

## Chapter 2

# Specie-Flow Mechanism

The classical economists, who followed Adam Smith, did not doubt that the arguments of their predecessors, the mercantilists, in favor of a chronic export surplus were based on an intellectual confusion. The classical refutation of the mercantilist principle is derived from the so-called Cantillon–Hume price-specie-flow mechanism. By this mechanism an inflow of bullion raises domestic prices, and selling dear and buying cheap tends to turn the balance of trade against the country. Purely automatic forces tend, therefore, to establish a natural distribution of specie between the trading countries of the world and there is a level of domestic prices such that each country's value of exports equals that of imports.

The crux of the classical price-specie-flow mechanism is thus the change in prices caused by redistribution of specie due to the trade imbalance. The famous and concise statement in Hume's essay *Of the Balance of Trade* runs as follows:

“Suppose four-fifths of all the money in Great Britain to be annihilated in one night and the nation reduced to the same conclusion, with regard to specie, as in the reigns of the Harrys and Edwards. What would be the consequence? Must not the price of all labour and commodities sink in proportion, and everything be sold as cheap as they were in those ages? What nation could then dispute with us in any foreign market, or pretend to navigate or to sell manufactures at the same price, which to us would afford sufficient profit? In how little time, therefore, must this bring back the money which we had lost, and raise us to the level of all the neighbouring nations?—Again, suppose that all the money of Great Britain were multiplied fivefold in a night, must not the contrary effect follow? Must not all labour and commodities rise to such an exorbitant height, that no neighbouring nations could afford to buy from us, while their commodities, on the other hand, became comparatively so cheap, that, in spite of all laws which could be formed, they would be run in upon us, and our money flows out, till we fall to a level with foreigners, and lose that great superiority of riches, which had laid us under such disadvantages?”<sup>1</sup>

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<sup>1</sup>See [Hume \(1955, pp. 62–63\)](#). For Cantillon's version, see [Cantillon \(1931, pp. 167–169\)](#).

One might wonder why “the price of all the labour and commodities” rise in a country which gained money and sink in a country which lost money, since the same good has always the same gold price in different countries, if it is internationally traded in the absence of obstacles. Such is the law of indifference. [Staley \(1976\)](#) rightly argued that what Hume had in mind is a model of an economy in which international trade takes place not continuously but discretely, so that the same good can have different prices in different countries unless the international distribution of gold has already settled in equilibrium.

In Hume’s day, it is certain that arbitrage took time to establish the law of indifference internationally. If international trade does not take place quickly and continuously, certainly prices rise temporarily not only for exportables and domestic goods but also for importables in the gold gaining country. There is no reason to assume that the adjustment process in international trade to establish uniform prices is much quicker than the process of the specie-flow mechanism to achieve the balance of trade equilibrium.

The traditional interpretation which follows [Viner \(1937, pp. 313–317\)](#) considers, however, that uniform gold prices always prevail for identical commodities in different countries. Since it is insisted on as the interpretation of the classical specie-flow mechanism in general, to consider it is worthwhile, as Staley himself admitted, independently of one’s view about the nature of the price changes envisioned by Hume. As the same price change is now assumed to occur in all countries at the same time, the price variations responsible for adjustment in the balance of trade are changes in terms of trade, i.e., the relative price of the exportables and the importables for countries. The price of the exportables must rise relative to that of the importables in the gold-gaining country, and vice versa, if the classical price-specie-flow mechanism works successfully.

Modern literature on international transfer has made it clear, however, that the resultant changes in prices can be in either direction, depending on the international difference in demand patterns, and are not necessarily in the direction suggested by the classical price-specie-flow theory, that is, the terms of trade rise in the surplus country and fall in the deficit country ([Kemp 1964, pp. 79–81](#)). If, for example, two countries are identical in taste which can be expressed by a homothetic social indifference map, so that Engel curves are identical straight lines through the origin,<sup>2</sup> the equilibrium prices are independent of the distribution of income between the two countries, including the distribution of specie. In this case, as is pointed out by [Dornbusch, Fischer, and Samuelson \(1976\)](#), there is no price effect associated with a redistribution of the world money supply and therefore no effects on real variables in the adjustment process for monetary disequilibrium, contrary to the classical price-specie-flow mechanism.

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<sup>2</sup>Indifference map is homothetic, when the slope of indifference curves remain unchanged by any proportional changes in the quantities of all the commodities. Income consumption curve, which shows how consumption varies if income increases and prices remain unchanged, is called Engel curve, since a German statistician Engel (1821–1896) studied it originally.

Let us construct a drastically simplified version of the model used by Dornbusch, Fischer, and Samuelson. For the sake of simplicity, we consider the case of a two-good, two-country model, in which each country completely specializes in the production of the exportables.<sup>3</sup> The production is of constant returns to scale with respect to the sole factor of production, called labor. As for the demand side, it is assumed that the level of aggregate expenditure of each country is proportional to the supply of money in the country<sup>4</sup> and that the ratio of expenditure on each good to the aggregate expenditure is a given constant.<sup>5</sup> The sum of supplies of money in the two countries is assumed to be constant.

