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International Fragmentation:
A Policy Perspective

by

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Abstract

International fragmentation, or outsourcing, is often referred to as a distinctly novel feature in today's global economy. First observed in the US-Mexican context, the phenomenon is increasingly catching policy makers' attention also in Europe. As barriers between east and west are progressively removed, low wage countries in eastern Europe are likely outsourcing targets for western European firms. Against this background this paper provides a policy-oriented discussion of cross-border fragmentation. It starts with a precise definition of the phenomenon, putting it into the broader perspective of economic globalization. It then uses simple graphical tools to address, in a general way, several questions that appear relevant from western European point of view. Specifically, the paper identifies conditions under which outsourcing is beneficial for a western country as a whole, and it highlights the internal redistributive effects associated with this gain. It then argues that preferential trading arrangements are formidable fragmentation barriers, particularly in Europe where a multiplicity of such arrangements has led to complex rules of origin. The efficiency loss from such barriers should provide a strong additional cause for a multilateral, as opposed to a regional, approach to trade liberalization.

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1 Introduction

The turn of the century has witnessed at least three dominant perceptions of change in a typical European economy. First, there is the demise of socialism in eastern Europe, followed by a rapid *transformation* of eastern European economies. Second, we observe an ever increasing obsession with a phenomenon dubbed economic *globalization*. And finally, there is the alleged emergence, originating in the US and fostered by rapid progress in information technology, of the *"New Economy"* as a whole new paradigm of how market economies might work.

Only the first of these phenomena is unquestioned in its existence, and fairly precise in its meaning. The second no doubt exists, but appears to have a somewhat unclear and arbitrary meaning, and there is much controversy regarding its effects. As to the third, many of us are in doubt on both, what it might mean, and whether it exists at all.

As always when we are uncertain about the existence and precise nature of a phenomenon, our views of, and attitudes towards, it are susceptible to manipulation, or at least to predispositions on the part of those who venture a description. Thus, *globalization* is sometimes described as a dreadful process which a) implies that our wages are set in Beijing,[2] which b) increasingly leads neighboring low-wage countries to chop slices off our domestic value added chain, c) exposes our domestic labor markets to floods of immigration from low wage countries, particularly from eastern Europe, which d) endangers cherished public goods, such as a clean environment and food safety, or health and labor standards, and which e) displaces our governments from the driver's seat regarding the course of economic policy.

Economists who are believers in the free market would probably find clever responses to each of these points. They might, in turn, hold that a) our wages are primarily determined by our own productivity, that b) outsourcing of value added components is but a new and beneficial form of international division of labor, c) inward flows of factors (labor and capital) are typically associated with an overall welfare gain for the host country, albeit coupled with potentially controversial redistribution effects, that d) employing restrictive policies towards trade, migration, and investment are at most second-best policies to treat problems of the environment, health and social standards, and that e) enlightened governments may view international restrictions on domestic policy as a useful commitment device, and a welcome disciplinary measure vis á vis domestic interest politics.

These are but two extreme views. Can we take the easy route and simply hold that the

[2] See the provocative title of Freeman (1995).

truth lies somewhere in the middle? This would surely be unsatisfactory. We need to have a clearer understanding of the underlying phenomenon that may usefully be called globalization, instead of simply listing its alleged effects.

2 Is there a clear and useful meaning of "globalization"?

Observers often take the empirical route, presenting impressive figures, usually focusing on world trade and investment flows, and intended to suggest that a new and powerful force is at work. But staring at detailed numbers, without a clear idea as to the phenomenon we are trying to look at, is a questionable exercise. Lacking such a clear idea, data may often be interpreted in rather different ways; see, for instance, Kleinknecht and ter Wengel (1998). Or even worse, they may not be interpreted in any meaningful and disciplined way.

Instead of detailed numbers, I therefore propose that we venture cursory look at the broad lines of modern history, in order to obtain a first and very rough idea as to what may, or may not, usefully be associated with the term globalization. Temin (1999) observes that the notion of activities spanning the whole globe probably dates back to the 17th century when technological advances in shipbuilding lead European emperors to embark upon global exploration, conquest, and expansion. But while this may mark the beginning of global thinking, a modern day economist is sure to point out that such activities have very little to do with what we now perceive as the essence of economic globalization. It took two more centuries, witnessing the formation of the modern nation-state, until we observe the first appearance of what, I would submit, is at the heart of economic globalization: The notion, and to a significant extent also materialization of world-wide arbitrage on markets for certain goods and assets.

By *arbitrage*, we mean activities which exploit price differences with the final result that a good cannot command different prices at different locations for prolonged periods of time. The same can be said, mutatis mutandis, for the return yielded by assets traded at different locations. Note that such activities need not actually take place on a massive scale, in order to prevent such price differences from arising. Tradability is important, not actual trade. Similarly, it is the "prospect of being arbitraged in a global economy" (Rodrik, 1998) which worries people, more than the immediate appearance of foreign goods and services in domestic shops.

Hence, when turning to data we should focus on price differences that indicate the presence of arbitrage, or lack thereof, rather than the quantities actually traded. And it is on this

account that the turn of the 19th-20th century marks the first period in history of economic globalization, comparable in broad terms to the level we observe today.[3] However, it took a further half-century until the word globalization made its first appearance; see Temin (1999). This is surprising, because in the 1960s one could, by any conceivable standard, hardly speak of globalization. Quite to the contrary, after the First World War the world had seen a prolonged period of a globalization backlash (Williamson, 1998), from which it had not yet fully recovered in the 1960s.

