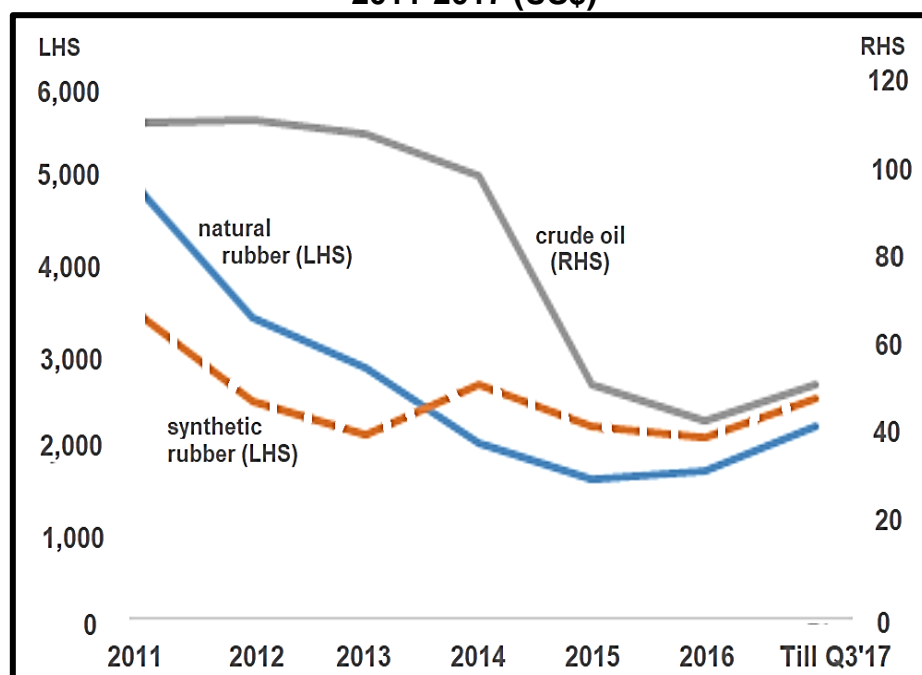


H1 Economics: A Level Revision

Microeconomics CSQ – Demand & Supply and Market Failures

Rubber and Tyres

Figure 1: Natural rubber, synthetic rubber and crude oil prices, 2011-2017 (US\$)



Source: International Rubber Study Group & Bloomberg, 19 January 2018

Extract 1: Natural rubber: traversing through tough times

Natural rubber is an essential raw material used in the creation of more than 40,000 products. It is used in car tyres, medical devices, surgical gloves and toys, etc.

In the recently concluded India Rubber Meet 2018, the Association of Natural Rubber Producing Countries put forth a grim outlook on natural rubber prices for the coming year.

The decline in natural rubber prices began in 2011 in which it rallied to record highs. The rally started to fizzle-off on improvement in supply-side factors as the area used for rubber cultivation expanded. In the meantime, uncertain global economic growth outlook and slowdown in vehicle sales pushed rubber prices down. Another contributing factor was the declining crude oil prices since the substitute of natural rubber – synthetic rubber – is produced from petroleum.

Source: Insight Magazine, 1 December 2018

Extract 2: Thai government promotes use of rubber to support price

Thailand is the world's biggest producer and exporter of rubber. With the price of unsmoked rubber sheets having fallen to 47 baht per kilogram, far below the record high of 180 baht per kilogram reached in 2011, the Thai government has announced a slew of measures to boost rubber prices.

It has set aside 1.5 billion baht to compensate farmers for cutting down young rubber trees in order to reduce supply. Farmers normally cut down rubber trees after 25 years, as ageing trees stop producing latex. This scheme aims to cut trees aged between one and 25 years. The government is also seeking to put aside another tranche of the budget to encourage farmers to stop tapping rubber trees in order to cut supply in the short term.

Thailand's government denies that the schemes to prop up commodity prices will involve buying directly from farmers at above-market price, in what is known as minimum support price. Such schemes have been criticised as they encourage farmers to grow without paying attention to yield, productivity or quality of the commodity.

