

## **Demand and Supply at a Foreign Currency Market<sup>1</sup>**

Let's look how *the demand and supply analysis* applies to a foreign currency market where various national currencies are exchanged. Note that real markets of foreign currencies look like traditional consumer goods markets. They are competitive markets with a large number of buyers and sellers trading such standard "products" as US Dollar, Deutsche Mark, British Pound or Japanese Yen. But the *price* at these markets or exchange rate of national currency is not a usual price in a sense that it ties *all* internal prices (eg., USA) to *all* foreign (eg., Japanese or German) prices. As a result change of exchange rate can make very important impact on levels of national production and employment at any country.

### **1. "Dollar - Yen" market**

Lets discuss how the foreign currency (Dollar and Yen) market functions. The trade between countries makes necessary exchange of their currencies. For instance, US exporters want to get Dollars but not Yens as a payment, but Japanese importers of US goods have Yens but not Dollars. This problem is solved through Japanese proposal of Yens in exchange for Dollars. On the contrary, US importers have to pay Japanese exporters with Yens but not Dollars. They are to go to the foreign currency market with demand for Yen. To cut a long story short, we can regard Japanese importers as Yen suppliers and US importers as Yen buyers. The Dollar price for Yen is determined by demand for Yen and its supply. Let's assume that equilibrium Dollar price of Yen, or Dollar - Yen exchange rate, is 1 USD = 100 Yen. In other words, for 1 Dollar one can buy 100 Yens ("dollar price" of one Yen equals 1 cent) or Japanese goods worth 100 Yens. And vice versa, for 100 Yens one can buy American goods worth 1 Dollar.

### **2. Exchange Rates: growth and decline**

What can cause change of this rate? *Non-price determinants of Yen demand* and its *supply* are similar to traditional determinants for other goods. To the benefit of the USA a number of circumstances may occur which foster *growth* of demand for Yen and consequently increase its dollar price. For instance, in the USA incomes may grow which make Americans not only buying more domestic products but also buying more Japanese Sony TV-sets, Nikon cameras and Nissan cars. To make such purchases Americans have to buy more Yens which leads to increased demand for Yen. The American consumers also can change their taste and start buying more Japanese goods. For example, when in 1970s petrol prices rapidly increased many American car buyers stopped buying big uneconomical domestic cars and increased demand for compact and fuel saving Japanese cars. As a result the Yen demand grew. The decisive factor in this case is that increase of American demand for Japanese goods increases demand for Yen and raises dollar price of Yen. Let's assume that the Yen dollar price grows from 1 USD per 100 Yen to 2 USD per 100 Yen. When the Yen dollar price *grows* we say that Dollar devaluates with respect to Yen. This means that now one should spend more Dollars to buy a unit of foreign currency (Yen). Dollar costs less because one can buy less Yens for it and less Japanese goods.

When the opposite circumstances occur, i.e. incomes raise in Japan and Japanese tend to buy more American goods, the Yen *supply* grow at foreign currency markets. This increase of Yen supply compared to its demand causes *decrease* of equilibrium dollar price of Yen. For instance, supply can grow to such extend that the primary dollar price of Yen which was 1 USD per 100 Yen will drop down to 50 Cents per 100 Yen. Such *decrease* of dollar price of Yen means that Dollar becomes more expensive compared to Yen. In this case one needs less Dollars to buy appropriate number of units of Yen. Dollar becomes more expensive because one can buy more Yens for it and, as a result, more Japanese goods.

### **3. Economic Consequences**

It is easy to explain quite profound consequences of exchange rate changes. Let's suppose that Dollar devaluates, i.e. dollar price of Yen increases from 1 cent per 1 Yen to 2 cents per 1 Yen. This undoubtedly means that Yen and accordingly all Japanese goods become more expensive for

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<sup>1</sup> Developed on the basis of : McConnell C.R., Brue S.L. Economics: Principles, problems and policies. McGraw-Hill, 1990.

Americans. What are the results? American consumers switch their demand from Japanese goods to American ones. For example, Chevy Corsa car is now more attractive for American buyers than Honda Accord. In general terms it means that such switch of consumers' expenditures stimulates American producers and they increase production and employment. On the contrary, Japanese export sectors face decrease in sales of their produce and they are forced to shrink production and cut down employment. Thus, devaluation of Dollar leads to higher level of prosperity in America and Japan finds itself in less favorable situation. And vice versa, growth of Dollar vis-a-vis Yen leads to weakening of the US economy and stimulates Japanese economy.

Recognizing that economic stakes are very high in this case it is easy to understand why governments often interfere into operations of international currency markets which are usually regarded as "free" ones. Thus, the US government may try to devalue Dollar when the US economy is in crisis. But here is problem that following after that switching of US buyers' consumption to national goods from foreign-made will reduce Japanese export and deteriorate the position of the Japanese economy. In its turn the Japanese government may not want Dollar to devalue as the US government wants.

Thus, both economic and political importance of currency exchange rates is extremely big.

