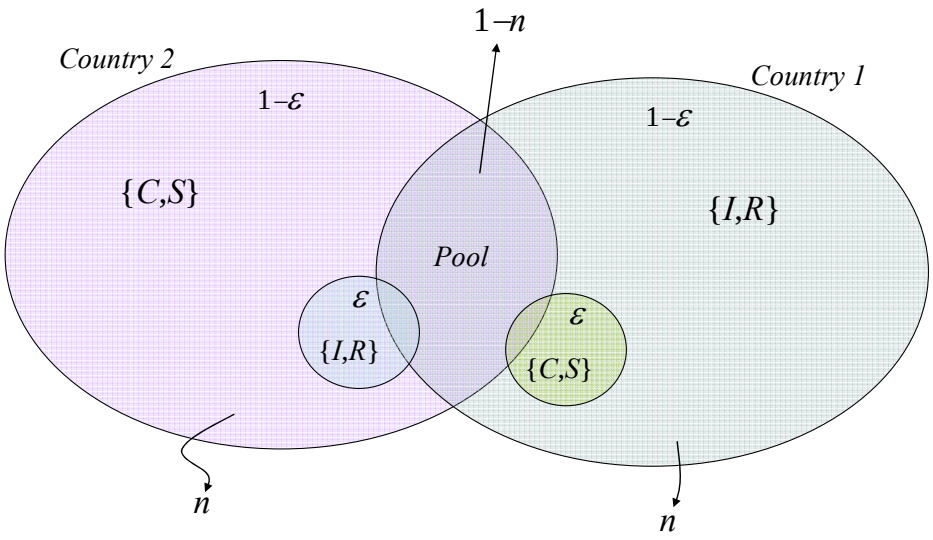

***Fig. 5*: Factor market integration.** (NOTE: ε is the expected fraction of idiosyncratic players among both employers and employees, n is the degree of geographical specificity of the factor markets and $1-n$ is the degree of factor market integration)

Factor market integration facilitates a transition from the $\{C,S\}$ equilibrium because it reduces the payoffs of those conforming to the convention and lessens the expected cost of deviating. Consider a complete contracting employer in country 2 (in the neighborhood of the $\{C,S\}$

equilibrium) who will benefit by being paired with a self-interested employee. With probability n he will be paired with a fellow national, encountering a self-interested worker with probability $1-\varepsilon$. With probability $1-n$ he will be paired with a worker from the common pool, half of whom are from country 2 and among these he will encounter a self-interested worker with probability $1-\varepsilon$; the other half in the common pool are from country 1 among whom he will encounter a self-interested worker with probability ε. Thus with probability $1/2+n(1-2\varepsilon)/2$ ($<1-\varepsilon$ because $\varepsilon<1/2$) he will be matched appropriately. For agents conforming to the convention in their own country, factor market integration (a lower value of n) thus increases the likelihood of a mismatch. The opposite is the case for idiosyncratic players; they achieve their payoff-maximizing match with probability $1/2-n(1-2\varepsilon)/2$ ($>\varepsilon$ because $\varepsilon<1/2$) and hence benefit from factor market integration.

The expected payoffs (equations (2) and (3)) can now be rewritten. The expected payoff after factor integration is the weighted sum of the expected payoff in the national factor market plus expected payoff in the common pool, the weights being the relative sizes of the two pools (n and $1-n$). Notice that, as in (2) and (3), in computing the expected payoffs under factor market integration in country 2 (equations (10) and (11) below) the ω and ϕ appearing in the terms referring to own country matching are the distributions of *play* not the distribution of *types*. Because we assume that all employers (employees) in country 1 are incomplete contract types (reciprocal types), taking account of idiosyncratic play, the country 2 agents who are matched in the pool with agents from country 1 will with probability $1-\varepsilon$ encounter employers (employees) offering *I*-contracts (reciprocators), while ε are offering *C*-contracts (are self-interested).

Consider again country 2; the expected payoffs of respectively incomplete and complete contract employers under factor market integration are

$$\begin{aligned} v_I(n) &= n\left[\omega\frac{\rho_2^t Q_H^t}{2}+(1-\omega)\frac{\rho_2^t Q_L^t}{2}\right]+(1-n)\left\{\frac{1}{2}\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]+\frac{1}{2}\left[\omega\frac{\rho_2^t Q_H^t}{2}+(1-\omega)\frac{\rho_2^t Q_L^t}{2}\right]\right\}, \\ v_C(n) &= n(1-\omega)[\rho_2^t Q_L^t-(w+\mu)]+(1-n)\left\{\frac{1}{2}[\rho_2^t Q_L^t-(w+\mu)]\varepsilon+\frac{1}{2}(1-\omega)[\rho_2^t Q_L^t-(w+\mu)]\right\}. \end{aligned} \tag{10}$$

While the expected payoffs of respectively reciprocal and selfish employees are

$$v_R(n) = n\left\{\phi\left(\frac{\rho_2^t Q_H^t}{2} - \delta\right) - (1-\phi)\gamma[\rho_2^t Q_L^t - (w+\mu)]\right\} + (1-n)\left\{\frac{1}{2}\left[\left(\frac{\rho_1^o Q_H^o}{2} - \delta\right)(1-\varepsilon) - \gamma[\rho_1^o Q_L^o - (w+\mu]\varepsilon\right] + \right.$$
$$\left. + \phi\frac{1}{2}\left(\frac{\rho_2^t Q_H^t}{2} - \delta\right) - \frac{1}{2}(1-\phi)\gamma[\rho_2^t Q_L^t - (w+\mu)]\right\}, \qquad (11)$$
$$v_S(n) = n\phi\left(\frac{\rho_2^t Q_L^t}{2} - \eta\right) + (1-n)\left[\frac{1}{2}\left(\frac{\rho_1^o Q_L^o}{2} - \eta\right)(1-\varepsilon) + \phi\frac{1}{2}\left(\frac{\rho_2^t Q_L^t}{2} - \eta\right)\right].$$