"Policies are decided based on myths. The government feels that there is a need to cradle farmers," says Viroj Na Ranong, research director at Thailand Development Research Institute (TDRI). The government has previously drawn from state budget to buy rubber off farmers at higher prices. However, most of the rubber simply remains in storehouses.

Sources: Bangkok Post, 27 Aug 2017, Nikkei, 3 April 2018

Extract 3: Tyres: The plastic polluter you never thought about

A 2017 study published in the International Journal of Environmental Research and Public Health found that tyres are actually among the most common plastic polluters on earth. Today's tyres consist of about 19 percent natural rubber and 24 percent synthetic rubber, which is a plastic polymer. The rest is made up of metal and other compounds. Because tyres are made of synthetic rubber, they are non-biodegradable. Throwing them away in a landfill simply means they will keep stacking up over time, taking up tremendous amounts of space. Furthermore, improper disposal can also create a myriad of safety and health problems. Fires have erupted in tyre piles, lasting for weeks or months at a time and releasing chemicals into the air and ground. Millions of tax dollars have been spent putting out these fires and cleaning up afterwards. When people illegally dump scrap tyres, they collect rainwater and provide a breeding ground for mosquitoes that transmit illnesses.

Sources: National Geographic, 20 September 2019
and extracted from wasteadvantagemag.com, 22 August 2020

Extract 4: Socially suboptimal investment in R&D

It could be argued that insufficient funding of beneficial applied research is hindering product development and the development of a viable End-of-life tyre industry. It is difficult to protect the intellectual property involved in many innovative applications for waste tyres. Such firms feel that they are unable to capture the benefits from an investment. Given the high risks in undertaking and implementing research and their small size, individuals and firms in the tyres industry are not encouraged to embark on R&D investment unless the potential rewards are correspondingly high. This is despite such developments potentially benefiting and making society better off. Public provision of research services is a common remedy to perceived inadequacy of private R&D.

Source: URS, Market Failure in End-of-life Tyre Disposal, Sep 2006

Extract 5: Extended producer responsibility in Belgium

As Belgium is highly dependent on resource import, it aims at making production processes and consumption patterns more sustainable by using materials in an optimal and sustainable way throughout their whole lifecycle and using all available options for reuse and recycling.

The Belgian government has introduced the Acceptance Duty. This obligation – as a type of extended producer responsibility (EPR) – ensures that those who produce and market products bear responsibility for the collection and processing of the resulting waste. The strategic aim of the EPR for used tyres is reducing the environmental impact of tyres in the waste stage as much as possible by eco design and waste prevention and by separate collection and processing, prioritising reuse, retreading and recycling wherever possible.

Used tyres can be handled in four ways:

- reuse second-hand tyres,
- retreading used tyres,
- material recycling (use of granulated compounds of used tyres), and
- incineration with energy recovery.

Retreading is barely used for private cars. This is probably explained amongst others by a lack of consumer confidence in the safety of retreaded tyres and the limited price difference between new and retreaded tyres. In the transport sector, however, retreaded tyres are quite common. In line with the waste hierarchy mentioned in the EU Waste Framework Directive, incineration with energy recovery is the least favourable option. Use of granulated rubber is the recycling option that is mostly used. Granulated rubber from used tyres ends up as infill material for synthetic sport fields, or is used for producing rubber road infrastructure, rubber tiles, insulation material etc.

Source: OECD EPR Case Study Flanders Used Tyres,
accessed on www.oecd.org, Sep 2020

Questions

(a) With reference to Figure 1,

- (i) Compare the prices of natural rubber, synthetic rubber and crude oil. [3]
- (ii) Identify and account for the relationship between synthetic rubber prices and crude oil prices. [4]

(b) With reference to Extract 1, and using a demand and supply diagram, explain one demand factor and one supply factor, and analyse how these two factors together impact the natural rubber market. [8]

(c) Explain how the two policies by the Thai government to reduce natural rubber supply in Extract 2 would have differing effect on the price elasticity of supply of natural rubber. [3]

(d) Discuss the desirability of the direct purchase scheme at above-market price (Extract 2) as a means to support natural rubber prices. [9]

(e) Explain how a greater prevalence of recycling would impact the Production Possibilities Curve (PPC) of an economy, and comment on the significance of the role of recycling in promoting sustainable growth. [6]

(f) Assess 'public provision of research services' (Extract 4) and 'extended producer responsibility' (Extract 5) as alternative intervention measures aimed at correcting the market failure arising from the improper disposal of tyres. [12]

[Total: 45]

Suggested Answers

(a) With reference to Figure 1,

(i) Compare the prices of natural rubber, synthetic rubber and crude oil. [3]

Prices of all 3 commodities fell. The fall in prices of crude oil and natural rubber was sharper than synthetic rubber. Oil prices was higher than natural and synthetic rubber prices throughout the entire period.