### **Questions for discussions**

1. Give the definitions of *demand* and *quantity demanded* for foreign currency. Who is the participant at the market on the demand side?
2. Give the definition of *supply* and *quantity supplied* of foreign currency. Who is the participant at the market on the supply side?
3. List *non-price determinants of demand* for foreign currency. How does change of each factor influence the demand?
4. List *non-price determinants of supply* of foreign currency. How does change of each factor influence the supply?
5. What are the peculiar features of foreign currency market in comparison with markets for traditional consumer goods.
6. What is economic and political importance of a state of foreign currency market for national economy?
7. What instruments can be used and measures taken by a government to influence a currency demand / supply? What goals are pursued and what results are expected in this case? Give specific examples for transition countries.

## **Why Banking Sector in Ukraine Is Not Growing But Pushing Country Into the Web of Poverty?<sup>2</sup>**

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Normal functioning of banking system in Ukraine is blocked by a number of external factors. They turn banking services into unattractive ones both for borrowers and lenders. The majority of the factors are directly or indirectly linked to the State policy.

### **1. TAX COLLECTION AND KARTOTEKA - 2**

Banks in Ukraine function as tax collectors. According to Kartoteka-2 system money coming to accounts of enterprises having tax indebtedness or wage arrears automatically transfers to cover these debts. As a result, enterprises avoid banking transactions. The major role in this belongs not Kartoteka-2 itself but intensity with which it is used by the Tax Administration which simply pushes enterprises from the banking system. By March 1<sup>st</sup> 1999 charges to banks on Kartoteka-2 was 52 billion Hryvnias, which is more than combined assets of the banking system (37 billion Hryvnias). This leads to very high operational expenditures of banking system. Though Kartoteka-2 was cancelled in June 1999 a number of enterprises proved its full-scale functioning.

### **2. DIRECT LOANS AND GOVERNMENT GUARANTEE LOANS**

By the information obtained from banks amount of credits which they issued in compliance with the Government orders was 1.6 billion Hr. Though these loans are granted under the Government guarantee such obligations often are not fulfilled. The majority of these loans is granted to loss-making sectors. This makes a negative impact on banks' profitability and puts additional costs on the banking system.

### **3. BAD COMPLIANCE WITH BANKING REGULATIONS**

Banking regulations are badly complied with and the National Bank status as a regulator of the banking system has not yet been defined. As a result, the banking regulatory mechanism has not yet been supported in a due manner. Statutory funds of 24 banks lack capital, i.e. less than 1 million Euro. By March 1<sup>st</sup> 1999 reserve requirements (17%) were not met by 49 banks including the biggest ones (of 214 banks). As a result a substantial number of small banks continue operations despite of definitely not being viable. Absence of consolidations means that there are very many small banks which can not make use of the economy of scale.

### **4. CRISIS OF CONFIDENCE AND COLLATERAL**

Vague assessment of soviet period enterprises and practical absence of land market deprives banks of collateral which they could have use to hedge their loans. Besides, a weak institute of support to compliance with contract obligations makes difficult for banks crediting at acceptable interest rates. Not efficient bankruptcy procedure means that banks are rarely able to compensate for their assets at the expense of liquidated enterprises. Such risk turns loaning to enterprises into a very unattractive and costly business. The majority of banks get profit only when they operate at the TB market. Inability of the Government to redeem TBs since autumn 1998 practically deprived banks of profitable operations. Instead of lending money to real Ukrainian economy substantial number of banks increased their deposits in foreign banks.

### **5. CURRENCY RISKS AND BARTER**

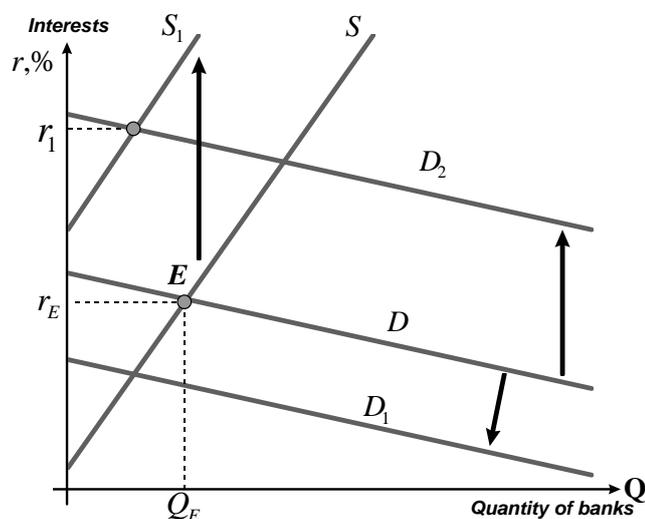
The currency rate regime is based upon the currency board which the Government is not able to maintain. As a result currency risk is very high. Which increases the cost of loans. For the reason of high interest rates people can not use turnover capital of banks. Because cost of money is very high the popular alternative is barter (operational costs of which under regular circumstances are very high).

The following graph demonstrates how the above mentioned factors turn banking system of Ukraine into a non-viable one. Under normal conditions and absence of limitations banks' supply (S) and their demand (D) lead to a quantity of banking services ( $Q_E$ ) at an interest rate ( $r_E$ ). But high Ukrainian taxes push a large segment into a shadow economy which does not use the banking system. Which drops the demand curve down to  $D_1$ . At the same time high cost which develops under influence of the above

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<sup>2</sup> Newspaper "Day" №223 02.12.1999 "<http://www.day.kiev.ua/rus>" © Day

mentioned factors raises the supply curve up to  $S_1$ . At this level only TB market (demand  $D_2$ ) can use banking system at excessive rate  $r_1$ . At such rate the rest of the economy can not use the banking system. Effective demand for the banking system ( $D_1$ ) does not correspond to the effective supply ( $S_1$ ) at any level of positive banking system. This illustrates the idea that in Ukraine banking system is practically non-existent. Total long-term Hryvnia loans to private sector compose only 600 million Hr. (\$150 million ) that is only \$ 3 per capita.