Using expressions (10) and (11) we set $v_I(n) = v_C(n)$ and $v_R(n) = v_S(n)$ to calculate the new critical values, ϕ^* and ω^* in country 2 for the case of factor market integration (see appendix):

$$\omega_2^*(n) = \frac{-\frac{\rho_2^t Q_L^t}{2} + [\rho_2^t Q_L^t - (w+\mu)] - \frac{1-n}{1+n}\left\{\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon) + \frac{\rho_2^t Q_L^t}{2}\varepsilon\right] - [\rho_2^t Q_L^t - (w+\mu)]\varepsilon\right\}}{\left(\frac{\rho_2^t Q_H^t}{2} - \frac{\rho_2^t Q_L^t}{2}\right) + [\rho_2^t Q_L^t - (w+\mu)]},$$
$$\phi_2^*(n) = \frac{\gamma[\rho_2^t Q_L^t - (w+\mu)] - \frac{1-n}{1+n}\left\{\left[\left(\frac{\rho_1^o Q_H^o}{2} - \delta\right) - \left(\frac{\rho_1^o Q_L^o}{2} - \eta\right)\right](1-\varepsilon) - \gamma[\rho_1^o Q_L^o - (w+\mu)]\varepsilon\right\}}{\left(\frac{\rho_2^t Q_H^t}{2} - \delta\right) - \left(\frac{\rho_2^t Q_L^t}{2} - \eta\right) + \gamma[\rho_2^t Q_L^t - (w+\mu)]}. \qquad (12)$$

Three results follow. First, for both employers and employees in country 2, factor market integration (reducing n) reduces the costs of idiosyncratic play, respectively $v_C(n, \omega = 0) - v_I(n, \omega = 0)$ and $v_S(n, \phi = 0) - v_R(n, \phi = 0)$ (see appendix). This occurs for two reasons. For both employers and employees, as we have seen above, factor market integration increases the probability that idiosyncratic players will make an appropriate match. Idiosyncratically playing employees additionally benefit from the higher payoffs from being matched with a country 1 producer. In this case the worker will produce the opaque good (rather than the transparent good) to be sold either at the prevailing international prices (if trade integration occurred, in which case $Q_H^o \rho_T^o > Q_H^t \rho_T^t$) or at the autarchic prices of country 1 (in the absence of trade integration, in which case $Q_H^o \rho_{1A}^o > Q_H^t \rho_{2A}^t$). The best responding country 2 employee benefits from an analogous increase in payoffs when paired with a country 1 employer. But taking account of both the better matching prospects for the innovating employee and the increase in payoffs for both best responders and idiosyncratic employees, we can show (see appendix) that the quantity $v_S(n, \phi = 0) - v_R(n, \phi = 0)$ is decreasing in n.

Second, for the country at the inferior {*C*,*S*} cultural-institutional equilibrium, factor market integration (reducing *n*) lowers the critical fraction of both employers and employees sufficient to induce a transition to the {*I*,*R*} equilibrium. Indeed it can be shown (see appendix) that

$$\frac{\mathrm{d}\omega_2^*(n)}{\mathrm{d}n} > 0 \text{ and } \frac{\mathrm{d}\phi_2^*(n)}{\mathrm{d}n} > 0.$$

Third, there exists a critical value, $n^* > 0$, of the degree of national specificity of the factor markets such that for $n < n^*$ a cultural-institutional transition from the {*C*,*S*} to the {*I*,*R*} convention will be induced in the absence of idiosyncratic play. For $n < n^*$, one of (or both) the critical values, $\omega_2^*(n)$ and $\phi_2^*(n)$, is negative, so innovators do better than best responders with the result that the erstwhile {*C*,*S*} convention, i.e. ($\omega = 0, \phi = 0$), is no longer an absorbing state in the unperturbed dynamic. Accordingly, n_ω^* and n_ϕ^* will be the values of *n* such that (respectively) $\omega_2^*(n) = 0$ and $\phi_2^*(n) = 0$, and $n^* = \max[n_\omega^*, n_\phi^*]$.

7. Discussion

We have shown that otherwise identical economies that differ in culture and institutions may find specialization and trade welfare-enhancing, and that trade reinforces these differences by inhibiting convergence to superior cultural-institutional arrangements while factor market integration favors convergence.

Our paper is a contribution to the rapidly growing literature on institutions and trade (earlier contributions surveyed in Belloc, 2006). Comparative advantage based on institutional differences has been investigated for the following settings: financial systems (Beck, 2002; Kletzer and Bardhan, 1987; Ju and Wei, 2005; Matsuyama, 2005; Svaleryd and Vlachos, 2005), enforcement of contracts and property rights (Esfahani and Mookherjee, 1995; Levchenko, 2007; Nunn, 2007), intellectual property rights (Pagano, 2007), contracts and the division of labor (Acemoglu, Antràs and Helpman, 2009; Costinot, 2009), contractual incompleteness and the product cycle (Antràs, 2005), labor market flexibility and volatility (Cunat and Melitz, 2007), legal establishment and accounting systems (Vogel, 2007). In contrast to these papers, rather than studying the effects of exogenously given differences in institutions on comparative advantage and trade, we also consider the impact of economic integration on the endogenous dynamics of institutions. Other papers treating the effects of trade on institutions are Belloc

(2005), Casella and Feinstein (2002), Dixit (2003), Do and Levchenko (2009) and Levchenko (2008). The main novelty of our approach with respect to this latter group of papers is our modeling of the complementary relationship between cultural preferences and institutions as a mechanism by which institutions associated with absolute disadvantage may persist indefinitely. In particular, our paper departs from and complements Do and Levchenko (2009) and Levchenko (2008) in which institutional differences are a historical datum that may be modified by a cooperative lobbying game, while in our model they are implemented as an endogenously generated non-cooperative cultural-institutional equilibrium. Finally, unlike all above papers but in common with Olivier, Thoenig and Verdier (2008) and Pagano (2007) we find contrasting convergence effects of trade integration and factor market integration; but our model and these two models share little else in common, the former illustrates the dynamics of the demand for "cultural goods" that contribute to group identity while the latter concerns intellectual property.

