

# **TOWARDS A THEORY OF INTERNATIONAL PRODUCTION OF INFRASTRUCTURE SERVICES**

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# **Towards a theory of international production of infrastructure services**

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## **Abstract**

This paper discusses elements of a theory of international production of infrastructure services. I present a microeconomic view on the major market failures of the infrastructure sectors, and argue that the idiosyncrasies of these sectors may require modification of current dominant international business theories as applied in the explanation of the specific context of infrastructure foreign direct investments. The paper discusses the relevant ownership advantages, mostly in standard setting and capitalization; location advantages that are clearer, but do not play in the conventional fashion. Preemptive entry will secure first mover advantages in light of the transient nature of the windows of opportunity. Internalization, although apparently not relevant, may take place in specific transactions involving procurement of projects and financing. The process of internalization of infrastructure firms may also merit adaptations, even considering the more recent version of the Uppsala model which considers liability of outsidership.

## **Keywords**

FDI; infrastructure sectors; adaptation to sector idiosyncrasies; international production of infrastructure.

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Traditionally, the several sectors that may fit into the infrastructure category start in the local, municipality or city environment and the geographical boundary of those firms evolve over time, led by opportunities and by strategic decisions. Several infrastructure segments advanced towards integration into wider networks, making up large regional or nationwide firms. A smaller though now significant number of firms crossed the boundaries of their home country and opted to service new markets through direct property in foreign nations.

The decision of internationalization by any infrastructure firm is not a trivial one. Differently from most sectors, infrastructure is marked by very high fixed costs, and its capital is highly specific. Investments are of a very complex nature particularly those of greenfield type (Sader, 1999). Those characteristics lead to relatively low *ex ante* incentive to investment, demanding regulatory action by the governments. Against that background, the typical infrastructure company bears risks that are different and often higher than those born by average corporations.

Despite the importance that infrastructure FDI and the international production of infrastructure has been assuming in recent decades, the matter is insufficiently explored in the academic literature. Few works can be found on the internationalization of infrastructure firms. Among the few exceptions is Sarkar, Cavusgil and Aulakh (1999), who presented an extensive evaluation of the international expansion of telecommunications industry companies, the infrastructure segment which is in a more advanced position as compared to other segments. They support the view that the international production of infrastructure is not well explained by dominant theories of international business as they stand, needing further adaptation or clarifications.

In this paper, I try to evaluate the applicability of dominant international business theories to the international production of infrastructure and I propose that one important

route to the adaptation of those theories is the consideration of the very specific microeconomic features of the infrastructure firms.

The paper is organized in six sections besides this one of introductory remarks. The first section presents some stylized facts on the international production of infrastructure services. The second section deals with some definition issues. The third section presents the major market failures of the infrastructure sectors, which may modify the key approaches of international business in respect to the idiosyncrasies presented. The fourth section presents a brief survey of major international business approaches to internationalization. The fifth section develops elements of a theory of international production of infrastructure services. Finally, concluding remarks are presented.

### **International production of infrastructure services**

It is widely known that the infrastructure industry plays a strategic role in any country's social and economic development. Adequate coverage and quality of network services like telecommunications, energy, water and transport are among the key ingredients for national progress, besides promoting poverty alleviation, environmental sustainability, and contributing to reduce digital divide and other forms of exclusion. Although infrastructure plays such a key role in economic development (Calderón e Servén, 2004), sub-optimal investment is a very common situation, especially in non developed countries. Foreign direct investment (FDI) may help to relieve the constraints related to poor infrastructure, but it is not easily attracted. Sader (1999) asks why it is so difficult to attract foreign direct investment into infrastructure, and found a number of macroeconomic and institutional challenges that willing recipient countries face.

International production of infrastructure services is not a new phenomenon. Wilkins (1988, 1998) provided a detailed history of international investments led by Britain and other

countries. Like in a review by Penrose (1972) on an earlier work by Wilkins, “Withal, Dr. Wilkins’ discussion of the economics of foreign direct investment is slight, although she has done a useful service in elucidating the historical record”, the same can be said, even though Wilkins introduced new concepts like the phrase “free standing company” for the British international ventures, many of them in infrastructure.