Weak banking system depends very much on external shocks. September 1998 financial crisis caused banks losses in the total (registered) amount of 153 million Hr. Clients lost \$1 billion value of their deposits while banking capital reduced by \$700 million. At the same time the banks' debt portfolio on dead and risky loans (officially recognised) almost doubled.

Besides sums officially recognised to be dead and risky debts the major portion of banks' short-term credit portfolio is composed of prolonged not reimbursed loans.

## REFORMING OF ECONOMIC POLICY

To develop the banking system it is necessary to eliminate obstacles which do not allow it to grow. This will allow to reduce high operational costs of the banking system, which in its turn will drop the supply curve down approaching it to the demand curve at positive level of the banking system. The Government should completely eliminate Kartoteka-2. There also is an urgent necessity to develop a system of collateral and land market as well as to introduce efficient bankruptcy procedure.

For the reasons of forced restructuring of T-bills and frequent violation of the determined currency band confidence to the Government has been undermined. Compliance with contract obligations should start with the Government. When one is unable to keep the currency band one can introduce controllable floating rate. In such situation investment decisions will be taken with respect to a currency risk. Artificial confidence created by a currency band very negatively impacts investment decisions because it often happens that such confidence is supported by nothing. To win confidence to the banking system it is necessary to stimulate operations of foreign banks in Ukraine. At the same time liberalisation of currency rate should go on.

The banking system will play an important role of a financial intermediary only when it manages to get rid of its own drawbacks. Political and legal obstacles on the way of financial development are difficult to get rid of. Moreover, institutional underdevelopment of the banking system pushes the country into a web of poverty which can seriously hamper economic growth even under stable macroeconomics.

Controllable floating rate may assist in prevention temporary monetary shocks. It can regulate currency even at times of really big shocks.

### Questions for discussing

1. What are the decisive factors for the banking system *supply*?
2. What are the decisive factors for the *demand* for banking services?
3. How to define equilibrium quantity of banking services and interest rate?
4. What problems accompany the equilibrium position of the banking services market in Ukraine?
5. What are the reasons for inefficiency of the banking services market under the analyzed circumstances?
6. In your view, what public policies can help the banking system to function properly?
7. Describe the state of the banking services market and public policy in this field pursued in your country.

### Consumer expenditures in the United States<sup>3</sup>

Engel curves explain how consumer spending varies among income groups. Table 1 illustrates this for some items taken from a recent survey by the U.S. Bureau of Labor Statistics. The data are averaged over many households, but they can easily be interpreted as describing the expenditures of a typical family.

Note that the data relate *expenditures* on a particular item, rather than the *quantity* of the item, to income. The first two items, entertainment and owner occupied housing, are consumption goods for which the income elasticity of demand is very high. Average family expenditures on entertainment increase almost sixfold when we move from the lowest to highest income group. The same pattern applies to the sales of homes; here, there is a sevenfold increase in expenditures from the lowest to the highest category.

In contrast, the third item, rental housing expenditures, actually falls with income. This pattern reflects the fact that most higher income individuals own, rather than rent, homes. Finally, health care is a consumption item for which the income elasticity is positive, but quite low. Here, average family expenditures increase modestly with income.

Table 1 Annual U.S. Household Consumer Expenditures (1991)

Expenditures (\$) on:	Income Group, \$					
	0 - \$9,999	\$10,000 - \$19,999	\$20,000 - \$29,999	\$30,000 - \$39,999	\$40,000 - \$49,999	\$50,000 +
Entertainment	545	661	1158	1280	1528	3072
Owned dwellings	1172	1526	2156	3164	4494	7800
Rented dwellings	1493	1790	2078	1897	1401	971
Health care	932	1250	1499	1522	1627	1707

Source: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Interview Survey: 1984 - 1991."

Table 2 Annual U.S. Household Consumer Expenditures (1986)

Expenditures (\$) on:	Income Group, \$							
	\$4000	\$8000	\$13000	\$18000	\$25000	\$35000	\$45000	\$60000
Furniture	103	108	160	191	297	391	446	890
New automobiles	468	421	703	768	1236	1775	2711	3925
Health insurance	718	866	1086	1265	1211	1173	1263	1779
Tobacco goods	176	192	240	230	247	271	297	262

Source: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Interview Survey: 1984 - 1987"

#### Questions for discussions

1. To what groups the goods in table 2 may belong?
2. Draw Engel curves for goods included into table 2.
3. How should the advertising policy for the goods presented in table 2 be aimed (at consumers with high income, at consumers with low income, not targeted campaign).
4. In what way the information in table 2 can be used for pursuing public policy of regulation tobacco consumption (in particular, to forecast social consequences of raising excise tax)?