The co-evolution of social norms and institutions is also modeled by Francois (2008). However, differently from our paper, in his model institutional change occurs is implemented by an institutional designer external to the transaction (a political actor). Furthermore, while we explore the effects of economic integration on cultural-institutional equilibria, Francois (2008) studies those of increasing market competition. We share with Conconi, Legros and Newman (2008) the conclusion that liberalization need not favor the evolution of efficient institutions. In contrast to ours, in their model factor market integration may induce inefficiency, and only in conjunction with goods market integration are the effects of the two positive (in our model factor market integration has unambiguously positive effects). As in Krugman (1987)'s model of learning by doing, we show that a one time tariff may permanently alter a nation's comparative advantage and induce welfare gains.

The possibility that trade may induce institutional and cultural divergence rather than convergence is suggested by the experience of Europe in the late 19^{th} century, when the institutional response to the import of cheap North American grain was radically different from country to country, resulting in a divergence with respect to tariffs and agrarian institutions (Gourevitch, 1977). Culture differences were also heightened, as the social solidarity of the subsidized Danish dairy cooperatives differed markedly from the nationalism associated with the German and French tariffs. Likewise, the centuries-long persistence of institutional differences among Western Hemisphere economies documented in Sokoloff and Engerman

(2000) may be explained in part by the fact that trade allowed specialization in "plantation goods" such as sugar and cotton in some countries and "family farm" goods such as tobacco and wheat in others. Richard Freeman (2000) and Chiaki Moriguchi (2003) document a divergence in labor market institutions in open economies.

These cases of divergence notwithstanding, the impact of the U.S. civil war studied by Nilsson (1994) is a reminder that cultural-institutional convergence does appear to be a powerful tendency in integrated global systems. But, like the convergence of European political institutions to the national state model over the half millennium prior to the First World War (Tilly, 1990), and the contemporaneous global diffusion of institutions and cultures of European origin, it also points to the important role of military and other political forces rather than the autonomous workings of international trade *per se* in this process.

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APPENDIX

A.1.1 Critical values ω^* and φ^* in autarchy. For brevity in this appendix we define $m \equiv w + \mu$. ω^* (ϕ^*) is the number of reciprocal employees (incomplete contract employers) in the previous period that makes an employer (employee) indifferent to offering an incomplete or a complete contract (to being reciprocal or selfish).

Employers. The expected payoffs to employers offering respectively *I*- and *C*-contracts, with *i* = *t*,*o*, are:

$$\begin{aligned} v_I &= \omega \frac{\rho^i Q_H^i}{2} + (1-\omega)\frac{\rho^i Q_L^i}{2}, \\ v_C &= \omega \times 0 + (1-\omega)(\rho^i Q_L^i - m). \end{aligned} \tag{A1}$$

ω^* is the level of ω such that $v_I(\omega) = v_C(\omega)$, i.e.

$$\omega \frac{\rho^i Q_H^i}{2} + (1-\omega)\frac{\rho^i Q_L^i}{2} = (1-\omega)(\rho^i Q_L^i - m),$$

so

$$\omega^* = \frac{\frac{\rho^i Q_L^i}{2} - m}{\frac{\rho^i Q_H^i}{2} + \frac{\rho^i Q_L^i}{2} - m}, \tag{A2}$$

which is the first of equations (5) in the text. Notice that expression (A2) is smaller than 1/2 because $\frac{\rho^i Q_H^i}{2} > \frac{\rho^i Q_L^i}{2} - m$.

Employees. Similarly, the expected payoffs to respectively *R*- and *S*-employees are:

$$\begin{aligned} v_R &= \phi\left(\frac{\rho^i Q_H^i}{2} - \delta\right) + (1-\phi)(-\gamma)(\rho^i Q_L^i - m), \\ v_S &= \phi\left(\frac{\rho^i Q_L^i}{2} - \eta\right) + (1-\phi)\times 0. \end{aligned} \tag{A3}$$

ϕ^* is the value of ϕ such that $v_R(\phi) = v_S(\phi)$, i.e.

$$\phi\left(\frac{\rho^i Q_H^i}{2} - \delta\right) + (1-\phi)(-\gamma)(\rho^i Q_L^i - m) = \phi\left(\frac{\rho^i Q_L^i}{2} - \eta\right),$$

so

$$\phi^* = \frac{\gamma(\rho^i Q_L^i - m)}{\left(\frac{\rho^i Q_H^i}{2} - \delta\right) - \left(\frac{\rho^i Q_L^i}{2} - \eta\right) + \gamma(\rho^i Q_L^i - m)}, \tag{A4}$$

which is the second of equations (5) in the text.

A.1.2 Effects of trade integration on the costs of deviation. In this subsection, we prove that trade integration, i.e. an increase in ρ^i (with $i = t$ in country 2, and $i = o$ in country 1) increases the cost of deviating from the status quo cultural-institutional convention. We only consider the {*C*,*S*} equilibrium, the extension to the {*I*,*R*} equilibrium being straightforward. The cost of deviation is given by the difference between the expected payoff of a best responder and that of a non-best responder.

Employers. Rewrite the expected payoff equations for employers offering respectively *I*- and *C*-contracts when all the employees in the previous period were selfish (i.e. equations (A1) with ω=0):

$$\begin{aligned} v_I(\omega = 0) &= \frac{\rho^i Q_L^i}{2}, \\ v_C(\omega = 0) &= \rho^i Q_L^i - m. \end{aligned} \tag{A5}$$

In the {*C*,*S*} equilibrium the cost of deviation is given by $v_C(\omega = 0) - v_I(\omega = 0)$. Using equations (A5) this is equivalent to

$$v_C(\omega = 0) - v_I(\omega = 0) = \frac{\rho^i Q_L^i}{2} - m, \tag{A6}$$

which is increasing in ρ^i.