Some stylized facts can be found in the literature. According to Dunning and Lundan (2007), the sectoral composition of inward foreign direct investment has shown some typical patterns. Nations rich in natural resources like Canada, Australia and several Middle Eastern and African countries attract FDI in the primary sector. Industrial or industrializing economies from Mexico to Germany usually attract a higher percentage of inward investment in the secondary sector. Other nations like the US, the UK, France, Switzerland Hong Kong (China) and Fiji attract more FDI into the tertiary sector. The services sector has grown in importance in inward FDI attraction against the primary and secondary sectors. Within the services sector, there is a concentration of investments in trade and financial services, but other services have been growing in importance, including transport and communications, particularly in developing countries. According to them: *“Generally speaking, the share of inbound MNE activity directed to the service sectors rises as income levels increase. However, it is also the case that FDI in infrastructural services, for example, public utilities, communications and financial services, has also increased as they have been privatized and/or deregulated, and as restrictions on the foreign ownership of such sectors has eased”*. Dunning and Lundan (2007, p. 36)

Infrastructure FDI is a relevant issue for developing countries that face high infrastructure needs. According to Sader (1999, p. 145) the increased foreign infrastructure investment in developing countries in the 1990s is behind “the creation of an entirely new

industry of companies now willing not only to supply equipment and services, but to take the commercial risk involved with the operation of facilities for long time periods”. The World Bank database records that 29% of investments with private participation committed to infrastructure between 1996 and 2006 were of foreign origin (Izaguirre, 2009). In fact, that investment boomed in the 1990s and receded somewhat in the 2000s, but international investments continue to take place, even though at a smaller pace than in the 1990s. An old constraint may take increased importance after the 2008 economic crisis. It is a fact that the value of globalization is growingly under question, and it has been more so in infrastructure services, where the different forms of property and the national origin of the operator are rather politically sensitive issues. Against the odds, however, the World Bank notes in Izaguirre (2009) recorded continuity of cross-border private investment activity in infrastructure in developing countries.

### **Internationalization of infrastructure**

The definition of internationalization of infrastructure does not come in a straightforward manner. Among the definitions that can be found in the literature, Jamison (2009A and 2009B) claims that internationalization of infrastructure occurs through “interconnections or links that cause interaction among infrastructures”, in various forms, including: (1) physical interconnections, where the value of the service on one side of the border depends on the actions of the other side; (2) logical interconnections, related to intelligence and controls across the system, which may be of cross-border nature like telecommunications numbering and Internet naming conventions; (3) financial interconnections, when multinational infrastructure operators in one country are affected by operations in another country; (4) strategic interconnections, when decisions are strategically related across jurisdictions, like natural gas pipelines and supply across Eastern Europe; (5)

policy interconnections, including spillovers of jurisdictional decisions, like regulations that leads firms to withdraw from a particular market, and others; (6) internationalization of customers; and (7) environmental interconnections, of growing importance.

Jamison (2009) deals with the issues of interconnections and links, his primary concerns are not the same as I deal with in this paper. He is more concerned with the geographical boundaries of regulation, and in fact he raises an interesting point of whether there would be a need to internationalize regulation in face of the ongoing trend of internationalizing infrastructure” (Jamison, 2009, p. 14). However, he offers one out of some interesting example of the several meanings that can be attributed to the term “internationalization of infrastructure”.

So, for the purposes of this paper, within the International Business literature, I define internationalization of infrastructure as the occurrence of FDI in infrastructure industries, leading to international production of infrastructure services. Thus, this paper is primarily concerned with FDI in infrastructure, which encompasses a subset of issues that is different from the interconnection and links issue discussed by Jamison (2009), and perhaps narrower than the latter. In addition, it is noteworthy that infrastructure plays a relevant role in many theoretical explanations of FDI that are widely documented in the literature, but here I am concerned with the international production of infrastructure as business in itself. Put it differently, I have looked at specific factors related to infrastructure FDI, but I have not addressed the effects of infrastructure on general FDI flows and stocks.

The consideration of FDI in infrastructure poses an additional issue, that of defining infrastructure and which industries or economic activities I am concerned with. This issue is dealt with in the next section.