<sup>3</sup> Developed on the base of: *Pindyck R.S. and Rubinfeld D.L. Microeconomics.- 3rd ed. Prentice-Hall, 1995. p.100.*

## The Value of Clean Air<sup>4</sup>

Air is free in the sense that one need not pay to breathe it. Yet the absence of a market for air may help explain why the air quality in some cities has been deteriorating for decades. In 1970 Congress amended the Clean Air Act to tighten automobile emissions controls. Were these controls worth it? Were the benefits of cleaning up the air sufficient to outweigh the costs that would be imposed directly on car producers and indirectly on car buyers?

To answer this question, Congress asked the National Academy of Sciences to evaluate these emissions controls in a cost-benefit study. The benefits portion of that study examined how much people value clean air, using empirically determined estimates of the demand for clean air.

Although there is no explicit market for clean air, people do pay more to buy houses where the air is clean than they pay to buy comparable houses in areas with dirtier air. This information was used to estimate the demand for clean air<sup>5</sup>. Detailed data for house prices among neighborhoods of Boston and Los Angeles were compared with the levels of various air pollutants, while the effects of other variables that might affect house value were taken into account statistically. The study determined a demand curve for clean air that looked approximately like that shown in Fig. 1.

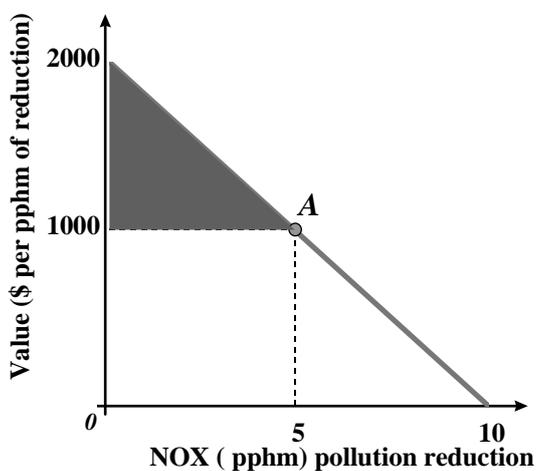


Figure 1. Valuing Cleaner Air.

The horizontal axis measures the amount of *air pollution reduction*, and the vertical axis measures the increased value of a home associated with those pollution reductions. For example, consider the demand for cleaner air of a home-owner in a city in which the air is rather dirty, as exemplified by a level of nitrogen oxides (NOX) of 10 parts per 100 million (pphm). If the family were required to pay \$1000 for each 1 pphm reduction *in* air pollution, it would choose A on the demand curve to obtain a pollution reduction of 5 pphm.

How much is a 50 percent, or 5 pphm, reduction in pollution worth to the typical family just described? We can measure this value by calculating the consumer surplus associated with reducing air pollution.

Since the price for this reduction is \$1000 per unit, the family would pay \$5000. However, the family values all but the last unit of reduction by more than \$1000. As a result, the shaded area in Figure 1 gives the value of the cleanup (above and beyond the payment). Since the demand curve is a straight line, the surplus can be calculated from the area of the triangle whose height is \$1000 (\$2000 - \$1000) and whose base is 5 pphm. Therefore, the value to the household of the pollution reduction is \$2500.

A complete benefit-cost analysis would use a measure of the total benefit of the cleanup (the benefit per household times the number of households). This could be compared with the total cost of the cleanup to determine whether such a project were worthwhile. We will discuss clean air further in Chapter 18 when we describe the tradable emissions permits that were introduced by the Clean Air Act of 1990.

### Questions for discussions

1. On the basis of what information one can assess readiness of people to pay for clean air?
2. How to calculate the efficient (the best) level of city pollution reduction?
3. Assess total and net benefit (consumer surplus) which dwellers gain on the territory where level of air pollution is reduced?
4. In what way the public policy can influence the efficient level of air purification and total and net consumer benefits?

<sup>4</sup> Developed on the base of : *Pindyck R.S. and Rubinfeld D.L. Microeconomics.- 3rd ed. Prentice-Hall, 1995. p.116.*

<sup>5</sup> The results are summarized in Daniel L. Rubinfeld, "Market Approaches to the Measurement of the Benefits of Air Pollution Abatement," in Ann Friedlaender, ed., *The Benefits and Costs of Cleaning the Air* (Cambridge, MA: M.I.T Press, 1976): 240-273.

### A Production Function for Wheat<sup>6</sup>

Crops can be produced using different methods. Food grown on large farms in the United States is usually produced with a *capital-intensive technology*, which involves substantial investments in capital, such as buildings and equipment, and relatively little input of labor. However, food can also be produced using very little capital (a hoe) and a lot of labor (several people with the patience and stamina to work the soil). One way to describe the agricultural production process is to show one isoquant (or more) that describes the combination of inputs that generates a given level of output (or several output levels). The description that follows comes from a production function for wheat that was estimated statistically.

The food production function on which this example is based is given by the equation  $Q=100(K^8L^2)$ , where  $Q$  is the rate of output in bushels of food per year,  $K$  is the quantity of machines in use per year, and  $L$  is the number of hours of labor per year.