Employees. Similarly, the expected payoff equations for respectively *R*- and *S*-employees when all the employers in the previous period were offering *C*-contracts (i.e. equations (A3) with ϕ=0) may be written as:

$$\begin{aligned} v_R(\phi = 0) &= -\gamma(\rho^i Q_L^i - m), \\ v_S(\phi = 0) &= 0. \end{aligned} \tag{A7}$$

The cost of deviation is thus given by $v_S(\phi = 0) - v_R(\phi = 0)$ which, using equations (A7), can be rewritten as

$$v_S(\phi = 0) - v_R(\phi = 0) = \gamma(\rho^i Q_L^i - m),$$

which is also increasing in ρ^i.

A.1.3 Effects of trade integration on the critical values ω^* and φ^*. In this subsection we show that trade integration, i.e. an increase in the value of the own-country-produced good ρ^i with *i*=*t*,*o*, leads to an increase in the expected number of idiosyncratic players in either class (employers and employees) sufficient to induce a transition from one cultural-institutional equilibrium to the other. To show this we study the sign of the derivative of ω^* and ϕ^* with respect to ρ^i. Using expression (A2), the former is

$$\frac{\mathrm{d}\omega^*}{\mathrm{d}\rho^i}=\frac{\frac{Q_L^i}{2}\left(\frac{\rho^i Q_H^i}{2}+\frac{\rho^i Q_L^i}{2}-m\right)-\left(\frac{Q_H^i}{2}+\frac{Q_L^i}{2}\right)\left(\frac{\rho^i Q_L^i}{2}-m\right)}{\left(\frac{\rho^i Q_H^i}{2}+\frac{\rho^i Q_L^i}{2}-m\right)^2}=\frac{m\frac{\rho^i Q_H^i}{2}}{\left(\frac{\rho^i Q_H^i}{2}+\frac{\rho^i Q_L^i}{2}-m\right)^2}>0$$

which is equation (8) in the text and is always positive. Analogously, using (A4), the latter can be written as

$$\frac{\mathrm{d}\phi^*}{\mathrm{d}\rho^i}=\frac{\gamma Q_L^i\left[\left(\frac{\rho^i Q_H^i}{2}-\delta\right)-\left(\frac{\rho^i Q_L^i}{2}-\eta\right)+\gamma(\rho^i Q_L^i-m)\right]-\left(\frac{Q_H^i}{2}-\frac{Q_L^i}{2}+\gamma Q_L^i\right)\gamma(\rho^i Q_L^i-m)}{\left[\left(\frac{\rho^i Q_H^i}{2}-\delta\right)-\left(\frac{\rho^i Q_L^i}{2}-\eta\right)+\gamma(\rho^i Q_L^i-m)\right]^2}$$

$$=\frac{\gamma\left[\left(\frac{Q_H^i}{2}-\frac{Q_L^i}{2}\right)m-Q_L^i(\delta-\eta)\right]}{\left[\left(\frac{\rho^i Q_H^i}{2}-\delta\right)-\left(\frac{\rho^i Q_L^i}{2}-\eta\right)+\gamma(\rho^i Q_L^i-m)\right]^2},$$

which is equation (9) in the text and is positive if and only if $\left(\frac{Q_H^i}{2}-\frac{Q_L^i}{2}\right)m-Q_L^i(\delta-\eta)>0$.

A.1.4 Transition-inducing tariff rate. $\theta^*>0$ is the tariff protecting the opaque good in country 2 such that a cultural-institutional transition from the {*C*,*S*} to the {*I*,*R*} convention will occur. Given the international price ratio p_T^t/p_T^o, θ_ω^* and θ_ϕ^* are the ad-valorem tariff rates such that, respectively, $\omega_2^*=0$ and $\phi_2^*=0$. The transition-inducing tariff is given by $\theta^*=\min[\theta_\omega^*,\theta_\phi^*]$. Recalling that $\rho_T^t=p_T^t/(p_T^t+p_T^o)$ and equating expression (A2) for country 2 to zero,

$$\omega_2^*=\frac{\frac{\rho_T^t Q_L^t}{2}-m}{\frac{\rho_T^t Q_H^t}{2}+\frac{\rho_T^t Q_L^t}{2}-m}=0,$$

θ_ω^* is obtained as follows:

$$\frac{\frac{p_T^t}{p_T^t+p_T^o(1+\theta_\omega^*)}Q_L^t}{2}-m=0$$

$$(1+\theta_\omega^*)=\left(\frac{Q_L^t}{2m}-1\right)\frac{p_T^t}{p_T^o};$$

whereas equating expression (A4) for country 2 to zero,

$$\phi_2^*=\frac{\gamma(\rho_T^t Q_L^t-m)}{\left(\frac{\rho_T^t Q_H^t}{2}-\delta\right)-\left(\frac{\rho_T^t Q_L^t}{2}-\eta\right)+\gamma(\rho_T^t Q_L^t-m)}=0,$$

we obtain

$$\frac{p_T^t}{p_T^t + p_T^o(1+\theta_\phi^*)} Q_L^t - m = 0$$

$$(1+\theta_\phi^*) = \left(\frac{Q_L^t}{m} - 1 \right) \frac{p_T^t}{p_T^o}.$$

Since, as it is readily seen, $\theta_\omega^* < \theta_\phi^*$, it follows that $\theta^* = \theta_\omega^*$.

