SOME TECHNICAL AND ECONOMIC INTERACTIONS BETWEEN NATURAL AND SYNTHETIC RUBBERS

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The growth of the Synthetic Rubber (SR) industry after the second world war has been phenomenal and this has adversely affected the Natural Rubber (NR) industry by causing frequent price fluctuations. A study of NR market therefore involves an investigation of the inter-relations between two commodities: NR and SR.

The relations between natural and synthetic rubber, are truly of a symbolic nature (D'ianni, 1989). Many of the rubber products essential to world economy today are based on blends of both types selected to provide optimum properties for the specific end use. In each case, of course, economic considerations help to determine the final composition. Tyres probably represent the ideal case, since each part is specifically engineered, from the stand point of materials and design, to provide optimum performance. The quantity of NR in tyres varies greatly, depending upon the type and intended use. Industrial rubber products are designed with the same concepts in mind. Many experts believe that the symbolic relations between natural and synthetic rubbers have been most rewarding and this has attributed to the vigourous growth of the rubber industry.

Considering the nature of agronomy, location, technology, market structure and economic behaviour, any exogenous shock to the NR – SR system has tended, in general, to produce both positive and negative consequences for NR due to substitution and income effects[1]. For example, the off setting effects of technology on NR consumption is illustrated by the introduction in the early 1960s of radial tyres, which have a higher NR content per tyre than the conventional cross-ply tyres. Production of radial tyres in each period should result in increased NR consumption. However, radial tyres are known to be longer lasting than cross-ply tyres (Economist Intelligence Unit, 1988). Therefore, under a specified demand for tyres and a constant rate of tyre utilization, the demand for NR over time may decline if existing cross-ply

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[1]The income effect of an increase (fall) in price is the adjustment in the consumption of goods to the reduced (increased) purchasing power of income.

The substitution effect of a price change is the adjustment in the composition of the consumer's spending to a change in relative prices.

tyres are gradually replaced by the longer lasting radial tyres. The net effect of radial tyres on NR consumption therefore depends on the trade-off between increased NR consumption and the increased milage per radial tyre.

Similarly, consider the short-run effects of a change in oil price *Ceteris paribus,* higher oil price results on the one hand in increased NR consumption via substitution of SR by NR, while on the contrary higher oil price causes a fall in NR consumption through a decline in transport demand and hence tyre consumption. These examples demonstrate the complex relationships influencing the two basic components of NR demand : that of `essential demand' for NR versus that of `competitive demand' between NR and SR.

It is the general purpose synthetic rubbers that have become competitive to NR. Among the general purpose SRs the only SR which is virtually a chemical analogue of NR is Polyisoprene. Hence, this SR is considered an excellent replacement for NR. In this sense NR is no more the unique rubber it was, but can be considered as one form of rubber (with a number of desirable properties and a few undesirable ones) among many others.

There is however an important difference between NR and SR in relation to their respective demand for tyre and non-tyre sectors. The NR/SR compositional requirements for tyres are not very responsive to price changes (Allen, 1985). This is not true in the non-tyre sector, where there are many `technically undemanding' applications for which either NR or SR can be used, depending on their relative prices (`technical' applies to processing requirements as well as to service performance). What would be the economic implications of such a behavioural pattern observed between the tyre and non-tyre sector?

When there is a surge in demand for tyres, the tyre manufacturers have to find the extra NR either from world stocks or by (as it is) `stealing' some NR from the non-tyre sector; this cannot come from extra NR production because this is unable to be increased in the short run. Hence, NR price will rise, and this will encourage consumers in the non-tyre sector to switch from NR to SR. Unfortunately - and this is the important point - when tyre demand slackens, there is evidence that the reverse process (switching back from SR to NR) in the non-tyre sector is not so strong. Thus, the existence of `technically undemanding' applications in the non-tyre sector has the effect of restraining the price rises which would otherwise occur as a result of booms in the tyre industry.

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