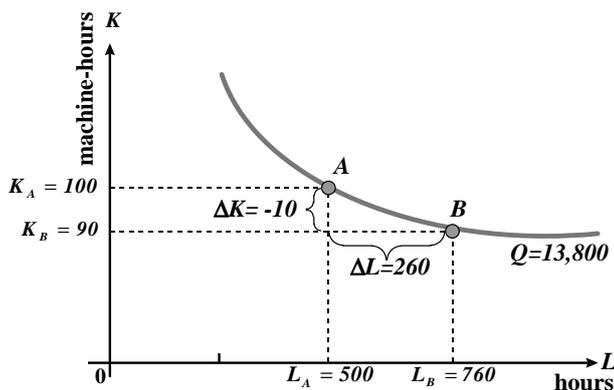


Figure 1. Isoquant Describing the Production of Wheat. A wheat output of 13,800 bushels per week can be produced with different combinations of labor and capital. The more capital-intensive production process is shown as point  $A$  and the more labor-intensive process as  $B$ . The marginal rate of technical substitution between  $A$  and  $B$  is  $10/260 = 0.04$ ,

Figure 1 shows one isoquant, associated with the production function, corresponding to an output of 13,800 bushels of wheat per year. The manager of the farm can use this isoquant to decide whether it is profitable to hire more labor or use more machinery. Assume the farm is currently operating at  $A$ , with a labor input  $L$  of 500 hours and a capital input  $K$  of 100 machine-hours. The manager decides to experiment by using fewer hours of machine time. To produce the same crop per year, he finds that he needs to replace this machine time by adding 260 hours of labor.

The results of this experiment tell the manager about the shape of the wheat production isoquant. When comparing points  $A$  (where  $L = 500$  and  $K = 100$ ) and  $B$  (where  $L = 760$  and  $K = 90$ ) in Figure 1, both of which are on the same isoquant, the manager finds that the marginal rate of technical substitution is equal to  $0.04$  ( $-\Delta K/\Delta L = -(-10)/260 = .04$ ).

The *MRTS* tells the manager the nature of the trade-off between adding labor and reducing the use of farm machinery. Because the *MRTS* is substantially less than 1 in value, the manager knows that when the wage of a laborer is equal to the cost of running a machine, he ought to use more capital. (At his current level of production, he needs 260 units of labor to substitute for 10 units of capital.) In fact, he knows that unless labor is substantially less expensive than the use of a machine, his production process ought to become more capital-intensive.

The decision about how many laborers to hire and machines to use cannot be fully resolved until we discuss the costs of production. However, this example illustrates how knowledge about production isoquants and the marginal rate of technical substitution can help a manager. It also suggests why most farms in the United States and Canada, where labor is relatively expensive, operate in the range of production in which the *MRTS* is relatively high (with a high capital-to-labor ratio), while farms in developing countries in which labor is cheap operate with a lower *MRTS* (and a lower capital-to-labor ratio).

#### Questions for discussions

1. What is the difference between production function for wheat in developed and developing countries? How will the parameters of these two functions differ in case of choosing Cobb-Douglas function?
2. Define the elasticity of output by labor and by capital.

<sup>6</sup> Developed on the base of: Pindyck R.S. and Rubinfeld D.L. Microeconomics.- 3rd ed. Prentice-Hall, 1995. p.185.

3. What is the difference in production functions for wheat growing in developed and
4. developing countries? How will the parameters of these two functions differ if the Cobb-Douglas function is chosen?
5. Discuss in what way the knowledge of the specific production function for agriculture can be used for taking public policy decisions aimed at:
  - a) increase of employment in agriculture?
  - b) stimulating production output increase?
  - c) enhancing production efficiency?

### **A cost function for the savings and loan industry**

Understanding returns to scale in the savings and loan industry is important for regulators who must decide how savings and loans should be restructured in light of the failure of numerous institutions. In this regard, the empirical estimation of a long-run cost function can be useful.<sup>7</sup>

Delta were collected for 86 savings and loan associations for 1975 and 1976 in a region that includes Idaho, Montana, Oregon, Utah, Washington, and Wyoming. Output is difficult to measure in this case because a savings and loan association provides a service to its customers, rather than a physical product. The output  $Q$  measure reported here (and used in oilier studies) is the total assets of each savings and loan association. In general, the larger the asset base of *an* association, the higher its profitability. Long-run average cost  $LRAC$  is measured by average operating expense. Output and total operating costs are measured in hundreds of millions of dollars. Average operating costs are measured as a percentage of total assets.

A quadratic long-run average cost function was estimated for the year 1975, yielding the following relationship:

$$LRAC = 2.38 - 0.6153Q + 0.0536Q^2 .$$

The estimated long-run average cost function is  $U$ -shaped and reaches its point of minimum average cost when the total assets of the savings and loan reach \$574 million.<sup>8</sup> (At this point the average operating expenses of the savings and loan are 0.61 percent of its total assets.) Because almost all savings and loans in the region being studied had substantially less than \$574 million in assets, the cost function analysis suggests that an expansion of savings and loans through either growth or mergers would be valuable.

How appropriate such a policy is cannot be fully evaluated here, however. To do so, we would need to take into account the possible social costs associated with the lessening of competition from growth or mergers, and we would need to assure ourselves that this particular cost function analysis accurately estimated the point of minimum average cost.

#### **Questions for discussions**

1. Find functions of marginal ( $MC$ ) and average ( $AC$ ) costs, draw graphs (sketches).
2. How, knowing  $MC$  and  $AC$  functions, can you find out the minimum level of average costs of loans?
3. What public policy should be pursued in the field of savings and loans depending on the minimum level of average costs in the field of loans?
4. What negative impact can expansion of loans and savings institutions make (when an institution is enlarged by the way of merging)?