A.2.1 Critical values $\omega_2^*(n)$ and $\varphi_2^*(n)$ under factor market integration. The proofs contained in this subsection and in the following two are valid using both autarchic and trade prices. Hence, while we denote by subscript 1 and 2 the prices of respectively country 1 (in the {*I*,*R*} equilibrium) and country 2 (in the {*C*,*S*} equilibrium), we omit subscript "*A*" and "*T*" standing for respectively autarchy and trade in the text. Clearly, if we consider trade prices it follows that $\rho_{1T}^t = \rho_{2T}^t = \rho_T^t$ and $\rho_{1T}^o = \rho_{2T}^o = \rho_T^o$, whereas if we consider autarchic prices we have $\rho_{1A}^t > \rho_{2A}^t$ and $\rho_{1A}^o < \rho_{2A}^o$; but our conclusions do not change in substance. Again we report the proofs only considering the disadvantageous culture and institutions {*C*,*S*} country, the extension to the {*I*,*R*} country being straightforward. $\omega^*(n)$ ($\phi^*(n)$) is the number of *R*-employees (*I*-contract employers) in the previous period that, under factor market integration, makes an employer (employee) indifferent to offering an *I*- or a *C*-contract (to being *R* or *S*). The expected payoff to an individual in the {*C*,*S*} country after factor market integration is given by *n* times the expected payoff of a domestic match plus (1–*n*) times the expected payoff of a match in the common pool, the latter being given by 1/2 probability times the expected payoff from matching an individual from the {*I*,*R*} country (where everybody is best responder except ε idiosyncratic players) plus 1/2 probability times the expected payoff from matching an individual from her own country. As explained in the text, when factors of production are matched in the pool the product produced is determined by the nationality of the employer. In the case of autarchy, the prices at which the output is sold are also determined by the nationality of the employer.

Employers. The expected payoffs to employers offering *I*- and *C*-contracts after factor market integration (equations (10) in the text) are:

$$\begin{aligned} v_I(n) &= n\left[\omega \frac{\rho_2^t Q_H^t}{2} + (1-\omega) \frac{\rho_2^t Q_L^t}{2} \right] + (1-n)\left\{ \frac{1}{2}\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon) + \frac{\rho_2^t Q_L^t}{2}\varepsilon \right] + \frac{1}{2}\left[\omega \frac{\rho_2^t Q_H^t}{2} + (1-\omega)\frac{\rho_2^t Q_L^t}{2} \right] \right\}, \\ v_C(n) &= n(1-\omega)(\rho_2^t Q_L^t - m) + (1-n)\left\{ \frac{1}{2}(\rho_2^t Q_L^t - m)\varepsilon + \frac{1}{2}(1-\omega)(\rho_2^t Q_L^t - m) \right\}. \end{aligned} \tag{A9}$$

To obtain $\omega_2^*(n)$ we compute the value of ω such that $v_I(n) = v_C(n)$; it follows:

$$n\left[\omega\frac{\rho_2^tQ_H^t}{2}+(1-\omega)\frac{\rho_2^tQ_L^t}{2}\right]+(1-n)\left\{\frac{1}{2}\left[\frac{\rho_2^tQ_H^t}{2}(1-\varepsilon)+\frac{\rho_2^tQ_L^t}{2}\varepsilon\right]+\frac{1}{2}\left[\omega\frac{\rho_2^tQ_H^t}{2}+(1-\omega)\frac{\rho_2^tQ_L^t}{2}\right]\right\}=$$

$$n(1-\omega)(\rho_2^tQ_L^t-m)+(1-n)\left[\frac{1}{2}(\rho_2^tQ_L^t-m)\varepsilon+\frac{1}{2}(1-\omega)(\rho_2^tQ_L^t-m)\right].$$

That, after some calculations, becomes

$$n\left(\frac{\rho_2^tQ_H^t}{2}-\frac{\rho_2^tQ_L^t}{2}\right)\omega+(1-n)\frac{1}{2}\left(\frac{\rho_2^tQ_H^t}{2}-\frac{\rho_2^tQ_L^t}{2}\right)\omega+n(\rho_2^tQ_L^t-m)\omega+(1-n)\frac{1}{2}(\rho_2^tQ_L^t-m)\omega=$$

$$-n\frac{\rho_2^tQ_L^t}{2}-(1-n)\left\{\frac{1}{2}\left[\frac{\rho_2^tQ_H^t}{2}(1-\varepsilon)+\frac{\rho_2^tQ_L^t}{2}\varepsilon\right]+\frac{1}{2}\frac{\rho_2^tQ_L^t}{2}\right\}+n(\rho_2^tQ_L^t-m)+(1-n)\left[\frac{1}{2}(\rho_2^tQ_L^t-m)\varepsilon+\frac{1}{2}(\rho_2^tQ_L^t-m)\right],$$

whereby

$$(1+n)\frac{1}{2}\left(\frac{\rho_2^tQ_H^t}{2}-\frac{\rho_2^tQ_L^t}{2}\right)\omega+(1+n)\frac{1}{2}(\rho_2^tQ_L^t-m)\omega=$$

$$-(1+n)\frac{1}{2}\frac{\rho_2^tQ_L^t}{2}+(1+n)\frac{1}{2}(\rho_2^tQ_L^t-m)-(1-n)\frac{1}{2}\left[\frac{\rho_2^tQ_H^t}{2}(1-\varepsilon)+\frac{\rho_2^tQ_L^t}{2}\varepsilon\right]+(1-n)\frac{1}{2}(\rho_2^tQ_L^t-m)\varepsilon$$

and, finally, we obtain

$$\omega_2^*(n)=\frac{-\frac{\rho_2^tQ_L^t}{2}+(\rho_2^tQ_L^t-m)}{\left(\frac{\rho_2^tQ_H^t}{2}-\frac{\rho_2^tQ_L^t}{2}\right)+(\rho_2^tQ_L^t-m)}-\frac{\left[\frac{\rho_2^tQ_H^t}{2}(1-\varepsilon)+\frac{\rho_2^tQ_L^t}{2}\varepsilon\right]-(\rho_2^tQ_L^t-m)\varepsilon}{\left(\frac{\rho_2^tQ_H^t}{2}-\frac{\rho_2^tQ_L^t}{2}\right)+(\rho_2^tQ_L^t-m)}\frac{1-n}{1+n},\qquad\text{(A10)}$$

which is the first of equations (12) in the text. The expected payoffs to *R*- and *S*-employees after factor market integration (equations (11) in the text) are:

