Lecture Note 14:

Imperfect competition: Even though many of both classical and neoclassical authors were aware of the fact that competition in the market is often very far from being complete, there had been few attempts to give a systematical treatment of less than perfect competition. This changed during the 1920s when several authors began to work in this field.

Monopolistic competition was introduced by **Edward Chamberlin** (1899 – 1967), and *imperfect competition* by **Joan Robinson** (1903 – 83), both in 1933. The basic idea is the same: The firm enjoys a local monopoly, which however is restricted by competitors, so that it has its own individual demand curve, on the basis of which it can find the monopoly price. This is however only part of the equilibrium since there is *free entry,* so that if the monopoly profit is positive, new competitors will enter, thereby reducing the demand of the given firm. In equilibrium, consequently, we must have both that marginal cost equals marginal revenue *and* price equals average cost.

Robinson's formulation was slightly different, using the so-called **Amoroso-Robinson** formula for the monopoly price, which contains the price

$$p_{\text{mon}} = \text{MC}\frac{1}{1 + \dfrac{1}{\varepsilon_D}},$$

where MC is marginal cost and ε_D is the elasticity of demand for the firm's product. The second condition, price equal to average cost, will obtain due to entry or exist of competing firms, since this will change the demand curve and in particular its elasticity.

Robinson belonged to the group around Keynes and later took an active part in the so-called Cambridge capital controversy, to which we return later.

The work of **Harold Hotelling** (1895 – 1973) dates to the late 1930s but fits well with the theory of monopolistic competition and his model is particularly useful as a case where it is possible to track directly how the demand function of the firm depends on the choices of its competitors. The location model has had a revival since 1990 and is used in a vary wide variety of contexts.

Among the other contributions of Hotelling (in his main research line as statistician) should be mentioned the idea of measuring value of attractive natural sights through prices of real estate at different sites.

Frederik Ludvig Bang Zeuthen (1888 – 1959) contributed to the theory imperfect competition at an early state, and his model of bilateral bargaining has been rediscovered later and is occasionally referred to, even if bargaining theory as developed

went in another direction. As noticed earlier, he introduced an extension to the Walrasian equations systems, adding the possibility of possible excess supply together with zero prices for some goods.

The "great" systems debate. Many of the theorists concerned about were engaged in an academic discussion which was taking place in the 1930s. Broadly speaking, the debate dealt with the problem of whether a socialist economy, understood as an economy where firms were directed by the state, was at all feasible, and if so, how the institutions should be set up in such a society. Behind this seemingly theoretical question was of course another one, about capitalism versus socialism, and the debate got its intensity from the latter. The systems debate itself became quickly outdated and is by now of little relevance, since both capitalism and socialism was considered in the debate as alternative allocation systems with perfect competition, something which was unrealistic already at that time. Some of the other works of the participants have survived.

Ludwig Heinrich Edler von Mises (1881 – 1973) initiated the debate arguing that without private property it would be impossible to establish prices and to carry out rational calculations of cost. He was a student of Böhm-Bawerk and initiated the younger Austrian school whose members typically were were ardent defenders of laissez-faire capitalism.

Friedrich August von Hayek (1899 – 1992) is the most prominent of the economists of the Austrian school in the 20th century. He studied in Vienna under von Wieser and attended seminars of von Mises. Subsequently he was invited to LSE by Lionel Robbins and stayed there until 1950, after which he moved to Chicago.

The main contribution of von Hayek in the systems debate is his pointing out the role of information. If allocation problems are decided upon by central planning, the planning agency must obtain information about people's wants and production possibilities, intuitively a vast amount of data which must be obtained and processed. If allocation is done in a perfectly competitive market, only incomes and prices are necessary, based on these (provided that they are correct) the agents will do the rest themselves. The intuition sounds right but it took most of a century to provide a formal proof of what is now called the informational effectiveness of the competitive mechanism (a version of the Walrasian general equilibrium model), cf. Calsamiglia (1982). The question of how the correct prices and incomes would be attained was largely left unanswered by von Hayek.

Econometrics. There are by now several texts treating the history of econometrics, for example Epstein (1987), followed by Morgan (1990) and Qin (2013). Frisch and Tinbergen are often considered as founders, but there were many predecessors, and some of those contributing in the 30s and later might deserve more mention. The following is based mainly on Epstein (1987).