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<sup>7</sup> Developed on the base of: Pindyck R.S. and Rubinfeld D.L. Microeconomics.- 3rd ed. Prentice-Hall, 1995. p.227-228.; J. Holton Wilson, "A Note on Scale Economies in the Savings and Loan Industry," *Business Economics* (Jan. 1981): 45-49.

<sup>8</sup> "This can be seen by graphing the curve, or by differentiating the average cost function with respect to  $Q$ , setting it equal to 0, and solving for  $Q$ ."

### A tax on gasoline<sup>9</sup>

During the 1980 presidential campaign, John Anderson, an independent candidate, proposed a 50 cent per gallon tax on gasoline. The idea of a gasoline tax, both to raise government revenue and to reduce oil consumption and U.S dependence on oil imports, has been widely discussed since then, and became part of the Clinton Administration's 1993 budget package. Let's see how a 50 cent tax would affect the price and consumption of gasoline.

We will do this analysis in the setting of market conditions during the middle of 1986 - when gasoline was selling for about \$1 per gallon, and total consumption was about 100 billion gallons per year (bg/yr)<sup>10</sup>. We will also use intermediate-run elasticities (i.e., elasticities that would apply to a period of about three to six years after a price change).

A reasonable number for the intermediate-run elasticity of gasoline demand is -0.5. We can use this elasticity figure, together with the \$1 and 100 bg/yr price and quantity numbers, to calculate a linear demand curve for gasoline. You can verify that the following demand curve fits these data:

$$\text{Gasoline Demand: } Q^D = 150 - 50P$$

Gasoline is refined from crude oil, some of which is produced domestically and some imported. (Some gasoline is also imported directly.) The supply curve for gasoline will therefore depend on the world price of oil, on domestic oil supply, and on the cost of refining. The details are beyond the scope of this example, but a reasonable number for the elasticity of supply is 0.4. You should verify that this elasticity, together with the \$1 and 100 bg/yr price and quantity, gives the following linear supply curve:

$$\text{Gasoline Supply: } Q^S = 60 + 40P$$

You should also verify that these demand and supply curves imply a market price of  $P_0 = \$1$  and quantity of  $Q_0 = 100$  bg/yr.

We can use these linear demand and supply curves to calculate the effect of a 50 cents per gallon tax. First, we write the four conditions that must hold:

$$\begin{aligned} Q^D &= 150 - 50P_t && \text{(Demand)} \\ Q^S &= 60 + 40P_s && \text{(Supply)} \\ Q^D &= Q^S && \text{(Supply must equal demand)} \\ P_t - P_s &= 0.50 && \text{(Government must receive 50 cents/gallon)} \end{aligned}$$

Now combine the first three equations to equate supply and demand:

$$150 - 50P_t = 60 + 40P_s$$

We can rewrite the last of the four equations as  $P_t = P_s + 0.50$ , and substitute this for  $P_t$  in the above equation:

$$150 - 50(P_s + 0.50) = 60 + 40P_s$$

Now we can rearrange this and solve for  $P_s$ :

$$\begin{aligned} 50P_s + 40P_s &= 150 - 25 - 60 \\ 90P_s &= 65, \text{ or } P_s = 0.72 \end{aligned}$$

Remember that  $P_t = P_s + 0.50$ , so  $P_t = 1.22$ . Finally, we can determine the total quantity from either the demand or supply curve. Using the demand curve (and the price  $P_t = 1.22$ ), we find that  $Q_t = 150 - (50)(1.22) = 150 - 61$ , or  $Q_t = 89$  bg/yr. This represents an 11 percent decline in gasoline consumption. Figure 1 illustrates these calculations and the effect of the tax.

The burden of this tax would be split roughly evenly between consumers and producers; consumers would pay about  $1.22 - 1.00 = \$0.22$  per gallon more for the gasoline they bought, and producers would receive about  $1.00 - 0.72 = \$0.28$  per gallon less.

<sup>9</sup> Developed on the base of: *Pindyck R.S. and Rubinfeld D.L. Microeconomics.- 3rd ed. Prentice-Hall, 1995. p.310-312.*

<sup>10</sup> Of course, this price varied across regions and grades of gasoline, but we can ignore this here. Quantities of oil and oil products are often measured in barrels, there are 42 gallons in a barrel, so the 1986 quantity figure could also be written as 24 billion barrels per year.

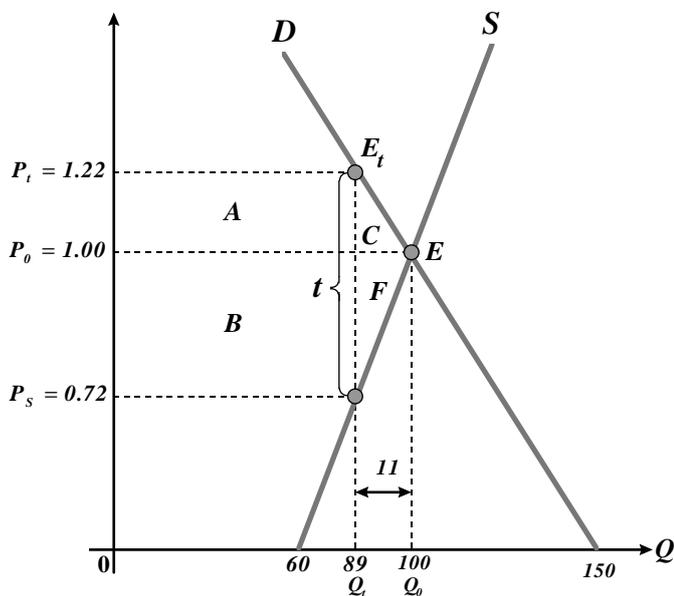


Figure 9.21 Impact of 50 Cent Gasoline Tax.