Globalization is thus new only as a word, but not as a phenomenon. This begs the question of what is responsible for the fearful apprehension now associated with the phenomenon, and apparently absent in earlier periods of similar globalization? Three reasons, it seems to me, may be put forward. *First*, globalization now features new forms of internationalization that extend into realms of the economy long thought beyond the reach of international arbitrage. *Second*, globalization is now re-emerging after a long period of retreat to economic nationalism which was provoked by earlier globalization, and which had a devastating effect on the world economy. This latter aspect is particularly worrisome, as it raises the specter of a future and similarly devastating globalization backlash if we do not take care to prevent history from repeating itself. A crucial point of concern, then and now, is a significant degree of income inequality that coincides with globalization, and is therefore often perceived as being caused by it; see Williamson (1998). The *third* point relates to policy. In a world where private activities are governed by world-wide arbitrage, the set of policy options that may be simultaneously, and independently, pursued by national governments is severely restricted. In a sense, the idea of arbitrage gets extended to the realm of policy. In principle, of course, this was no less true 100 years ago than it is today. However, the principle has now become a constraint which is much more severely binding, for the simple reason that modern governments want to do, and achieve, much more than in earlier times.

3 Fragmentation: A new form of globalization

According to the traditional view of production and specialization, the principle of arbitrage is applied to a well defined value added process as a whole. The new feature of globalization which we term *fragmentation* now arises whenever *arbitrage is applied to ever smaller slices of the value added process*, instead of the value added process as whole. The extent to which the value

[3] See, for instance, Irwin (1996), Williamson (1996), Obstfeld (1998), and Temin (1999).

added process is amenable to such separation is, of course, determined by *technology*. The extent to which it actually takes place across borders is governed by *economic considerations*, featuring in particular the costs of linking such separated slices towards effective supply of the final product, and the cost advantages arising from separation, say from carrying out individual fragments of value added offshore, as opposed to doing everything in an integrated way at home.

It is important that the significance of fragmentation is not limited to *multinationals* outsourcing certain services to their foreign subsidiaries. Much of it takes place at *arms length*, relying on contracts with independent firms. Obviously, a driving force behind fragmentation is a reduction in the *costs of linking such fragments across borders*, so as to guarantee a steady supply of the final product to the buyer. Advances in the communications technology, as well as a reduction in *formal* and *technical barriers to trade*, are responsible for fragmentation to happen where it was economically unreasonable before; see Harris (1993) and Jones & Kierzkowski (2000). If such costs are higher for cross border links than for domestic links, as it is often argued, then there must be an offsetting cost advantage for producing individual fragments offshore. These can be due to *superior technology*, but also to an interplay between *factor price differences* and *factor intensities* of these fragments which may even compensate for a backward technology. And if costs of cross border trading and linking are progressively reduced, which for our purpose is the operational description of globalization, without at the same time also annihilating international differences in technology and factor prices, then an increase in fragmentation is the outcome.

Did this happen to an *observable* extent? One may try to crudely measure this by appropriately modifying the traditional measure of openness, trade in *percent of GDP*, so that merchandise trade is expressed in *percent of merchandise value added*. Feenstra (1998) observes that on this account trade has increased much more rapidly than if trade is expressed in percent of GDP. Table 1 compares these two measures for a few European and non-European economies. While trade as a percent of GDP did increase for all economies except Australia and the UK, trade in percent of merchandize value added has increased much more dramatically. This is, admittedly, a very indirect way of measuring the prevalence of the phenomenon of fragmentation. But it is at least "strongly consistent" with the view that the international division of labor has moved into the real of value added processes. Additional evidence on the commodity composition of US-trade support this view.; see Feenstra (1998) and Irwin (1996). Adding more direct, although partly anecdotal, evidence, such as the maquiladora example

in the US-Mexican case, it is hard to avoid the overall conclusion that a convincing story of fragmentation does, indeed, become apparent from the data.

Table 1: Traditional Trade versus Fragmentation

	Trade in % of GDP			Trade in % of Value Added		
Country	*1890*	*1990*	*%-change*	*1890*	*1990*	*%-change*
Australia	15.7	13.4	-14.6	27.2	38.7	42.3
Canada	12.8	22.0	71.9	29.7	69.8	135.0
Denmark	24.0	24.3	1.3	47.4	85.9	81.2
France	14.2	17.1	20.4	18.5	53.5	189.2
Germany	15.9	24.0	50.9	22.7	57.8	154.6
Italy	9.7	15.9	63.9	14.4	43.9	204.9
Japan	5.1	8.4	64.7	10.2	18.9	85.3
Norway	21.8	28.8	32.1	46.2	74.8	61.9
Sweden	23.6	23.5	-0.4	42.5	73.1	72.0
United Kingdom	27.3	20.6	-24.5	61.5	62.8	2.1
United States	5.6	8.0	42.9	14.3	35.8	150.3

Source: Feenstra (1998).

Assuming that the existence of the phenomenon is unquestioned, what is its *policy relevance*? I shall restrict myself to two issues: a) *factor prices and aggregate welfare*, and b) the role that *preferential trade arrangements* play for fragmentation. It is important to be clear about the question asked. Specifically, the following questions need to be distinguished: 1) How does fragmentation affect the domestic distribution of income? 2) Does fragmentation enhance international factor price equalization? 3) How does it affect employment? 4) How does it affect aggregate welfare in the economies involved? And 5) Does fragmentation enforce the process of catching up by countries, such as the transition economies in the European context? Unfortunately, the answers to the first three questions are unclear and importantly dependent on the kind of model that one relies upon. The answers to questions 4 and 5 are likely to be in the affirmative, and less sensitive with respect to the model used, at least in the long run. I shall now try to shed some light on these issues, relying on abstract theoretical reasoning and using a simple graphical tool.