$$v_R(n)=n\left\{\phi\left(\frac{\rho_2^tQ_H^t}{2}-\delta\right)-(1-\phi)\gamma(\rho_2^tQ_L^t-m)\right\}+(1-n)\left\{\frac{1}{2}\left[\left(\frac{\rho_1^oQ_H^o}{2}-\delta\right)(1-\varepsilon)-\gamma(\rho_1^oQ_L^o-m)\varepsilon\right]+\right.$$

$$\left.+\phi\frac{1}{2}\left(\frac{\rho_2^tQ_H^t}{2}-\delta\right)-\frac{1}{2}(1-\phi)\gamma(\rho_2^tQ_L^t-m)\right\},\qquad\text{(A11)}$$

$$v_S(n)=n\phi\left(\frac{\rho_2^tQ_L^t}{2}-\eta\right)+(1-n)\left[\frac{1}{2}\left(\frac{\rho_1^oQ_L^o}{2}-\eta\right)(1-\varepsilon)+\phi\frac{1}{2}\left(\frac{\rho_2^tQ_L^t}{2}-\eta\right)\right].$$

$\phi_2^*(n)$ is the level of ϕ that makes an employee indifferent to being selfish or reciprocator, i.e. such that $v_R(n)=v_S(n)$, so we can write

$$n\left[\phi\left(\frac{\rho_2^tQ_H^t}{2}-\delta\right)-(1-\phi)\gamma(\rho_2^tQ_L^t-m)\right]+(1-n)\left\{\frac{1}{2}\left[\left(\frac{\rho_1^oQ_H^o}{2}-\delta\right)(1-\varepsilon)-\gamma(\rho_1^oQ_L^o-m)\varepsilon\right]+\right.$$

$$\left.+\phi\frac{1}{2}\left(\frac{\rho_2^tQ_H^t}{2}-\delta\right)-\frac{1}{2}(1-\phi)\gamma(\rho_2^tQ_L^t-m)\right\}=n\phi\left(\frac{\rho_2^tQ_L^t}{2}-\eta\right)+(1-n)\left\{\frac{1}{2}\left(\frac{\rho_1^oQ_L^o}{2}-\eta\right)(1-\varepsilon)+\phi\frac{1}{2}\left(\frac{\rho_2^tQ_L^t}{2}-\eta\right)\right\},$$

that, after some calculations, can be rewritten as

$$n\left[\left(\frac{\rho_2^t Q_H^t}{2}-\delta\right)+\gamma(\rho_2^t Q_L^t-m)-\left(\frac{\rho_2^t Q_L^t}{2}-\eta\right)\right]\phi+(1-n)\frac{1}{2}\left\{\left(\frac{\rho_2^t Q_H^t}{2}-\delta\right)+\gamma(\rho_2^t Q_L^t-m)-\left(\frac{\rho_2^t Q_L^t}{2}-\eta\right)\right\}\phi=$$

$$n\gamma(\rho_2^t Q_L^t-m)-(1-n)\left\{\frac{1}{2}\left[\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)(1-\varepsilon)-\gamma(\rho_1^o Q_L^o-m)\varepsilon\right]-\frac{1}{2}\gamma(\rho_2^t Q_L^t-m)-\frac{1}{2}\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)(1-\varepsilon)\right\}$$

whereby

$$(1+n)\frac{1}{2}\left[\left(\frac{\rho_2^t Q_H^t}{2}-\delta\right)+\gamma(\rho_2^t Q_L^t-m)-\left(\frac{\rho_2^t Q_L^t}{2}-\eta\right)\right]\phi=$$

$$(1+n)\frac{1}{2}\gamma(\rho_2^t Q_L^t-m)-(1-n)\left\{\frac{1}{2}\left[\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)(1-\varepsilon)-\gamma(\rho_1^o Q_L^o-m)\varepsilon\right]-\frac{1}{2}\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)(1-\varepsilon)\right\}$$

and, finally, we obtain

$$\phi_2^*(n)=\frac{\gamma(\rho_2^t Q_L^t-m)}{\left(\frac{\rho_2^t Q_H^t}{2}-\delta\right)-\left(\frac{\rho_2^t Q_L^t}{2}-\eta\right)+\gamma(\rho_2^t Q_L^t-m)}-\frac{\left[\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)-\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)\right](1-\varepsilon)-\gamma(\rho_1^o Q_L^o-m)\varepsilon}{\left(\frac{\rho_2^t Q_H^t}{2}-\delta\right)-\left(\frac{\rho_2^t Q_L^t}{2}-\eta\right)+\gamma(\rho_2^t Q_L^t-m)}\frac{1-n}{1+n}, \quad \text{(A12)}$$

which is the second of equations (12) in the text.

A.2.2 Effects of factor market integration on the costs of deviation. In this subsection we show that the cost of deviation from the best response convention in the {*C*,*S*} cultural-institutional equilibrium decreases after factor market integration.

Employers. First we write the expected payoff equations for employers under factor market integration when all the employees in the previous period were self-interested. These are given by equations (A9) with ω=0,

$$\begin{aligned} v_I(n,\omega=0)&=n\frac{\rho_2^t Q_L^t}{2}+(1-n)\left\{\frac{1}{2}\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]+\frac{1}{2}\frac{\rho_2^t Q_L^t}{2}\right\},\\ v_C(n,\omega=0)&=n(\rho_2^t Q_L^t-m)+(1-n)\left[\frac{1}{2}(\rho_2^t Q_L^t-m)\varepsilon+\frac{1}{2}(\rho_2^t Q_L^t-m)\right]. \end{aligned} \quad \text{(A13)}$$