It should not be surprising, then, that both consumers and producers opposed such a tax, and politicians representing both groups fought the proposal every time it came up. But note that the tax would raise significant revenue for the government. The annual revenue from the tax would be

$$tQ_t = (0.50)(89) = \$44.5 \text{ billion per year.}$$

The cost to consumers and producers, however, will be more than the \$44.5 billion in tax revenue. Figure 1 shows the deadweight loss from this tax as the two triangles (C and F). The two rectangles A and B represent the total tax collected by the government, but the total loss of consumer and producer surplus is larger.

Before deciding whether a gasoline tax is desirable, it is important to know how large the resulting deadweight loss is likely to be.

We can easily calculate this from Figure 1. Combining the two small triangles into one large one we see that the area is

$$(1/2) \times (\$0.50/\text{gallon}) \times (11 \text{ billion gallons/year}) = \$2.75 \text{ billion per year}$$

This deadweight loss is about 6 percent of the government revenue resulting from the tax, and must be balanced against any additional benefits that the tax might bring.

### Questions for discussions

1. How the introduction of a tax with the rate  $t$  per unit will influence the demand, supply and equilibrium at the gasoline market? Does the result depend on who pays the tax - demand or supply side?
2. What factors influence the distribution of a tax burden between producers and consumers?
3. What public policy goals can be pursued with introduction of gasoline taxes?
4. What are economic and social consequences of new petrol tax introduction? (Analyse how do the producers' and consumers' surplus and total economic welfare change, assess the deadweight losses and situation at linked markets of inputs and products). By what price (in terms of efficiency) social and other political goals are achieved?

**Price Regulation - Mother of Deficit**  
**And the factor which, at the end of the day, will give impetus to inflation<sup>11</sup>**

*“The second arrival of inflation” in Ukraine differs to large extent from the situation at the beginning of 1990s. If that time the rate of commodity inflation was running ahead of the monetary inflation, today everything goes the other way round. Nowadays the Dollar rate is visibly going ahead of commodity prices both in wholesale and retail trade. This is especially visible in the case of petroleum products. Under such circumstances the national Government rushes to do its favourite thing - regulate prices absolutely ignoring real factors which influence pricing and throwing out of mind its recent oath to love national economy.*

The primary objects for government regulation are prices in wholesale and retail trade of petroleum products. At the first glance prices for light and heavy petroleum products are really skyrocketing both in wholesale and retail sectors. But the people who stand at the economic steering wheel of the country should have paid more attention to the problem.

From the second half of August the official NBU rate has grown almost by 50% and at the end of September it was 3.40 Hryvnia per 1 US Dollar. The retail Dollar rate has grown almost by 53%. For all that, petrol A-95 whose wholesale price grew most, added to its average price just a little more than 22%, the price of petrol A-92 and A-76 increased only by 15-17%. These are mainly imported products and naturally settlements for them are made in hard currency. If, with respect to this fact, to assess these products price dynamics in dollar equivalent one can see that in Ukraine prices are dropping down...

In this context the figures of over-the-counter wholesale petroleum prices growth over the last two weeks in Ukraine look differently. “Hryvnia” price growth both for light and heavy petroleum products in Ukraine happens almost equally. The price of diesel fuel over this period grew in average by more than 9% and price of small and medium retail batches of A-92 petrol grew in average by 8.5%. Unfortunately, in dollar equivalent the situation is absolutely different. Over this period crude oil and A-76 petrol prices dropped by 15.21% and 15.09% accordingly. The dollar price of diesel fuel dropped by almost 13%. High-octane petrol prices in dollar equivalent dropped down by average 12-14% over the last two weeks. “Dollar devaluation” of petrol and heavy petroleum products started in Ukraine at the beginning of the year but exactly due to the autumn inflation it turned into an avalanche.

Setting up threshold sales prices by the Government must surprise those who realise above-mentioned facts. Both the necessity and methods used for defining maximum allowed prices are not clear.

Let's recall that according to resolution # 1912 of 14.09.1998 taken by Kyiv City Administration the highest allowed wholesale prices for A-76 petrol and diesel fuel should have not exceeded 0.55 and 0.46 Hryvnias per litre accordingly before the 1<sup>st</sup> of October.

If to recall that the highest proposed wholesale price for A-76 petrol before the eruption of inflation was exactly 0.55 Hryvnias, it becomes clear that the City Administration wants not only to deprive petroleum traders of any opportunity to compensate for their inflationary losses but even force them to cut down sales prices for their goods by 1.5 times.