The condition for the equilibrium of demand and supply of labor in the home country is then

$$wL = aV\left(\frac{M}{G}\right)G + a^*V^*\left[1 - \left(\frac{M}{G}\right)\right]G \quad (2.1)$$

where  $L$  is the given supply of labor,  $w$  is the money rate of wage,  $a$  is the given ratio of expenditure on the exportables of the home country,  $V$  is the constant velocity of the circulation of money,  $M$  is the domestic money supply,  $G$  is the given world money supply, variables and parameters with(out) asterisk are those of foreign(home) country, and the rate of foreign exchange is assumed to be 1. Similarly, for the labor in the foreign country, we have

$$w^*L^* = (1 - a)V\left(\frac{M}{G}\right)G + (1 - a^*)V^*\left[1 - \left(\frac{M}{G}\right)\right]G. \quad (2.2)$$

If the distribution of specie,  $M$ , is given, we can solve (2.1) and (2.2) for  $w$  and  $w^*$ . If two countries have identical taste, such that  $a = a^*$  and  $V = V^*$ , furthermore, it is easily seen that equilibrium  $w$  and  $w^*$  are independent of the distribution of specie,  $M$ .

The specie-flow mechanism is given as

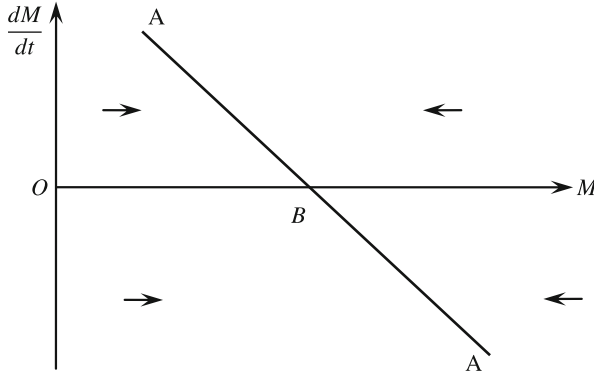
$$\frac{dM}{dt} = wL - VM \quad (2.3)$$

where  $t$  denotes time and  $dM/dt$  signifies the instantaneous rate of change in  $M$ . The supply of money  $M$  is increased as a result of the trade surplus that is equal to the difference of income  $wL$  and absorption  $VM$  (see Problem 1.3). Since  $w$  remains unchanged when  $M$  is changed, if two countries are identical in taste, it can easily be seen that the solution of (2.3),  $M(t)$  is stable in the sense that it approaches to  $wL/V$  and the trade balance is eventually established. In Fig. 2.1,  $M$  is measured horizontally, and  $dM/dt$ , vertically. A downwardly sloping line AA signifies the

<sup>3</sup>Dornbusch, Fischer, and Samuelson 1976 considered the case with infinitely many goods.

<sup>4</sup>See Dornbusch and Mussa (1975), where such a behavior of expenditure is explained by intertemporal optimization.

<sup>5</sup>See Problem 2.1.



**Fig. 2.1** The specie-flow mechanism

solution of (2.3). If  $M > B = wL/V$ ,  $M$  decreases through time and if  $M < B = wL/V$ , it increases, as the arrows indicate, so that it always approaches to  $B$  where the balance of trade is established.

Since the price of each good is completely determined by the wage cost in our model, there is no price effect of specie flow in this special case. Something must be done to explain the changes in prices in the direction suggested by the classical price-specie-flow theory. Dornbusch, Fischer, and Samuelson showed that even in this special case the introduction of non-traded domestic goods revitalizes the classical conclusion that in the adjustment process prices decline along with the money stock in the deficit country while both rise in the surplus country. Let us therefore introduce non-traded goods in our model and assume that the ratio of expenditure on non-traded goods in each country is constant; that is,  $(1 - k)$ . Non-traded goods and the exportables are produced in each country but there is still no import competing production. In view of identical taste, then, (2.1) and (2.2) are, respectively, modified into

$$WL = aVG + (1 - k)V\left(\frac{M}{G}\right)G \quad (2.4)$$

and

$$W^*L^* = (k - a)VG + (1 - k)V\left[1 - \left(\frac{M}{G}\right)\right]G \quad (2.5)$$

from which  $w$  and  $w^*$  are obtained.<sup>6</sup> Now equilibrium wages are no longer independent of the distribution of specie. An increase in  $M$  increases  $w$  and reduces  $w^*$ . The prices of goods produced in a country change in the same direction as the supply of money in the country. Since we have from (2.4)

<sup>6</sup>Numerical values of  $a$  in (2.4) and (2.5) are different from those in (2.1) and (2.2).

$$\frac{dw}{dM} = (1-k)\frac{V}{L} \quad (2.6)$$

the right-hand side of (2.3) is decreasing with respect to  $M$  and therefore the price-specie-flow mechanism is stable.

## 2.1 Problems

**2.1.** Suppose the utility function of a consumer is

$$U = X^a Y^b$$

where  $X$  and  $Y$  are, respectively, the quantity of commodities  $X$  and  $Y$ , and  $a$  and  $b$  are positive constants such that  $a + b = 1$ . When  $U$  is maximized, being subject to the budget constraint,

$$pX + qY = Z$$

where  $p$ ,  $q$ , and  $Z$  signify, respectively, the price of  $X$ , the price of  $Y$ , and the given income of the consumer, express  $X$  and  $Y$  as functions of  $p$ ,  $q$ , and  $Z$ . Show that “the ratio of expenditure on each commodity to the aggregate expenditure is a given constant.”

**2.2.** Draw the indifference map between  $X$  and  $Y$  in the case of the utility function given in Problem 2.1, and show that it is a homothetic case where “Engel curve is a straight line through the origin.”

**2.3.** What are typical examples of non-traded goods?

**2.4.** Solve (2.3) explicitly for  $M$  as a function of  $t$  and discuss its stability.

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<http://www.springer.com/978-4-431-54433-3>

Developments of International Trade Theory

Negishi, T.

2014, XIII, 174 p. 37 illus.,

ISBN: 978-4-431-54433-3