The empirical content of economics was rather low all through the classical era and even for the neoclassical writers, including Marshall as well. Real world data entered mostly as illustrations including a few numbers, and many of the authors thought that concepts such as demand and supply could not be estimated empirically. It should be added that available data were few and unreliable, only data for weather conditions and astronomical events could be obtained in reasonably long series.

Systematical use of statistical methods (which themselves were emerging only in the late 19th century) to estimate or test economic models started in the USA with the work of **Henry Ludwell Moore** (1869 – 1958) who set out to test the marginal productivity wage theory proposed by J.B.Clark, first using data from 39 strikes (seeing that strikes were more likely to happen when wages were below marginal productivity than when they were above), and subsequently using data from harvests in a model of the business cycle. He was aware that demand and supply curves might shift up and down, but he found that relative price changes and relative quantity changes had a more stable behavior, so that the relation between price and quantity would take the form

$$\frac{\Delta P}{P} = a - b \frac{\Delta Q}{Q} + \text{error}.$$

Moore wrote much about business cycle models and their estimation, and he is one of several authors of the cobweb model. In one of his contributions, he attributed business cycles to weather conditions and in another one, to the movements of the planet Venus. Like Jevons' sunspot theory, they have been subject to unjustified ridicule. This were attempts to connect data with a theoretical model, so it was a meaningful activity even if subsequent data showed that they were wrong.

Among Moore's students were **Henry Schultz** (1893 – 1938) improved the methods of Moore after observing that regressing $\frac{\Delta Q}{Q}$ on $\frac{\Delta P}{P}$ would yield elasticity estimates different from those coming from regression of $\frac{\Delta P}{P}$ on $\frac{\Delta Q}{Q}$. **Holbrook Working** (1895 – 1985) estimated demand curves and attempted to get beyond the assumption of constant supply in the short run, proposing also to take futures markets and their prices into account.

The difficulties arising when estimating demand or supply is connected with the equilibrium approach, since data refer to equilibria and both supply and demand may shift. The American authors saw this as the result of several omitted variables, but for the early European writers, such as **Jan Tinbergen** (1903 – 1994) it was the result of outside forces, the influence of exogenous variables. Since these variables would be different for demand and supply, we have two equations, one for supply

and one for demand,

$$Q = a_1 P + a_2 A$$
$$Q = b_1 P + b_2 B,$$

where the variables are taken as deviations from the mean to avoid the constant term. Solving for Q and P, one gets

$$P = \frac{1}{b_1 - a_1}(a_2 A - b_2 B)$$
$$Q = \frac{1}{b_1 - a_1}(b_1 a_2 A - b_2 a_1 B)$$

and the four parameters in the original system can be recovered from those of the second one. This would in principle allow the market equilibrium to be estimated using ordinary regression analysis on two separate equations.

Ragnar Frisch (1895 – 1973) was concerned about multicollinearity, occurring when there is a hidden linear relation between some of the variables on which the regression is performed, and resulting in indeterminacy of the estimated coefficients. He proposed a method of selecting among all possible subsets, checking the residuals and testing for the best possible result, a procedure which however was too cumbersome in practice.

The approach suggested by Tinbergen, replacing simultaneous equations with a reduced form, was met with critics once it was realized that the error terms, even when initially independent, might cease to be so. It was shown by **Trygve Haavelmo** (1911 – 1999) that even in the simplest possible case of two simultaneous equations

$$Y = \alpha X + u$$
$$X = \beta Y + v,$$

estimation using ordinary least squares would not be consistent, and the finite sample behavior of the estimator would be quite complex. This meant that estimation of coefficients in simultaneous equations should be done by other methods. Among the researchers taking part in the further development should be mentioned **Tjalling Charles Koopmans** (1910 – 1985) and **Lawrence Klein** (1920 – 2013), initiating the estimation of simultaneous equation models. The further development of these methods spread over the 50s and 60s, whereas time series estimation came to the forefront.

References:

Epstein, R.J. (1987), A history of econometrics, Elsevier Science Publishers, Amsterdam.

Morgan, M.S. (1990), The history of econometric ideas, Cambridge University Press, Cambridge.

Qin, Duo (2013), A history if econometrics: The reformation from the 1970s, Oxford University Press, Oxford.