4 Outsourcing: A trade off between cost savings and loss of employment?

Interest in fragmentation has arisen primarily from concern about a persistent decline of certain types of *wage income* relative to others, and relative to non-wage income. Factor price effects, therefore, seem of particular policy relevance. Unfortunately, however, robust results are hard to come by. Feenstra & Hanson (1996,1997) argue that fragmentation is responsible for an increase in the gap between high- and low-skilled labor. Arndt (1997, 1999) presents a counter-argument that fragmentation may just as well increase income of labor relative to capital in both Mexico and the US. Moreover, Deardorff (2000) and Jones & Kierzkowski (2000) argue that the incremental effect of fragmentation on international factor price equalization is ambiguous. Thus, the overall impression one obtains from this literature is that almost anything can happen regarding questions 1 and 2 above. Too much, it seems, depends on the details for these questions to be amenable to a theoretical treatment of reasonable generality.[4]

However, it should nonetheless be possible with some modeling effort to identify some of key channels and trade-offs involved. All models rely on assumptions, the art of modeling is choosing them in a well-guided and useful way. From a policy perspective, it is probably important to depart from the *long run* perspective and the *full employment* assumption that the literature has so far relied upon. I therefore assume that each industry relies on a given stock of *sector specific capital* stock which may be moved across the border in the process fragmentation, but which is useless in other industries, whether at home or abroad. By way of contrast, *labor is mobile* across sectors *domestically*, but immobile across national borders. In such a situation, capital owners earn a rent which is determined by the price of the commodity produced in a given industry and the prices that are charged for its inputs, including the ongoing wage rate. Depending on labor market frictions, labor may or may not be fully employed. Without going into the details of labor market imperfections, I will address the implications of possible unemployment in the context of international fragmentation.

In figure 1, the line V^1 depicts the *marginal value added of employment* in industry 1, given a pre-determined stock of industry-1-capital. Assuming that firms perceive the wage rate as beyond their control, we may read this line as a *labor demand* curve for industry 1, with the wage rate – expressed in the same unit as value added – read on the vertical axis. We

[4] A general treatment of the factor price effects encompassing the above mentioned special cases is presented in Kohler (2000).

add a similar labor demand curve V^2 for the rest of the economy, with the origin placed at the lower right-hand corner, and with the horizontal difference between the two origins measuring overall labor supply $\bar{L}$. For simplicity, we assume labor supply to be given in fixed amount. We thus obtain a *labor market equilibrium*, featuring industry-1-employment equal to L^1, with the rest of the economy's labor force employed in industry 2, i.e., $L^2 = \bar{L} - L^1$. The wage rate in this equilibrium is w^*. Value added in industry 1 is measured by the area $A^1BL^10^1$, while the rest of value added is given by the area $A^2BL^10^2$.

We now consider fragmentation, assuming that it may take place only in industry 1. This is but a stylized way to say that for fundamental reasons of technology, different industries are susceptible to international fragmentation and outsourcing in very different degrees. We interpret the line V^1 as a result of two different *value-added-fragments* which may be carried out separately, but which nonetheless depend on each other in that they derive their value only from being "assembled" towards the final product. Suppose, then, that V_1^1 depicts the marginal value added of labor employed in fragment 1 of industry 1, while V_2^1 depicts a similar schedule for fragment 2, with V^1 the horizontal sum of the two. It is of vital importance to be clear about the precise meaning of these schedules. Specifically, V_1^1 is the marginal value added of fragment 1 labor, *given* that the profit maximizing amount of labor, read off the line V_2^1 for alternative wage rates, is employed in fragment 2, and given that the two fragments thus obtained are then "assembled" to a final product which is sold at the prevailing market price. Thus, total value added created in industry 1 is the sum of area $A^1B_1^1L_1^10^1$ (fragment 1) and area $A_2^1BL^1L_1^1$ (fragment 2). Either of these areas, however, exists only in connection with the other.[5] Each fragment in an essential way derives its value from the existence of the other. We shall therefore call these areas the *derived values* of fragment 1 and 2, respectively.

Suppose now that due to some advance in transactions and communications technology, firms are actively seeking to take advantage of cheap foreign labor by outsourcing individual fragments. Let us assume for simplicity that for some reason no such outsourcing is possible for fragment 1.[6] Our aim here is thus not a full-fledged explanation of international fragmentation.

[5] Conceivably, either fragment may also have further uses in other value added processes which we do not explicitly model here. However, if fragments are tradable, as we assume here, then the derived value added of any alternative use cannot exceed the respective area mentioned above, for otherwise profit maximizing firms would not use it in industry 1.

[6] Again, this is a matter of simplification. For the issue of outsourcing to arise, we must obviously preclude industry 1 leaving the home country altogether. A reasonable interpretation is that final assembly as well as production of fragment 1 rely on both, technological knowledge which is specific to firms presently residing

Instead, we are interested in an account of its effect on the home country. With this in mind, suppose that there is a neighboring country, which for concreteness we now call an eastern European country, where the wage rate is $w^E < w^*$. Will home firms consider moving production of fragment 2 to the eastern country where they find cheaper foreign labor to produce fragment 2? If they do, we call it "outsourcing" of fragment 2. We first note that in this way it is possible to secure the derived value of fragment 2 at lower cost, the cost-advantage being B_1^1BDC. However, it is important to realize that domestic firms will only go for *outsourcing*, if they can appropriate at least some of this advantage for themselves. Several interpretations are possible. For the sake of a clear argument, we assume for now that fragmentation, if taking place at all, is carried out to *full extent*, meaning that all of fragment 2 formerly produced at home is now produced abroad. We shall return to *partial fragmentation* below. We must now make an important distinction.

1. If *capital is immobile across national borders*, then home firms may secure fragment 2 at arms length from foreign subcontractors who rely on foreign capital in production of this fragment.[7] The question, of course, arises how domestic firms may in this case appropriate the cost-advantage. In other words, if the foreign subcontractors produce a fragment worth $A_2^1BL^1L_1^1$ to home firms, what prevents them from charging an amount equal to this value? Here, we must remember that under our assumptions this value derives exclusively from subsequent assembly with fragment 1. If a firm-specific and/or country-specific asset confers an effective "ownership advantage" to domestic firms,[8] then it seems reasonable that the home firms can appropriate at least some of this cost-advantage. For simplicity, we assume they can fully appropriate it. The result is that they obtain a fragment worth $A_2^1BL^1L_1^1$ at a cost which is lower than this value by the amount B_1^1BDC.

