<CHT>**infant industry argument**

The infant industry argument suggests that an industry may be developed under the umbrella of the government's temporary protection. Such a policy must weigh the future cost savings of an industry in which dynamic economies of scale are present with the current consumers' foregone rents due to higher domestic prices as well as higher imported prices of similar products. By establishing an import tariff that is somewhat related to the efficiency level of the domestic industry relative to the foreign one, the government articulates a rent redistribution mechanism, from domestic consumers to local producers, that may help the local industry to overcome the initial cost disadvantage and thus survive in the long run.

The argument that local industry can develop only if given a chance to reduce costs has been around for a long time. During the first Washington administration (1788–92), the first U.S. secretary of the treasury, Alexander Hamilton, favored the temporary protection of the American industry to facilitate its full and fast development as an effective way for the United States to become less dependent on English manufactures. Import substitution can certainly be welfare enhancing if learning is fast enough so that near-future cost savings overcome current consumer losses. It should be pointed out that an import duty not only makes imports more expensive. It also allows domestic producers of similar products to charge higher prices, thus softening domestic competition. This is perhaps the reason why Thomas Jefferson, then secretary of state of the Washington administration and representative of the rural South, bitterly opposed Hamilton's protection plan. Import duties immediately made consumption of all products more

expensive for southerners while the North reaped the gains through an increase in jobs and industrial capability. Hamilton's policy—as later Friedrich List's proposals for Germany—was intended to be temporary but it was still around more than a half century after it was first implemented, and the issue of protection was second only to slavery in the contentious relations between the North and the South in the period leading up to the Civil War.

The academic debate surrounding the infant industry argument focuses on whether this policy can be effective and on analyzing whether the future gains offset current costs. But this is a debate that is not alien to the influence of political ideology. Left-leaning parties traditionally favor the involvement of governments in economic activity and as a consequence they traditionally favor a protectionist policy based on the infant industry or any other argument. Conservative parties favor promarket policies, lately favor free-trade agreements, and commonly have denounced the infant industry argument based on failed experiences or have pointed out how easily a projected temporary protection can become permanent.

Infant industry tariff protection was successfully implemented in Japan after World War II, establishing the principle that has inspired the import-substitution policy of many Latin American and Asian countries for many decades with varying degrees of success. Despite many promises of an imminent opening to trade, successive governments repeatedly renewed tariff protection. Japan succeeded in developing its industry and some other countries later moved toward a policy of export promotion in order to ensure fast learning and the development of the domestic industry. The Latin American experience was less positive. Domestic industries failed to take off despite

repeated renewals of protection, while locals felt impoverished as imports and related domestic products became more expensive. Furthermore, as domestic producers felt that their respective governments would renew protection, they had little interest in innovating and becoming more efficient. If the dynamic gains of protection are never realized because domestic producers do not believe that protection is temporary, the effects of the infant-industry protection can be analyzed within a static setup with a domestic industry with market power. In the case of Latin America a well-intended but poorly designed policy led to a massive transfer of rents from consumers to producers, who saw their market power significantly increased and the incentives to innovate reduced.

As noted earlier, an import duty does more than just increase the price of imports. Local producers of similar products can charge higher markups as foreign competitors lose at least part of their cost advantage. These are not the only costs of protection. In addition, protection induces a loss of competitiveness of industries that use the output of the infant industry as inputs. These "collateral costs" of protection are ignored in the partial equilibrium analysis commonly used to evaluate the welfare implications of the infant industry argument. However, since governments commonly fail to lift protection, these additional costs of establishing a "temporary" import duty confirm the current negative opinion that the overwhelming majority of economists share regarding any tariff protection based on potential learning effects.

The temporal trade-off of cost and benefits motivates the research question surrounding the infant industry argument. Could the infant industry have been developed without protection? If so, what is the cost of this development? Will the infant industry

ever be able to compete with developed foreign firms? In welfare terms, can protection lead to a higher total surplus than simply allowing imports at competitive prices? And last, will protection ever end or is the infant industry argument just another excuse to prolong protection indefinitely?

Perhaps the most important criticism of the infant industry argument is that governments lack any incentive to lift such protection in the future. If that is the case, any incentive that protection may introduce for firms to invest and take advantage of this temporary protection will disappear, and thus the country will end up, as many undeveloped economies nowadays, with high import duties but without dynamic industrial development.

The practical implementation of the infant industry argument is certainly difficult. Governments must be able to accurately predict the learning dynamics of each particular industry to be protected as well as the cost that such protection generates to domestic consumers and firms. From a theoretical point of view, the question is a different one: Is infant industry tariff protection "logically" time-inconsistent? Should we oppose such protection on the basis of a theoretical result or just because from a practical perspective we believe that its effectiveness is quite implausible?

A majority of economists have argued against infant industry protection mostly from ideological premises rather than based on an appropriate theoretical model. Thus the infant industry argument is frequently dismissed by pointing out that free trade is Pareto dominant, that is, it would be mutually beneficial to all countries involved. Neither Hamilton nor the protectionists ever claimed such a global viewpoint. The infant industry argument therefore needs to be addressed within the partial equilibrium framework of a

small country and evaluated on the basis of whether a temporary protection policy can effectively help develop a domestic infant industry that otherwise would never have taken off.