Recalling that the cost of deviation for an employer in the {*C*,*S*} equilibrium is given by $v_C(\omega=0)-v_I(\omega=0)$ and using equations (A13), under factor market integration we have

$$v_C(n,\omega=0)-v_I(n,\omega=0)=$$

$$n(\rho_2^t Q_L^t-m)+(1-n)\left\{\frac{1}{2}(\rho_2^t Q_L^t-m)\varepsilon+\frac{1}{2}(\rho_2^t Q_L^t-m)\right\}-n\frac{\rho_2^t Q_L^t}{2}-(1-n)\left\{\frac{1}{2}\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]+\frac{1}{2}\frac{\rho_2^t Q_L^t}{2}\right\}$$

that, after some calculations, can be rewritten as:

$$(1+n)(\rho_2^t Q_L^t-m)+(1-n)\frac{1}{2}(\rho_2^t Q_L^t-m)\varepsilon-(1+n)\frac{\rho_2^t Q_L^t}{2}-(1-n)\frac{1}{2}\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]. \quad \text{(A14)}$$

From (A6), the corresponding cost of deviation under factor immobility is:

$$v_C(\omega=0)-v_I(\omega=0)=\frac{\rho_2^t Q_L^t}{2}-m. \tag{A15}$$

It can be shown that (A14) is smaller than (A15). Indeed the inequality

$$(1+n)\frac{1}{2}(\rho_2^t Q_L^t-m)+(1-n)\frac{1}{2}(\rho_2^t Q_L^t-m)\varepsilon-(1+n)\frac{1}{2}\frac{\rho_2^t Q_L^t}{2}-(1-n)\frac{1}{2}\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]<\rho_2^t Q_L^t-m-\frac{\rho_2^t Q_L^t}{2}$$

can be written as

$$(1-n)\frac{1}{2}(\rho_2^t Q_L^t-m)\varepsilon-(1-n)\frac{1}{2}\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]-(1-n)\frac{1}{2}\left(\frac{\rho_2^t Q_L^t}{2}-m\right)<0,$$

which must be true because the third of the three terms of the algebraic sum is positive, and it can be shown that the sum of the first two must be negative. Indeed:

$$(1-n)\frac{1}{2}(\rho_2^t Q_L^t-m)\varepsilon-(1-n)\frac{1}{2}\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]<0$$

$$\text{i.e. } \varepsilon<\frac{\frac{\rho_2^t Q_H^t}{2}}{\frac{\rho_2^t Q_H^t}{2}+\frac{\rho_2^t Q_L^t}{2}-m}$$

can be rewritten as

$$\varepsilon<1-\frac{\frac{\rho_2^t Q_L^t}{2}-m}{\frac{\rho_2^t Q_H^t}{2}+\frac{\rho_2^t Q_L^t}{2}-m},\ \text{ i.e. } \varepsilon<1-\omega_{CS}^* \tag{A16}$$

The inequality in (A16) must be true because, as it easily shown by the fact that $\rho^t Q_H^t/2>\rho^t Q_L^t/2-m$ in (A2), $\omega_2^*<1/2$ and we know from the persistence condition of the $\{C,S\}$ (see Section 3 in the paper) convention that $\varepsilon<\omega_2^*$.

Employees. The expected payoff equations for respectively *R*- and *S*- employees under factor mobility when all the employers in the previous period were offering *C*-contracts, i.e. equations (A11) with ϕ=0, may be written as:

$$\begin{aligned} v_R(n,\phi=0)&=-n\gamma(\rho_2^t Q_L^t-m)+(1-n)\left[\frac{1}{2}\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)(1-\varepsilon)-\gamma\frac{1}{2}(\rho_1^o Q_L^o-m)\varepsilon-\frac{1}{2}\gamma(\rho_2^t Q_L^t-m)\right],\\ v_S(n,\phi=0)&=(1-n)\frac{1}{2}\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)(1-\varepsilon). \end{aligned} \tag{A17}$$

Recalling that the cost of deviation for an employee in the $\{C,S\}$ equilibrium is given by $v_S(\phi=0)-v_R(\phi=0)$ and using equations (A17), under factor market integration we have

$$v_S(n,\phi=0)-v_R(n,\phi=0)=$$

$$(1-n)\frac{1}{2}\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)(1-\varepsilon)+n\gamma(\rho_2^t Q_L^t-m)-(1-n)\left[\frac{1}{2}\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)(1-\varepsilon)-\gamma\frac{1}{2}(\rho_1^o Q_L^o-m)\varepsilon-\frac{1}{2}\gamma(\rho_2^t Q_L^t-m)\right]$$

which can be rewritten as:

$$(1-n)\frac{1}{2}\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)(1-\varepsilon)-(1-n)\left[\frac{1}{2}\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)(1-\varepsilon)-\gamma\frac{1}{2}(\rho_1^o Q_L^o-m)\varepsilon\right]+(1+n)\frac{1}{2}\gamma(\rho_2^t Q_L^t-m). \quad \text{(A18)}$$

From (A8), the cost of deviation in the presence of factor immobility is:

$$v_S(n,\phi=0)-v_R(n,\phi=0)=0+\gamma(\rho_{2A}^t Q_L^t-m). \quad \text{(A19)}$$

It can be shown that (A18) is smaller than (A19). Indeed the inequality

$$(1-n)\frac{1}{2}\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)(1-\varepsilon)-(1-n)\left[\frac{1}{2}\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)(1-\varepsilon)-\gamma\frac{1}{2}(\rho_1^o Q_L^o-m)\varepsilon\right]+(1+n)\frac{1}{2}\gamma(\rho_2^t Q_L^t-m)<\gamma(\rho_2^t Q_L^t-m)$$

can be rewritten as

$$(1-n)\frac{1}{2}\left[\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)-\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)\right](1-\varepsilon)+(1-n)\gamma\frac{1}{2}(\rho_1^o Q_L^o-m)\varepsilon-(1-n)\frac{1}{2}\gamma(\rho_2^t Q_L^t-m)<0,$$

which must be true because the third of the three terms of the algebraic sum is positive, and it can be shown that the sum of the first two must be negative. Indeed:

$$(1-n)\frac{1}{2}\left[\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)-\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)\right](1-\varepsilon)+(1-n)\gamma\frac{1}{2}(\rho_1^o Q_L^o-m)\varepsilon<0$$

$$\text{i.e. } \varepsilon<\frac{\left[\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)-\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)\right]}{\left[\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)-\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)\right]+\gamma(\rho_1^o Q_L^o-m)}$$

can be rewritten as

$$\varepsilon<1-\frac{\gamma(\rho_1^o Q_L^o-m)}{\left[\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)-\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)\right]+\gamma(\rho_1^o Q_L^o-m)}, \quad \text{i.e.}\ \varepsilon<1-\phi_1^* \qquad \text{(A20)}$$

The inequality (A20) must be true because of the persistence condition of the {*I*,*R*} convention (see Section 3 in the paper).