2. If capital may be moved abroad, home firms, of course, have an incentive to guarantee appropriation of the cost-advantage by *foreign direct investment*. They would then use their capital to do what they did before, i.e., producing fragment 2, but using foreign

in the home economy, and on some form of country-specific advantage, such as for instance the presence of specific infrastructure.

[7] We do not look at the foreign economy in any detail and simply assume that such capital is available in the required amount.

[8] Ownership advantage is a concept used in the theory of the multinational enterprise. It means that a firm has exclusive access to some asset, in our case fragment 1.

labor receiving w^E, instead of domestic labor which would cost w^*. Fragmentation in this case is thus associated with foreign direct investment. We could now say that the capital invested abroad earns a higher rent than it did before when using domestic labor. But a preferable interpretation is that the implicit rent is equal to $A_2^1BB_1^1$, and that the fragment is shipped to the parent firm at a transfer price totalling $A_2^1BL^1L_1^1 - B_1^1BDC$. Again, domestic firms obtain a fragment with derived value equal to $A_2^1BL^1L_1^1$ at a cost which falls short of this value by the amount B_1^1BDC.

Whatever the interpretation, fragmentation confers an advantage to domestic firms similar to a price cut for some intermediate input that they use. This is the good news. However, the bad news is that the domestic economy loses employment. If all of fragment 2 is moved to the eastern country, then all of former fragment-2-employment, $L^1 - L_1^1$, is lost. Moreover, in the case of immobile capital, domestic capital is similarly set idle. At first sight, this looks like a rather unattractive scenario for the home economy, as it raises the specter of *losing a whole slice* of industry-1-value-added to the neighboring country. Does this country need to worry?

5 Gain and pain: Overall welfare and redistribution

As regards *overall welfare*, the crucial question is whether the domestic resources released through outsourcing find alternative domestic employment where they create an output value which is equal to that of their previous use. In the case where outsourcing is coupled with foreign direct investment, the answer is in the affirmative regarding capital, since all *domestic capital* formerly employed in domestic production of fragment 2 is now employed in foreign production of the same fragment. The same does not necessarily hold true if outsourcing relies on foreign capital in which case domestic fragment-2-capital is indeed released from its former use. And similarly, it does not necessarily hold for *domestic labor*, which is set free in the amount $L^1 - L_1^1$ if full outsourcing takes place, whether coupled with foreign direct investment or without.

In its entirety, the immediate cost-savings effect from outsourcing, CB_1^1BD, will show up as an overall *welfare gain* for the home economy at large only if all of this domestic labor finds alternative use where it creates value added equal to its former income, measured by the rectangle $(L^1 - L_1^1) \times w^*$. Remember that $CDL^1L_1^1$ is now income paid to *foreign* labor. To the extent that this *alternative value added* is lower than $(L^1 - L_1^1) \times w^*$, the welfare gain

is reduced or may vanish altogether. Indeed, the gain may even turn to a *welfare loss* if this value added is sufficiently low.

There are two possible reasons why the alternative value added generated by domestic resources that are set free through outsourcing may fall short of $(L^1 - L_1^1) \times w^*$. First, some of these resources may end up not being employed at all, due to some market imperfection. And secondly, if employed, they may be subject to the "law" of diminishing marginal returns. In the first case the overall welfare effect is clearly negative. One for one, each step of outsourcing would then generate *domestic unemployment*. It is still true that for every unit of labor released through outsourcing, the economy saves $w^* - w^E$ on fragment 2, but at the same time it loses domestic income in the amount of BL^1. This obviously generates a *welfare loss* of DL^1. But this is surely a very bad assumption to rely upon for a reasonable policy view on outsourcing.

Let us, then, assume case 2 above. Under three additional assumptions, we may conclude that outsourcing has an unambiguously positive efficiency, or welfare, effect: 1) Outsourcing is a continuous process and not subject to any indivisibility. 2) Firm behavior is governed by profit maximization. 3) There are no market imperfections. These assumptions are by no means innocuous, but they nevertheless represent a useful benchmark case. The crucial point is that if they are met, then outsourcing will not be carried out to an arbitrary extent. Instead, firms will determine an *optimal degree of outsourcing* which will guarantee an efficiency gain for the economy at large. However, this gain is coupled with a redistribution effect at home. Hence we observe the familiar tension between efficiency and distribution. To quote Rodrik (1998): "No pain, no gain".

Once more, we look at figure 1. Consider alternative foreign wage rates, starting with w^*, i.e., an equal wage rate at home and abroad, and then continuously falling below w^*. As the foreign wage rate falls below w^*, home firms will want to move fragment-2-production to the foreign economy, in order to utilize this lower wage cost. Suppose that they do so by relying on foreign direct investment, thus using their own fragment-2-capital alongside foreign labor. The home economy loses fragment-2-employment through outsourcing, and there is excess supply of labor with an ensuing downward pressure on the wage rate. However, the cost reduction on fragment 2 acts like a price cut for an intermediate input, and it therefore increases the *marginal value added* for fragment 1 which, together with fragment 2, goes into production of the final good. Profit maximizing firms will therefore increase labor demand for domestic fragment 1 production, sliding down the labor demand schedule V_1^1 to $\tilde{B}_1^1$, as outsourcing

takes them down to D^E along V_2^1. Notice, however, that as firms move on V_1^1 the origin for V_2^1 moves to the right. Notice also that demand for foreign labor in fragment-2-production increases beyond former domestic employment $L^1 - L_1^1$, depending on the foreign wage rate in line with V_2^1 (with origin L_1^1). One may call the line segment of V_1^1 starting at point B_1^1 as the *"cum outsourcing" labor demand curve* of industry 1. For successively lower foreign wage rates, the cost advantage from outsourcing is increased which is mirrored by an increase in demand for domestic labor towards production of fragment 1.