### **The infrastructure industry**

The public utility services industry is probably one of the most challenging segments among all the services industries. That arises due to the fact that, besides the typical characteristics of services, managers have to deal with large capital requirements in very specific forms of capital. That creates the pillars of a highly regulated environment. A lot of attention has to be paid by the managers on the forms of engagement in public concessions or arrangements with the public sector. Market expansion relies increasingly upon successful arrangements between public and private sector.

Infrastructure services are different from other sectors. Key differences include high fixed costs, a feature that often comes jointly to very specific forms of capital. High fixed costs imply a trade-off between productive and allocative efficiency. On the one hand, there are significant economies of scale so that a single producer is able to produce at lower costs than two separate producers dividing the market. On the other hand, the monopoly power of this single, efficient producer will give him power to set up his price above the marginal cost of production, a penalty to consumers that will distort allocative efficiency. To preserve efficiency, countries often concede monopoly rights to a producer, either a State-owned company, or a private sector operator, in the latter case the operator being subject to strict price or rate-of-return regulation.

In the absence of competition in the market, various countries use competition for the market, the so-called Demsetz competition, as surveyed by Braeutigam (1989), as a shortcut to drive prices closer to marginal costs with less discretion in price formation. Bidders will compete in an auction for a franchise that grants the right to serve the market for a given period, usually 15-25 years. Although this arrangement may be a substitute of a regulation in some aspects, in most cases it has been used together with regulation. Williamson (1985) provides an interesting discussion of the advantages of Demsetz's *ex ante* competition,

vis-a-vis ex post regulation. He argues that “Where significant investments in durable specific assets are required and contracts are subject to technological and market uncertainties, franchise bidding in practice requires the progressive elaboration of an administration apparatus that differs mainly in name rather than in kind from that which is associated with the regulation that it is intended to supplant” (Williamson, 1985, pp. 350-351). Nevertheless, Williamson actually sees franchise bidding as a feasible or even superior alternative in social terms, in some cases like in the trucking industry where physical assets can be redeployed, and also in local service airlines.

Specific forms of capital cause under-incentive to investment. This comes from the possible reduction in the value of assets that normally takes place after the investment is made. Such an irreversibility of investment decisions cause investors to be more conservative, as long as they will get locked in. There may be the case for creeping expropriation: the bargaining power between the private owner and the government may change radically after the investment is done, creating room for opportunistic behavior of future heads of government that may be in a position to get advantage from the relatively weaker position of the private owner of the project. Uncertainty on future returns is affected by this feature and all this has to be priced in when the returns of the project will be calculated.

Regulation is in itself a complex world to deal with, and may involve a set of different actors with which the firm will have a relationship. According to Viscusi (1995, p. 13), *“typically the regulatory agency is not the only governmental player. Congress and the judiciary provide one check, and more importantly the regulatory oversight process within the White House has substantial input as well. Each of these groups has its own agenda”*. Dealing with the multiple regulators and relevant actors may require a significant amount of

very specialized resources, namely human capital endowed with the relevant social and political networks, as well as the skills and abilities to use such networks in favor of the organization.

Additionally, raising funds for financing an infrastructure investment, especially in non mature countries, is not a simple task. Cost of capital is typically higher than in mature markets. In some countries like Brazil, only official agencies are able to provide domestic long term financing lines for investment projects. Alternatively, international capital markets may be a reasonable alternative, even though country risk premium will make the operation more expensive than in a developed country.

All these rather peculiar industry characteristics, together with the need for regulation and the long-term nature of the investments comprise the motive for the typical under-incentive for investment in infrastructure. In the case of direct investment, when more than one jurisdiction is involved, the deterrent factors are potentiated.

In light of these characteristics, I can define the basic set of infrastructure industries that fit into the description. Primarily, I include water distribution and sewage collection; telecommunications, both wired and wireless; transports; and energy distribution. All these industries have the features of high fixed cost in very specific forms of capital.

### **Some dominant IB theories**

There are several competing explanations for foreign direct investment and its modes. The key explanations include the Uppsala model; the eclectic paradigm; and the internalization theory, all these are briefly summarized below.