(ii) Identify and account for the relationship between synthetic rubber prices and crude oil prices. [4]

Direct/positive relationship.

Another contributing factor was the declining crude oil prices since the substitute of natural rubber – synthetic rubber – is produced from petroleum.

Crude oil is a factor of production for petroleum while petroleum is a factor of production for synthetic rubber. When price of crude oil falls, this reduces the marginal cost of production for both petroleum and synthetic rubber. Producers of synthetic rubber may pass on this lower marginal cost to consumers in the form of lower prices, accounting for the direct/positive relation between synthetic rubber and crude oil prices.

(b) With reference to Extract 1, and using a demand and supply diagram, explain one demand factor and one supply factor, and analyse how these two factors together impact the natural rubber market. [8]

Demand factor

Synthetic rubber and natural rubber are substitutes or goods in competitive demand since both can be used to produce similar goods eg car tyres. When price of synthetic rubber falls, utility driven consumers will switch over from purchasing natural rubber to synthetic rubber instead. Hence, demand for natural rubber will fall from D0 to D1, ceteris paribus.

Due to uncertain economic outlook, consumers want to increase their precautionary savings in case they lose their jobs and are less willing to purchase goods and services such as cars since it is not a necessity. Hence, demand for natural rubber will fall from D0 to D1, ceteris paribus.

Supply factor

Since the area used for rubber cultivation has expanded, this means more rubber trees can be planted and more latex (natural rubber) can be tapped. Hence supply of natural rubber increases from S0 to S1.

[Draw diagram]

Market adjustment process

In the market for natural rubber, a fall in demand and increase in supply will cause price of rubber to fall but output is ambiguous as it depends on their relative changes in demand and supply.

Suppose the fall in demand for rubber is more than the increase in supply since it takes a long gestation time to grow the rubber trees and to be able to tap the rubber from these newly grown trees.

This creates a surplus at original price $P_0 \rightarrow$ downward pressure on price \rightarrow increase quantity demanded, cut down on their quantity supplied. This process continues until new equilibrium is reached. Prices of natural rubber will fall from P_0 to P_1 , output falls from Q_0 to Q_1 while total revenue falls (reference to graph).

(c) Explain how the two policies by the Thai government to reduce natural rubber supply in Extract 2 would have differing effect on the price elasticity of supply of natural rubber. [3]

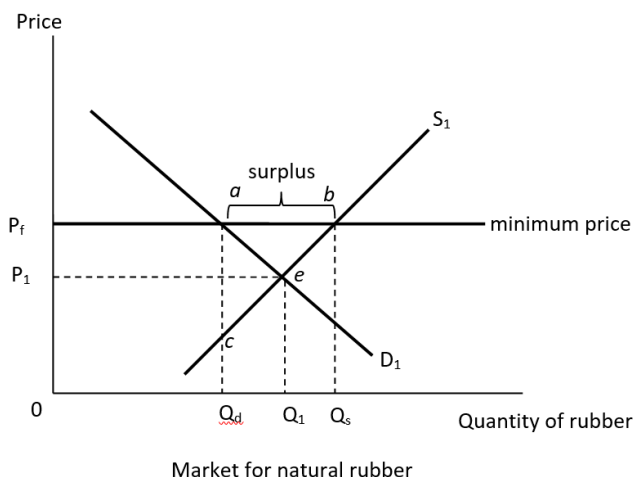
When government offers compensation to the farmers to cut down their trees, this will make PES of rubber more inelastic as compared to the other policy that requires farmers to stop tapping rubber in the short term.