At the same time, a falling wage rate increases labor demand in industry 2, moving along V^2 to $\tilde{B}^2$. Combining this with "cum outsourcing" labor demand by industry 1, it is easy to see that for all domestic wage rates above w^E there will be domestic *excess supply of labor*. Suppose this causes the wage rate to fall right down to the foreign level w^E. At this point, the domestic industry 2 has increased its labor demand to ${}_0\tilde{L}^2$, while industry 1 employs ${}_0\tilde{L}_1^1$. One may now argue that there is still excess supply of labor in the amount of $\tilde{L}_1^1\tilde{L}^2$, but if the domestic wage rate falls further, then the whole cost-advantage of outsourcing will disappear at once. If it is possible to split fragment-2 between offshore production and domestic production, relying on split use – foreign direct investment and domestic use – of the specific domestic capital stock, then domestic firms will be indifferent between full outsourcing and *partial* outsourcing, meaning that they use $\tilde{L}_1^1\tilde{L}^2$ of domestic labor (plus the required amount of capital) for domestic production of fragment 2, and producing the rest "offshore" with foreign labor input of $CD^E - \tilde{L}_1^1\tilde{L}^2$ (plus the required amount of foreign direct investment).

In this latter case, there is a clear *welfare gain* from outsourcing. The opportunity cost of the former level of fragment 2 production is reduced by CB_1^1BD. Moreover, there is an additional outsourcing surplus equal to the triangle BDD^E, due to increased employment of foreign labor which is paid its marginal contribution to value added. But this is partly offset by the falling marginal value product that domestic labor finds in its alternative domestic use, and which may be read off the line V^2 from point B to point $\tilde{D}$, and line V_1^1 from point B_1^1 to point $\tilde{B}_1^1$. The aggregate welfare gain, therefore, is equal to the sum of the two triangles $B_1^1C\tilde{B}_1^1$ and $BD^E\tilde{B}^2$. This substantiates the argument indicated in the introduction that fragmentation is but a *beneficial form of international division of labor*. But, as with other forms of trade, the efficiency gain comes with a potentially troublesome *redistributive effect*. In the example of figure 1, domestic labor is arbitraged by cheap foreign labor and the possibility to rely on such labor for "offshore" production of fragment 2.

A natural question to ask is what might have precluded this kind of arbitrage before,

and what has lead it to be a significant element of modern economic globalization. On a general level, we may refer to improvements in the *technology of communication* which makes it less costly to separate the value added process across national borders; see Harris (1993) and Jones & Kierzkowski (2000). In addition, a reduction in formal and technical *barriers to trade* may play a role, since a fragment which is produced abroad is often subject to such barriers when imported back to the home country for assembly to the final good. Turning back to figure 1, we may, for instance, envisage a situation where such transactions costs first annihilate the cost advantage of outsourcing afforded by the wage gap $w^* - w^E$, but are gradually reduced by a policy of integration and/or improved communications and transport technology, so that a fragmentation incentive arises. However, policies of integration, like the eastern enlargement of the EU, are also likely to narrow the international wage gap. More generally, while globalization may be associated with a world-wide increase in the gap between certain types of wage income, or between wage income and other incomes, it is likely to close the gap between wages earned for similar labor in adjacent countries. Only if this latter effect materializes at a lower pace, will the overall development be conducive towards international fragmentation.

It is important to realize that the *redistributive* effect need not necessarily be to the *disadvantage of labor*. The example so far portrayed by figure 1 is quite extreme in that labor is the only domestic factor which is effectively released through outsourcing. The assumption was that domestic fragment-2-capital, rather than being set free, is moved across the border to work with foreign labor. Suppose, instead, that outsourcing takes place in an environment where no foreign direct investment is possible, or where firms for some other reason choose to use of foreign, rather than domestic, capital when producing fragment 2 "offshore". Then domestic capital is affected much like labor, and the outcome is much more favorable for labor. For instance, if capital is industry-specific but may nonetheless be used equally for different fragments, then the "cum outsourcing" labor demand curve exhibits a discrete jump at L_1^1, $\text{up to } \bar{V}_1^1$. The reason is that, with all industry-1 capital now available to support employment for fragment-1-production alone, all labor input L_1^1 becomes more productive. It is quite clear that if "cum outsourcing" labor demand follows the line $\bar{V}_1^1$, the domestic wage will not fall all the way down to w^E. Not surprisingly, if domestic capital is released alongside labor, then outsourcing has a much less severe domestic wage effect. Outsourcing is thus more likely to be harmful for domestic labor if it is associated with direct investment than in the case of trade only in goods.

A final remark is in order regarding the low wage country. The above argument assumes that outsourcing may draw upon a completely elastic foreign labor supply at a wage rate w^E. This is a rather optimistic view. If labor in the eastern European country is likewise employed subject to diminishing marginal value added, then any additional demand arising from international fragmentation can only be met by bidding up eastern wages. This is good news if one is concerned with catching-up, but at the same time it implies that the welfare gain that western countries may reap from outsourcing is reduced. It does, however, also mean that the distributional effect within the western country is mitigated.

6 Fragmentation barriers: The role of preferential trading agreements

Outsourcing has first caught economists' attention in the case of the maquiladoras appearing at the US-Mexican border as a result of NAFTA; see Arndt (1997). In Europe, the fall of the "iron curtain" has generated a similar situation in that western European firms may find neighboring low wage countries as attractive targets for outsourcing. Indeed, there are reasons to believe that the *European case of market integration* is even more prone to fragmentation than the NAFTA. After the Second World War, Europe has long been characterized by a complex system of independent *rules of origin* pertaining to its preferential trading blocs (EC and EFTA) and a host of bilateral association treaties. This system has undergone repeated change through new association agreements and changing membership constellations. Such rules of origin are inherently arbitrary and susceptible to protectionist abuse; see Bhagwati et al. (1998). Among other things, they promote *local parts industries*; see Komuro (1997). It is to be expected, therefore, that an eastern enlargement of the EU, which does away with such rules for trade between incumbent member states and low wage new member countries, will enhance an efficient sourcing of inputs; see Anell et al. (1998).