Johanson and Vahlne (1977) proposed an *establishment chain* for internationalization of firms, based on their empirical observations of international subsidiaries of Swedish firms. They found that this establishment chain was set up according to the psychic distance

(*factors that make it difficult to understand foreign environments*), in a dynamic but non deterministic process that evolves over time with learning and incremental commitment building, under a bounded rationality assumption. The same authors proposed an update of their theory, as recently presented in Johanson and Vahlne (2009). As Eden (2009) puts it, “outsidership relative to the relevant network, rather than psychic distance, is the root cause of uncertainty and precipitates the internationalization process” (Eden, 2009, p. 1409). In the original theory, *liability of foreignness* was a key concept, while in the new version a relevant concept became the liability of outsidership, in relation to a relevant network.

John Dunning (1977) and his so-called eclectic paradigm of international production emerged from the finding that the subsidiaries of American companies in the United Kingdom were more productive than similar firms in the US, even though America’s industrial productivity was much higher than in the UK.. The Dunning paradigm is based in three components, ownership (O), location (L) and internalization (I), and so it can be named “OLI”. The ownership component is related to firm-specific availability of resources to the firm and is related to the Resource Based View (RBV) of the organization, the latter having been proposed by Penrose (1959) who saw the firm as “a set of productive resources.” The RBV explains how companies manage to obtain sustainable competitive advantage, analyzing their internal resources to correct their weaknesses and develop their potentials. The existence of assets – tangible or intangible – is related to the firm’s capacity to expand and stand out from its competitors. Among the tangible assets are economies of scale or patents, while the intangible assets include the firm’s brands and reputation. Dunning’s eclectic approach is criticized on the grounds of being too general, and was recently updated in Dunning and Lundan (2007).

The internalization theory of the multinational enterprise is a stream of literature

initiated by Buckley and Casson (1976, 2003), as reviewed and updated by the same authors in Buckley and Casson (2009), hereafter B&C. The internalization approach is based on the Coasian nature of the firm in which imperfect markets can be internalized into firm's internal non-market "transactions". Such approach leads to the discussion of the boundaries of the firm, which "are set at the margin where the benefits of further internalization of markets are just offset by the costs". In addition, firms seek the least-cost location for each activity considering relevant linkages, and there is a relevant role for R&D in firm's profitability and growth (B&C, 2009).

However, elements of the Dunning paradigm somewhat coincide to the theories herein presented. For example, Buckley and Casson (2009) propose the view that internationalization occurs as a result of the interaction between internalization and location effects, which can be linked to Dunning's L and I components, as they have influenced the development of the OLI paradigm.

The "I" component reflects a view that the boundaries of a firm should be large as long as it faces transaction costs. Ronald Coase (1937) led the view that transaction costs are as important to how the market is organized and that was subsequently extended by authors like Williamson (1985), who further developed the notion of the boundaries of the firm in presence of important market imperfections. The B&C approach on internationalization is very much based upon this view, in their internalization component.

It is noteworthy that Johanson and Vahlne (2009) also point to a sort of convergence between the dominant international business approaches as they urge researchers to look for "similarities between internalization theory/the OLI paradigm and their own network-based internationalization process model" (Eden, 2009, p. 1409). In fact, as Johanson and Vahlne (2009) propose that the firm should be viewed as an exchange unit rather a production unit

(Eden, 2009), they seem converge to an approach rooted in Coase or Williamson. Thus, while there are competing international business theories, one may anticipate that the ongoing convergence will lead to more unified explanations that have a high probability of succeed, considering the existing interfaces.

For the purposes of this paper, identifying motives of MNE activity is helpful. Dunning and Lundan (2007, p. 67) identified four types of MNE activity, building on the earlier taxonomy by Behrman (1972), and added some additional motives that are presented below as “other motives:

1. Natural resource seekers. There are three main types of resources they seek: physical resources; cheap and well-motivated unskilled or semi-skilled labour; and technological capability, management or marketing expertise and organizational skills. Typically, they export a significant part of their production to developed countries.
2. Market seekers. There are four types of market-seeking investment: one, following suppliers or customers which in turn have invested overseas; two, investment in products that need local adaptation or physical closeness; three, high costs of transports or transaction; and four, of increasing importance, is the need perceived as strategic to have a physical presence in the leading market served by the competitors. Unlike in other forms of FDI, market-seeking are more prone to treat affiliates as self-contained business units rather than part of a network.
3. Efficiency seekers. Economies of scale and scope as well as risk diversification are the most typical source of gains from common governance of geographically dispersed production, taking advantage of factor endowments, cultures, institutional and demand patterns, macroeconomic setting and others. Usually, efficiency seekers

will be “experienced, large and diversified MNEs producing fairly standardized products and engaging in internationally accepted production processes” (p. 72).