The academic debate on infant industry protection has recently focused on precisely the issue of whether tariff protection will ever end after successfully helping the domestic industry to develop. To summarize the results described in the rest of this article: infant industry protection may be effective and temporary when the level of protection is linked to the efficiency level of the domestic industry. However, it will commonly fail if it sets a future liberalization date that is independent of the degree of development of the domestic industry, or if cost reduction requires specific investments that are not directly linked to the production decisions of domestic firms.

<A>**A Framework for the Analysis of Infant Industry Protection**

Consider a small country where an early industry suffers from such cost disadvantage relative to foreign producers that it will have to shut down in the event that the domestic government enforces a free trade policy. The domestic and foreign industries produce similar, but not necessarily identical products. The foreign industry is assumed to behave competitively and to have exhausted all its dynamic economies of scale. A single infant monopolist is assumed to produce all domestic production. This firm enjoys significant learning by doing and marginal cost will reduce as production takes place. The demand for differentiated domestic and imported products depends on the decision variables of the two players: government chooses the import tariff to maximize the discounted sum of consumer surplus, profits, and tax revenues while the monopolist chooses the relative

price of the domestic good that maximizes the net present value of future profits.
Marginal cost reduces at a certain rate with current production and experience depreciates
as a fraction of the current level of marginal cost. Therefore, learning is a reversible
process that requires some positive output to induce cost savings while at the stationary
equilibrium, once learning is exhausted, current production only impedes marginal cost
from increasing.

The monopolist and the government engage in a dynamic game where the former
chooses the price and the latter the tariff level. Both players discount the future at a
common rate. The game is dynamic because each player's action affects the state of the
game, that is, the level of marginal cost through the direct or indirect effect on the
domestic production and accumulation of experience. This setup is essentially a capital
accumulation game World such as the one studied by Reynolds (1987). If we further
restrict our attention to a system of linear demands for domestic products and imports,
this dynamic model becomes a linear-quadratic differential game that allows us to obtain
a closed-form solution and thus easily characterize the features of the equilibrium
strategies.

<A>**Alternative Assumptions**

The foregoing description is based on Miravete (2003). Melitz (2005) departs from this
framework in two main aspects: the domestic industry is assumed to be competitive and
the government behaves as a social planner.

The earlier framework could be easily generalized to an *n*-firm symmetric
oligopoly industry without changing qualitative results other than learning would now be

slower as each firm would only count for one *n*th of accumulated experience. Thus the more firms in the domestic industry, the faster learning needs to be in order to achieve higher welfare than the default scenario where domestic firms just shut down and consumers only purchase from foreign firms. An additional issue that may arise when several firms compete in the domestic market is the existence of learning spillovers. As Stokey (1986) shows, this introduces additional reasons to protect an industry.

By assuming the existence of a social planner rather than a noncooperative solution, Melitz eliminates the dynamic interaction between government and firms. This corresponds to a situation in the above framework when the government and the monopolist collude in choosing the tariff and price strategies, which may be important for state-owned industries or when the industry in question has significant political influence. In a dynamic strategic environment firms would charge higher prices and the government lower rates than in Melitz's case.

This framework presents another important advantage: an infinite horizon game rules out the possibility of any other future rent after the formal end of the game, and the equilibrium strategies are thus robust to the existence of any other unaccounted rent. This is not the case of Leahy and Neary (1999), Miyagiwa and Ohno (1999), and most explicitly Tornell (1991), who considers the possibility of a third period where wages are renegotiated when the initial protection of the industry was planned only for two periods. Considering extraneous elements after the planning horizon of the game as formally ended turns protection, by definition, into a time-inconsistent policy.

<A>**Markov versus Non-Markov Strategies**

The basic criticism to the infant industry argument is that governments lack the ability to commit to taking particular policy actions in the future. In particular, a government cannot commit to reducing protection if the protected industry fails to make the anticipated productivity gains. Although this may be true in practice, it cannot be defended with models that by construction make reneging from the announced policy the dominant government's strategy. A more interesting distinction is the use of strategies that are linked to the level of efficiency of the domestic industry. The effect of learning is reducing the marginal cost of production simply by means of producing in the past. A protection strategy linked to this marginal cost (or alternatively to the related level of output or price) of the domestic industry is called a Markov strategy.

A way to help governments renege from announced liberalization is by using non-Markov strategies such as in the case of Staiger and Tabellini (1987) or Matsuyama (1990). Protection eases domestic production, and thus, through learning, marginal costs get reduced. In these models, however, cost reduction depends on investments that are not linked to the state of the game, that is, the level of marginal cost. Therefore there is no source of commitment for the government either. In the framework described earlier such policies can indeed be computed when both the government and the domestic producer can commit to a sequence of tariffs and prices over time. But most generally, a Markov perfect equilibrium can be constructed when both tariffs and prices are made contingent on the evolving level of marginal cost. The interesting added result of taking this approach is that if such strategies are employed, the best response of the government to the pricing of firms is to reduce tariff protection as the level of marginal cost decreases. Thus there is no need to renege and time-consistent equilibrium strategies lead

to future trade liberalization. The government simply allows the domestic firm to earn the

minimum markup to induce them to reduce costs beyond the static equilibrium. As this

process takes place, marginal cost gets reduced, and the required level of protection

needed is also lower. But this result also confirms Hamilton's intuition, that protection

based on the infant industry argument would be only temporary despite sometimes

surviving for a long time.

<CR>*See also* import substitution industrialization

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