A good case in point is the textiles industry where subcontracting has a long tradition. Typically, when a fragment of textile production is subcontracted to a foreign firm, this fragment will also require certain material inputs – for instance yarn, fibre or thread – in addition to foreign labor and capital. These materials may not always be available most cheaply in the subcontractor country, but may instead be imported from a third country. If the trading environment is characterized by *preferential agreements*, then the fragment may be denied preferential treatment when imported back to the outsourcing country, because the use of

third country materials violates existing *rules of origin*.

To be more specific, this was of practical concern for Swiss suppliers of yarn and other textile materials when the EU15 had reached preferential trading agreements on a bilateral basis with several central and eastern European countries (CEECs), the so-called *Europe Agreements*. In the 1990s, textile fragments subcontracted across different EU15 countries and incorporating Swiss-made materials have obtained preferential treatment under existing EU-EFTA rules of origin. Such was often not the case, initially, for the same fragments when subcontracted to CEECs, because relying on Swiss-made materials has implied that an insufficient amount of *original working or processing* was applied to the fragment in the relevant CEEC. If preferential treatment was decisive, the result was that outsourcing either did not take place at all, or that the fragment itself has relied on an inefficient sourcing of material inputs. In either case the welfare gains identified above do not materialize to their full potential.

The EU has acknowledged this problem by implementing what is known as *diagonal (or pan-European) cumulation* through the so-called "Harmonized Protocol" in 1997; see Komuro (1997). This implies that the use of EFTA-made materials confers *originating status* to the fragment on the same footing with EU materials *(bilateral cumulation)*. This point is illustrated by figure 2. An important message to be drawn from this figure is that any further trade agreement between the EU and other countries, say the Maghreb, Mexico, South Africa, or the Mercosur, will put the CEECs in a position similar to Switzerland prior to diagonal cumulation, unless the CEECs become full members. Incidentally, this may also be a crucial incentive for Switzerland to join the EU.

I cannot indulge into detailed modeling here, but it is quite clear even from these cursory observations that the co-existence of several *preferential trading arrangements* entails significant *fragmentation barriers*. Cumulation provisions may be suitable instruments to avoid these barriers if perceived unwelcome because of their detrimental distortionary effects. But in addition to creating pure distortions, rules of origin are also costly to administer and susceptible to protective abuse. Hence, relying on bilateral or regional agreements plus subsequent cumulation protocols strikes one as a grossly inefficient strategy for international trade policy. To give a rough impression on just how inefficient the present situation is likely to be in this regard, we may briefly look at figure 3, which is adapted from Snape (1996). It depicts the bewildering multitude of existing trade agreements which Bhagwati has aptly likened to a spaghetti bowl; see Bhagwati et al. (1998).

7 Conclusions

What can we learn from this analysis? I submit that the following general conclusions can be drawn. First, although outsourcing carries a rather direct flavor of the home economy losing some of its value added, there is a clear potential that this is associated with a welfare gain. It is somehow less obvious than for trade in final goods, but outsourcing of parts and components is an instance of potentially beneficial international division of labor.

As in many other cases, the efficiency gain comes with a pain in the form of a redistributive effect on incomes. There is no general rule to diagnose, let alone predict, how outsourcing affects wages and other forms of income. But it is possible to give precise meaning to the potential welfare gain, even in the presence of severe income redistribution. One may identify conditions under which the incomes lost in some parts of the economy are overcompensated in the aggregate by income gains in other parts. These conditions are far from innocuous and even if they are met, the redistributive effect may make the efficiency gain difficult to obtain for political or normative reasons.

Any unemployment which may arise from outsourcing due to the presence of market frictions partly offsets the above mentioned welfare gain. If all labor previously employed in the activity which has moved offshore ends up unemployed, then the direct effect of outsourcing on domestic welfare is clearly negative. However, if wages are flexible, some of the incipient unemployment is absorbed by additional employment in the remaining fragments of the outsourcing industry, and in other industries of the domestic economy.

The effect of outsourcing on international factor price differences is not clear-cut. I have touched upon this issue only in a rather cursory manner, but it transpires that one should not jump to quick conclusions arguing that outsourcing is conducive to international factor price equalization. Much detail that I have deliberately kept in the background above becomes relevant for this issue. Initial progress has been achieved by Deardorff (2000), but the question clearly needs further analysis.

Whether or not fragmentation is conducive to closing gaps between different countries' income levels, such as eastern and western European countries, is an altogether different question. As with factor price equalization, I have not explicitly dealt with this issue in the present paper. A few remarks are nonetheless warranted in closing. In principle, the level of real income per capita, or welfare, may rise in CEECs by the virtue of them receiving western outsourcing, even if their relative factor prices do not therewith approach those observed in

the west. However, the specific conditions under which outsourcing occurs, in particular the firm-specific and country-specific advantages involved, are likely to be such that the potential efficiency gain will mostly be appropriated by the western country where outsourcing originates. At the same time, production of individual fragments in the east may be an effective vehicle of technology transfer, particularly if coupled with foreign direct investment.

The co-existence of several preferential trading agreements is a powerful barrier against fragmentation and outsourcing. This is a detrimental effect which existing theory, focusing on creation and diversion of trade in final goods, has not sufficiently acknowledged. Governments have tried to at least partly avoid the unwelcome effects of these barriers by complex cumulation provisions in the rules of origin pertaining to these preferential agreements, but this is an inherently inefficient way to deal with the problem. Indeed, it is hard to avoid the general conclusion that the emergence of outsourcing and international fragmentation reinforce the case for a return to multilateralism, as opposed to regionalism as the driving paradigm of international trade policy.