There are two types: those investors taking advantage of different factor endowments across countries; and those in broadly similar country structures and income levels, but benefiting from economies of scale and scope, and differences in consumer tastes and supply capabilities. For the latter, market idiosyncrasies and particular economic policies play a key role.

4. Strategic asset or capability seekers. Sustaining or advancing global competitiveness may involve, for some firms, acquiring foreign companies. It is less a matter of cost of marketing advantages than to augment the global portfolio of physical assets or human competences, which may sustain or boost ownership-specific advantages or weaken the competitors.
5. Other motives: escape, support and passive investments. Escape investments are made to avoid legal restrictions or country policies, being usual when governments adhere to ideologies and strategies that are business unfriendly. Support investments include trade- and finance-related investments that promote and lubricate sales. Passive investments are those not involved in active management of the firm (some may not fall in official FDI classifications as they fall into the ‘portfolio investment’ category). These include private equity funds, which specialize in buying and selling of companies but provide some managerial inputs, and the threshold between active and passive management becomes less clear.

Motives may be multiple, and may also change over time due to experience, learning and opportunities. Each type of MNE activity can be aggressive (taking proactive action towards its strategic objectives) or defensive (reactions taken by competitors or just perceived as so).

## **Towards a theory of infrastructure FDI**

The infrastructure segment which is more advanced in terms of internationalization is, by far, telecommunications, being also the one with more studies on the internationalization phenomenon. A relevant paper by Sarkar, Cavusgil and Aulakh (1999) carried out an extensive evaluation of the international expansion of telecommunications industry companies, the infrastructure segment which is in a more advanced position as compared to other segments, and concluded that the determinants of internationalization in infrastructure are quite specific. They have surveyed previous theory on the internationalization of firms in that sector and quoted some authors that support that international business theories should be adapted to the specific context of the telecommunications sector.

Sarkar, Cavusgil and Aulakh (1999) found substantial first-mover advantages related to transient nature of the windows of market opportunity, as well as from the need to influence regulators, for telecommunications sector internationalization. These windows of opportunity arise from the very complex design of process of privatization, including a broad type of arrangement between the public and private sectors. In light of increasingly scarce resources to invest on infrastructure services, the approval and correct design of public-private partnerships is needed, although this is a quite politically sensitive issue. However, once the process is designed, being a divestiture of assets, or any form of contract like concession, public private partnership, permission and a multitude of others, there may be the opportunity for entry.

Usually, political contexts either local or national favoring private participation are the main fact in the root of that opportunity. However, the ultimate reason is a market failure that is deemed to be enough to prevent the unregulated operation of one or more private firms. Thus the underlying market failure shapes the process and the way it is tackled is the

factor that shapes the opportunity, defining modes of entry and other relevant parameters. Although this is a key feature of infrastructure and of many other sectors that were operated by public sector, Sarkar, Cavusgil and Aulakh (1999) found that “international expansion associated with privatization and liberalization is relatively current and has arguably received less attention in the FDI/MNC literature”. Relevant idiosyncrasies like this one are clear points of attention for putting together the approaches to infrastructure FDI.

Amatucci (2009) analyzes the specific case of Brazil in light of dominant international business theories, in the period between 1850 and 1920, and provided interesting conclusions. First, he saw a partial application of the Uppsala gradual expansion pattern, since on the one hand there is no possibility of establishing sales offices overseas for infrastructure investments, but on the other hand he perceived that deals involved a sort of social engineering that requires ample social and political networks in the target country. More modernly, however, many current infrastructure investments start with local offices devoted to prospection and the establishment of business networks, so as to build the relevant networks and to reduce the potential liability of foreignness, and the (in the infrastructure context) strongly correlated liability of outsidership.

Liability of outsidership may play a key role in the internationalization of infrastructure firms. A good argument can be found in Williamson (1985, p. 337), who predicted that “prospective suppliers who possess superior skills in least cost supply respects but who are relatively inept in dealing with the franchising bureaucracy and in influencing the political process are unlikely to submit winning bids” in a franchise bidding for a natural monopoly, this said “in circumstances where renegotiation is common and perhaps vital to the profitable operation of a franchise”. However, he sees a merger between this firm and another firm with political skills as potentially yielding not only private gains but social

gains. He presents a concrete example in a cable television franchised market.