A.2.3 Effects of factor market integration on the critical values $\omega_2^*(n)$ and $\varphi_2^*(n)$. In this subsection we show that factor market integration leads to a decrease in the expected number of idiosyncratic players in either class (employers and employees) sufficient to induce a transition from one cultural-institutional equilibrium to the other. To show this we study the sign of the derivative of $\omega_2^*(n)$ and $\phi_2^*(n)$, given respectively by (A10) and (A12), with respect to *n.* The first fraction on the right hand side of (A10) does not depend on *n*, and the denominator of the second fraction is positive. It can be shown that the numerator is also positive. Indeed:

$$\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]-(\rho_2^t Q_L^t-m)\varepsilon>0$$

$$\varepsilon<\frac{\frac{\rho_2^t Q_H^t}{2}}{\frac{\rho_2^t Q_H^t}{2}-\frac{\rho_2^t Q_L^t}{2}+(\rho_2^t Q_L^t-m)},$$

which is equivalent to (A16) and is always true for the same reason that (A16) is true. It follows that the sign of $\mathrm{d}\omega_2^*(n)/\mathrm{d}n$ depends on the sign of $\mathrm{d}[-(1-n)/(1+n)]/\mathrm{d}n=2n/(1+n)^2$ which is positive. Similarly, we can study the sign of $\mathrm{d}\phi_2^*(n)/\mathrm{d}n$. The first fraction on the right hand side of (A12) does not depend on *n*, and the denominator of the second fraction is positive. It can be shown that the numerator is also positive. Indeed:

$$\left[\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)-\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)\right](1-\varepsilon)-\gamma(\rho_1^o Q_L^o-m)\varepsilon>0$$

$$\text{i.e. }\ \varepsilon<\frac{\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)-\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)}{\gamma(\rho_1^o Q_L^o-m)+\left(\frac{\rho_1^o Q_H^o}{2}-\delta\right)-\left(\frac{\rho_1^o Q_L^o}{2}-\eta\right)},$$

which is equivalent to (A20) and is always true for the same reason that (A20) is true. It follows that the sign of $\mathrm{d}\phi_2^*(n)/\mathrm{d}n$ depends on the sign of $\mathrm{d}[-(1-n)/(1+n)]/\mathrm{d}n=2n/(1+n)^2$ which is positive.

A.2.4 Transition-inducing degree of national specificity. There exists a critical value, $n^*>0$, of the degree of national specificity of the factor markets such that for $n<n^*$ one of (or both) the critical values, $\omega_2^*(n)$ and $\phi_2^*(n)$, is negative, so innovators do better than those conforming to the erstwhile convention, inducing a cultural-institutional transition from the {*C*,*S*} to the {*I*,*R*} convention. Denote by n_ω^* the level of *n* such that $\omega_2^*(n)=0$, and by n_ϕ^* the level of *n* such that $\phi_2^*(n)=0$, the transition-inducing degree of national specificity is $n^*=\max[n_\omega^*,n_\phi^*]$. Equating expression (A10) to zero,

$$\omega_2^*(n)=\frac{\left[-\frac{\rho_2^t Q_L^t}{2}+(\rho_2^t Q_L^t-m)\right](1+n)-\left\{\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]-(\rho_2^t Q_L^t-m)\varepsilon\right\}(1-n)}{\left(\frac{\rho_2^t Q_H^t}{2}-\frac{\rho_2^t Q_L^t}{2}\right)+(\rho_2^t Q_L^t-m)}=0,$$

the former is given by

$$n_\omega^*=\frac{\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]-(\rho_2^t Q_L^t-m)\varepsilon-\left(\frac{\rho_2^t Q_L^t}{2}-m\right)}{\left[\frac{\rho_2^t Q_H^t}{2}(1-\varepsilon)+\frac{\rho_2^t Q_L^t}{2}\varepsilon\right]-(\rho_2^t Q_L^t-m)\varepsilon+\left(\frac{\rho_2^t Q_L^t}{2}-m\right)}. \qquad \text{(A21)}$$

And equating expression (A12) to zero,

$$\phi_2^*(n)=\frac{\gamma(\rho_2^tQ_L^t-m)(1+n)-\left\{\left[\left(\frac{\rho_1^oQ_H^o}{2}-\delta\right)-\left(\frac{\rho_1^oQ_L^o}{2}-\eta\right)\right](1-\varepsilon)-\gamma(\rho_1^oQ_L^o-m)\varepsilon\right\}(1-n)}{\left(\frac{\rho_2^tQ_H^t}{2}-\delta\right)-\left(\frac{\rho_2^tQ_L^t}{2}-\eta\right)+\gamma(\rho_2^tQ_L^t-m)}=0,$$

and the latter is

$$n_\phi^*=\frac{\left[\left(\frac{\rho_1^oQ_H^o}{2}-\delta\right)-\left(\frac{\rho_1^oQ_L^o}{2}-\eta\right)\right](1-\varepsilon)-\gamma(\rho_1^oQ_L^o-m)\varepsilon-\gamma[\rho_2^tQ_L^t-(w+\mu)]}{\left[\left(\frac{\rho_1^oQ_H^o}{2}-\delta\right)-\left(\frac{\rho_1^oQ_L^o}{2}-\eta\right)\right](1-\varepsilon)-\gamma(\rho_1^oQ_L^o-m)\varepsilon+\gamma[\rho_2^tQ_L^t-(w+\mu)]}. \qquad \text{(A22)}$$

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