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Figure 1: Welfare and distributional effects of outsourcing

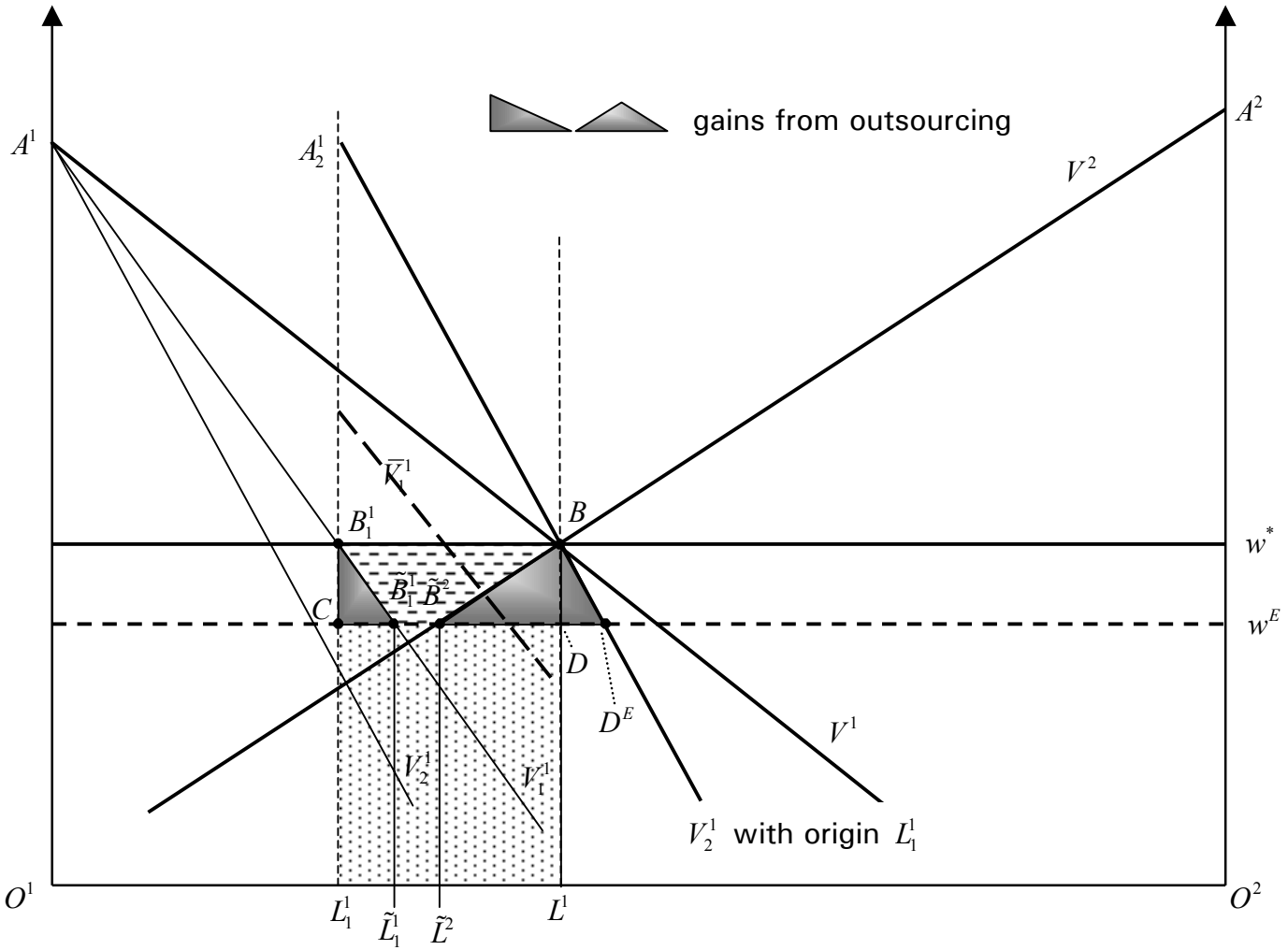


Figure 2: Fragmentation and European preferential trading agreements