In another argument applied to infrastructure, Amatucci (2009) proposed that the location is the only factor that is relevant to infrastructure, among the three OLI components of Dunning's eclectic paradigm. not a relevant component of a infrastructure internationalization theory.

The ownership of several infrastructure markets would offer no advantage at all in the context of the received neoclassical microeconomic theory. However, market imperfections would lead to important advantages in this respect. Sarkar, Cavusgil and Aulakh (1999) found two: enhanced power in standard setting debates, which are clearly relevant; and increased long-term market capitalization, which favors the large amounts of investment that any infrastructure firm may be required to make. Additional complication stems from the fact that many infrastructure organizations operate several business lines other than their infrastructure; and also the fact that the infrastructure business within an organization or economic group may not be the leading one.

The location factor is relevant for infrastructure, as in Kogut (1990) apud Sarkar, Cavusgil and Aulakh (1999): telecommunication firms may be able to arbitrage across countries with different policies and to overcome eventual stringency by local regulators. The "unfavorability" of local regulatory conditions may be correlated with international expansion, and this may be valid for the whole infrastructure industry. For non-infrastructure sectors, the same could be held, for instance, for the "unfavorability" of the tax burden and the firm burden related to taxation.

However, put that way, it would seem clear that firms would move from unfavorable to favorable regulatory conditions, which is certainly not the case. The search of another location may be based on current and existing windows of opportunity, which open and close

very rapidly. This leads to the idea that aggressive entry will be favored in infrastructure, since there will be a need of proactive action towards the strategic objective of securing transient entry opportunities in very specific markets. However, the aggressive nature of investments will also lead to defensive reactions: some key global players will be compelled to seek entry in reaction to potential competitors' entry in other markets. The pure location factor, then, is insufficient to explain international investments in infrastructure.

The infrastructure firm grows more as a collection of relevant markets, and their local costs of production are their assets and their products (services) are geographically locked and non tradable. While in many services segments there may be sorts of international trade or outsourcing, infrastructure services cannot be exported in most relevant cases. Thus, the B&C statement that “the division between exports and local servicing is largely the result of the economics of location” (B&C, 2009, p. 1564) is not a valid affirmation, in the context of infrastructure. Apparently, there would not be any internalization of decisions. However, there are important intra-firm transactions that may be relevant for infrastructure companies and that may be internalized, for example, the procurement of projects, the acquisition of financing, and others. Although internalization advantages are seemingly unimportant, they may be found as relevant with the analysis of empirical cases.

### **Concluding remarks**

Efforts towards a theory of international production of infrastructure services may be in their early or at most intermediate stage. Nonetheless, some important elements of such theory – if it is to develop and provide a good explanation to facts – can be anticipated. In this paper, we cited the market imperfections of the infrastructure sector and the practical consequences of these as a key point of attention in the buildup of the specific approach to international production of FDI, these being the idiosyncrasies that may modify existing approaches of

international business so as to explain infrastructure FDI.

As for the process of internationalization, there are ownership advantages accruing to international production of infrastructure, both in standard setting and capitalization. Location advantages are clear and may drive internationalization, but not in the conventional fashion predicted by dominant international business theories: there may be preemptive entry in international markets so as to secure first mover advantages in light of the transient nature of the windows of opportunity. Internalization, although apparently not relevant, may take place in specific transactions involving procurement of projects and financing.

The process of internalization may follow in general terms the path anticipated by the Uppsala model in its more recent version of liability of outsidership, but there may be relevant specific differences against the predicted pattern: the firm will seek market opportunities depending on their opening, taking aggressive moves whenever they are available; destinies are not freely chosen. Commitment may evolve in a gradual manner, beginning with prospection offices in some locations, but sometimes an event, say a privatization opportunity, leads to very rapid and sometimes problematic entry in a random market.

As long as infrastructure FDI seems to continue at a relatively strong pace, even though less buoyant than in the 1990s, the internationalization of these sectors is a relevant phenomenon with wide opportunities not only for investment, but also for academic research and progresses in our current understanding.

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