When the farmers to cut down their trees, this reduces the number of trees available for tapping natural rubber. When price of natural rubber increases in the future, producers will become less responsive to increase their quantity supplied, ceteris paribus. As such, this policy reduces the PES of natural rubber.

As for the other policy, which requires farmers to stop tapping rubber in the short term, when price of rubber increases in the future, farmers are able to respond swiftly by resuming their tapping activities and increase the quantity supplied, ceteris paribus as the number of trees available for tapping remain unchanged. In this case, there is minimum or no change to the PES of rubber.

(d) Discuss the desirability of the direct purchase scheme at above-market price (Extract 2) as a means to support natural rubber prices. [9]

The direct purchase scheme at above-market price works like a minimum support price which has to be set above the market equilibrium in order to be effective which is at P_f .



THESIS: Explain why this scheme may be desirable

Farmers benefit by the increase in total revenue: higher price (P_f) and larger quantity (Q_s)

ANTITHESIS: Explain why this scheme may not be desirable

Buyers (firms that use natural rubber as input): higher cost \rightarrow fall in profits, c.p.

Govt: strain on gov's budget Area Q_dabQ_s

Deadweight loss = Area Q_dabQ_s <to be elaborated> + resulting in a diversion of resources from other areas eg reduces healthcare subsidies to purchase the surplus instead. This may even lead to a greater deadweight loss to Thailand.

May lead to black market <to be elaborated> Consumers may switch to purchase from other rubber exporting country instead \rightarrow fall in Q_d for Thailand rubber.

Evaluation (some possible evaluation)

- This increases the MC of the rubber products, which Thailand produces, drives up the prices and makes the rubber exports from Thailand less price competitive. This may result in a fall in export revenue (actually, depends on PED of rubber products, which differs from the PED of natural rubber) \rightarrow slowdown in economic growth
- Thailand is world's largest exporter \rightarrow PED for Thailand rubber is inelastic \rightarrow as buyers are unable to find other sellers
- Government can introduce measures to increase the demand for natural rubber eg to produce better quality or new products \rightarrow reduce the size of the surplus

(e) Explain how a greater prevalence of recycling would impact the Production Possibilities Curve (PPC) of an economy, and comment on the significance of the role of recycling in promoting sustainable growth. [6]

[Draw PPC]

Explain how a greater prevalence of recycling would impact the Production Possibilities Curve (PPC) of an economy.

A greater prevalence of recycling increases the quantity of FOP available in an economy to produce goods and services.

Recycling also cuts down on the disposal of car tyres and the pollution it creates (eg reduce the release of chemicals into the air and ground). This helps improve the quality of the FOP such as land and water source.

The increase in quantity and quality of resources will cause PPC1 to shift out to PPC2, enabling the economy to achieve higher potential economic growth through the increase the maximum productive capacity.

Comment on the significance of the role of recycling in promoting sustainable growth.

Recycling plays a significant role in promoting sustainable growth since recycling cuts down the disposal of used tyres, which may cause pollution to the environment. This also cuts down the depletion of natural resources since the used tyres take up tremendous amounts of space in the landfill. By preserving the environment, recycling helps promote sustainable growth in an economy.

(f) Assess 'public provision of research services' (Extract 4) and 'extended producer responsibility' (Extract 5) as alternative intervention measures aimed at correcting the market failure arising from the improper disposal of tyres. [12]

Explain how improper disposal of tyres may lead to market failure

Individuals, when deciding on the disposal of tyres, would consider their MPB and MPC.

- MPB of improper tyre disposal = cost savings from making trips to the used tyres collection centre = fuel cost + value of time foregone
- MPC of improper tyre disposal = expected value of the fine [because it is 'improper', the individual is likely to face a fine when caught]
- MEC of improper tyre disposal = gov spending of millions of tax dollars to put out fires caused by those tyres disposed improperly

Private equilibrium, Q_p where $MPB = MPC$ for the last unit of tyres is being disposed

Socially optimum output, Q_s where $MSB = MSC$ for the last unit of output disposed

Since $Q_p > Q_s$, the improper disposal of tyres generate a deadweight loss of area abc.