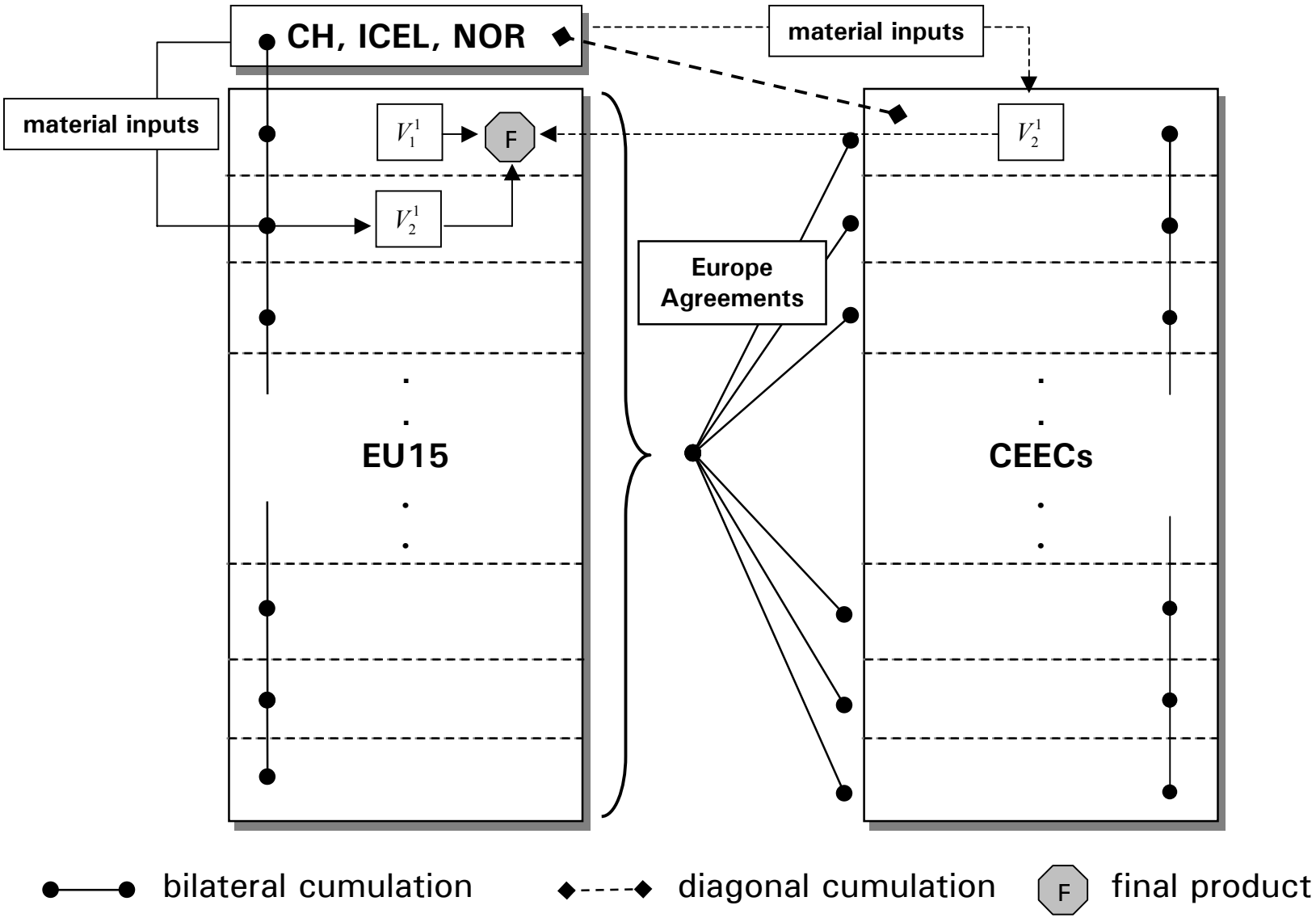
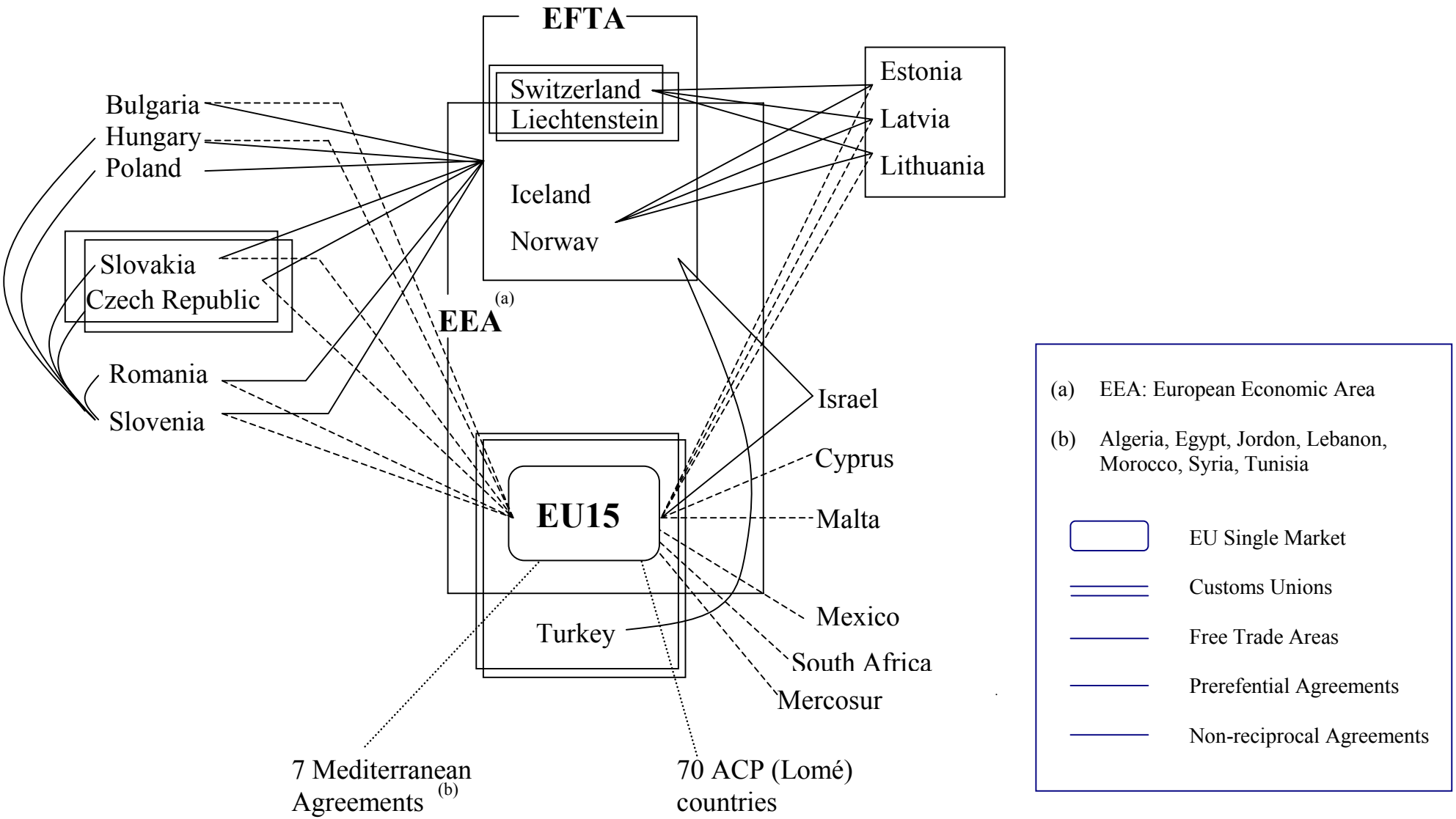


Figure 3: Multiplicity of existing trade arrangements



Adapted from: **Richard H. Snape**, *"Trade Discrimination – Yesterday's Problem?"*, The Economic Record, 1996