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<sup>11</sup> Newspaper «Day». №190 06.10.98 © Day

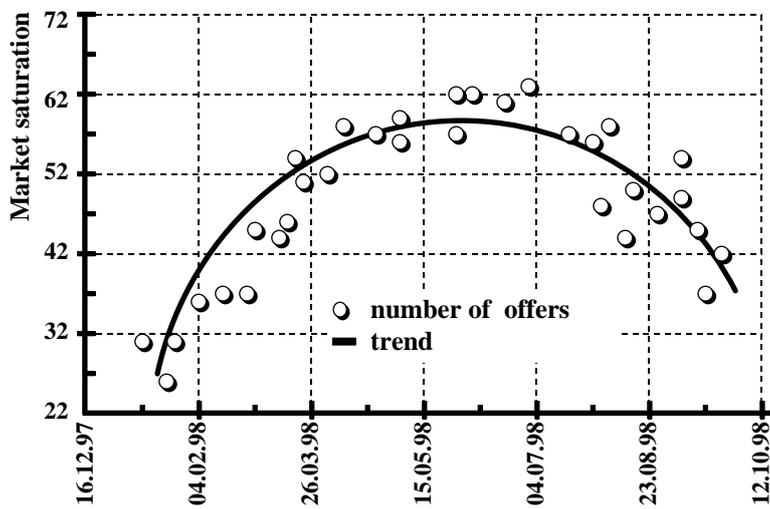


Fig. 1. Dynamics of market saturation with wholesale of A-76 petrol.

The natural reaction to this at any commodity market would be voting with feet. Clearly there is no surprise that saturation of over-the-counter market with all kinds of petroleum products has been steadily decreasing (see fig.1)

Once again the actions of state authorities aimed at combating crisis in the economy by the way of regulating petroleum prices remind treatment of lung inflammation with painkillers. And it's not the case that somebody suffers heavy losses, though it's also very important in terms of the Ukrainian economy development..

Ukrainian petroleum traders, who do not have very big funds at their disposal, under these circumstances will simply be forced to wrap up their operations which will be followed up by deficit and new price increase.

### Questions for discussions

1. Use a demand – supply model to illustrate price-ceiling policy. When answering this and following questions respect a market structure (competitive or monopolised).
2. On what goals is the price regulation policy based in general and in the given case?
3. In what way the price regulation policy affects the market efficiency and total economic welfare? How will total benefits and costs change?
4. How do changes of benefits and costs connected to price regulation distribute among various groups of market participants?
5. What ultimate results of price regulation policy can be expected in the given case?

## **Diamond Trade Monopolization Problems<sup>12</sup>**

De Beerse Consolidated Mines, Ltd., of South Africa produces about 85% of the annually sold volumes of diamonds. The Company is the owner of the diamond-fields in Africa and the diamond factories. Therefore, De Beerse Company sells its own rough diamonds on the market and re-sells diamonds bought from other country-miners. Specifically, Russia sells to the Company 95% of its diamonds mined volume.

Recently, the Company unilaterally proposed to its clients, Russia included, to cut down the price of small inexpensive diamonds to 15%, while increasing price level of large size expensive diamonds to 3 to 8%. The half of products sold by Russia to De Beerse Company are small-size diamonds, therefore, Russia could face considerable losses and has not agreed with the new price list yet.

However starting from July, 1, with the reference to the lack of an agreement regarding new prices, De Beerse Company stopped to accept products of Almazy Possii-Sakha Company aggravating the financial status of the diamond producers of Yakutia facing lack of financial resources.

In essence, the Company of Russia was saved by the national diamond cutting industry with its demand compensating for the purchases stopped by the South African De Beerse Company.

The above situation once again confirmed the arguments of the representatives of the diamond complex of Russia stating that the country has to transfer from the export of rough diamonds to the export of cut diamonds along with the relevant adjustment of its own system of diamond sales on the world market excluding De Beerse Company as an intermediary.

On the opinion of the above concept supporters, the Russian diamond cutting industry could process up to 80% of all rough diamonds mined in Russia. The rest 20% which can not be cut efficiently by the national industry - small-size diamonds of low quality or the so-called "Indian commodities" may be sold to India on the basis of direct agreements excluding intermediaries.

It will readily be seen that De Beerse Company has no place in the created structure possibly serving the reason of the recent strict measures of the Managerial Staff of the Company exerting direct financial pressure on the Russian partners.

### **Questions for discussions**

1. Please, characterize the structure of the rough diamond market. What is the position of De Beerse Company on the market?

2. Demonstrate possible small-size diamond demand curve on the plot. Why does De Beerse Company has the possibility to cut down price on small-size diamonds? What can you say about the elasticity of small-size diamonds demand? How can the decreased price influence the purchase volumes and proceeds of De Beerse Company?

3. Demonstrate possible large-size demand curve on the plot. Explain De Beerse Company proposal as to large-size diamonds price increase. How can the increased price of large-size diamonds influence the purchase volumes and proceeds of De Beerse Company?

4. What aims does De Beerse Company pursue changing price structure of the diamond market?

Why De Beerse Company price policy is not favorable for Russia? Why does Russia sell 95% of its diamonds mined volume to De Beerse Company? What measures does Russia may take to counteract De Beerse Company price policy? What may be the response of De Beerse Company to preserve its position on the market?

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<sup>12</sup> Developed on the base of: *E. Guseinov "De Beerse Company has ceased to pay to our diamond makers and they learn the art of trade on their own". "Izvestia", September 1, 1995)*