Since government aims to achieve efficiency, it has to step in to correct this market failure

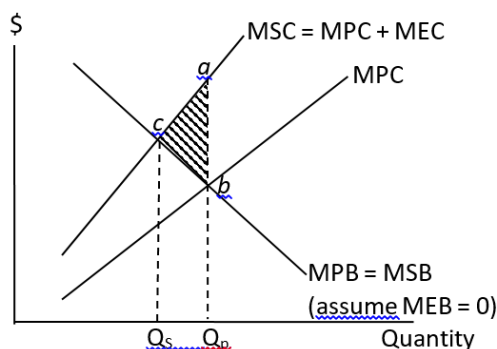


Figure 6: Over-production of goods with negative externalities

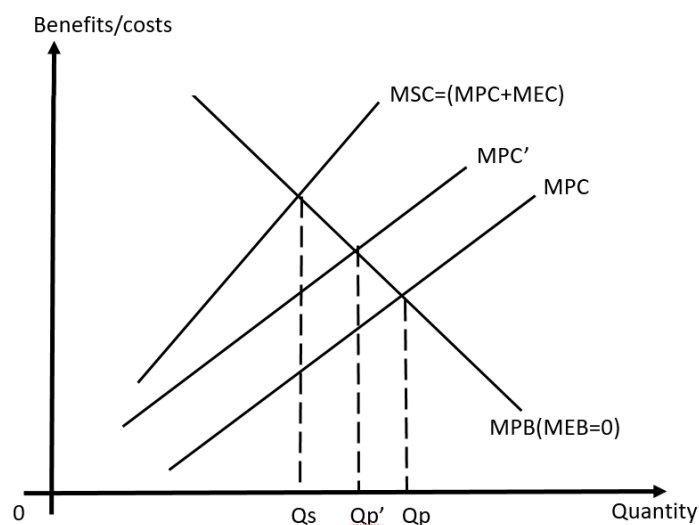
Explain how ‘public provision of research services’ (Extract 4) corrects market failure and its limitation.

Government can fully subsidise the research services. This will incentivise firms to engage in more research activities and explore the different ways to recycle the used tyres (from which they are able to derive alternative sources of revenue) instead of disposing them. This would then reduce the MEC generated.

Limitations (any 1)

- Governments also face limited resources in terms of budget constraint. The increased govt spending on “public provision of research services” may lead to a diversion of resources from other areas such as cutting down healthcare subsidy and reduce the supply of healthcare. The opportunity cost of forgone healthcare services could be greater than the benefits of removal of the deadweight loss caused by the improper disposal of tyres. This results in greater allocative inefficiency.
- If the government faces budget constraint, it may resort to raise taxes (eg GST) to finance the R&D but then this cause supply to fall in other markets and create deadweight losses in other markets. Moreover, it conflicts with the goal of equity if the poor are disadvantaged by the relatively higher tax burden on them.
- Long-term policy, benefits not certain, not immediate

Explain how 'extended producer responsibility' (Extract 5) corrects market failure and its limitation



If government imposes legislation and force producers to bear responsibility for the collection and processing of the resulting waste, this increases the MPC of the producers to MPC' and reduces their net benefits. To avoid this, they will find ways to collect back the tyres and recycle them, reducing MEC at the same time. This helps to cut down the number of tyres disposed to Qp' and lead to a more allocative outcome.

Limitations

Difficult to monitor unless govt reinforce the producers to emboss their company's name on the tyres for accountability and fine them if any tyre is found disposed improperly. The amount of fine (marginal cost) has to be greater than marginal benefit of not tracking the disposal or management of used tyres, otherwise it will not be effective in solving the problem.

By introducing EPR, firms have to find ways to reduce the number of disposed tyres eg by retreading and recycle the used tyres. However, there is a lack of demand due to a lack of consumer confidence for retreaded tyres. Firms can engage in public education and increase the demand for such tyres. At the same time, firms are obligated to engage in R&D and find ways to lower the MC of retreading the used tyres. This will make the retreaded tyres more price competitive as compared to the new tyres. When price of retreaded tyres become relatively cheaper, consumers may switch and purchase these recycled tyres instead.

Evaluation

Which is a more effective/appropriate policy

- Short-term v.s. long-term
- Who bears the cost of transition