Innovation and investments in an urban cross-sectoral growth model: a change of course is needed in macroeconomic policies

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Abstract

The paper illustrates a theoretical model, where growth is based on the interdependent changes of the sectoral structure of the supply and the demand. A crucial role is attributed to the flows of new knowledge, innovation and investment, as factors which affect both the aggregate supply and the aggregate demand. The paper first illustrates the role of new knowledge in determining the level of investment and the aggregate demand. Then, it illustrates the model of the cross-sectoral demand and of the cross-sectoral supply and the characteristics of their equilibrium and it compares this model with the traditional macroeconomic AD-AS model. Finally, it indicates that industrial and regional policies are complementary to the monetary and fiscal policies, as they may promote the creation of new productions, such as high-tech or low-tech products or also public goods and they may determine an increase of GDP and employment, in the perspective of short-medium term stabilization policies and not only for long term development.

JEL Codes: E14, L52, O14, O18, O33,

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1. Introduction[1]

The case of an urban economy (Markusen 2007, Cappellin 2007, Markusen and Schrock 2009, Cappellin 2011) may be relevant in the design of the macro-economic policies aiming to a higher employment in the Euro area, In urban areas, monetary policy is not relevant since the monetary market has a national or international dimension and the interest rate is exogenously determined. Public expenditure is to a large extent rigid since the local authorities are obliged by law to a balanced budget. The market price of goods and the wages are to a large extent exogenous, due to the high interregional mobility of goods and labor. Also export and import can't be promoted through exchange rates adjustments and the urban economies are mainly specialized in services which have a mainly local market. Therefore, the crucial instruments for local authorities in order to promote growth are the policies for innovation, investment and private finance. This case is very similar to the case of national States in the European Union, since they have increasingly lost their powers on the traditional tools of macroeconomic policies to supranational authorities and have only kept some power on the growth of the supply side of the economy.

Due to the fall of investment in the Euro (12) area 369 billions of Euro were lacking in 2013, in order to return to the investment level in 2008. That value almost coincides with the value of 300 billions of Euro indicated by the new President of the European Commission, Jean-Claude Juncker, in his proposal in order to relaunch the European Economy.

As indicated in table 1 in the appendix, investments in the Euro (12) area have fallen by 19,8% since the beginning of the crisis and their share on the GDP has decreased by 3,9 percentage points in favor of the other components of the final demand. That decrease has been much greater than that of private consumption (-1,7%) and it is the main factor of the decrease of the GDP (-2,1%). On the contrary, notwithstanding the public debate in Europe focuses always on the State budgets, public consumption have increased (2,7%) on the average in the Euro area in the period 2008-13.

Therefore, the decrease of investments has been the most important factor of the decrease of the GDP in the Euro area, since it would have determined a decrease by 4,3% of the GDP, if this negative effect would have not been compensated by the increase of the net exports and by the public consumptions.

Moreover, fixed investment are mostly accompanied by immaterial investment into new knowledge, in the design of product and process innovation and also by an increase of employment, since firms have to invest both in capital expenditure and in new jobs in order to create new productions.

A sectoral breakdown of investments is not available for the Euro area, but only for some countries. As indicated by table 3, in Italy the decline of investments has been greater in rather traditional sectors, such as the public utilities sectors (electricity, gas, steam and air conditioning supply, water supply, sewerage, waste management and remediation activities), in the construction sector and in the manufacturing industry, while it has been lower in more innovative sectors such as, information and communication services or arts, entertainment and

[1] I wish to thank the participants to the "discussion group" promoted by the eBook "Growth, Investment and Territory: the role of industrial and regional policies" (www.economia.uniroma2.it/dedi/ebook-politiche-industriali/) for the discussions on earlier drafts of this paper at the Policy Workshops on 9 July 2014, University of Milan, on 12 September 2014 at the Congress of AISRe, University of Padua. In particular, I wish to thank for the in depth discussions, the intelligent comments and useful suggestions received Maurizio Baravelli, Enrico Ciciotti, Enrico Marelli, Paolo Paesani, Guido Pellegrini and Pier Luigi Porta.

recreation and other service activities, where the demand is more dynamic. Moreover, the decrease of investment has had a strong negative effect on the demand and production of specific sectors, such construction industry, machinery industry and also business services. Finally, as indicated in table 4 in the appendix in the case of Italy, the low flow of net investments in the period after 2008 has determined a decrease of the stock of fixed assets in the agriculture, electricity, gas, and manufacturing sectors, thus determining a process of "disinvestment" or deindustrialization.

The traditional monetary and fiscal policies have not been capable to promote a recovery of the European economy after six years of recession and stagnation (Cappellin , Marelli, Rullani and Sterlacchini 2014; Marelli 2014), since private investment are not sensitive to the deline of the market interest rate and the public budget are also very rigid, due to the Fiscal Compact rules. Therefore, there is the need of a new course of action and the case of an urban economy may be useful in indicating the possibility or the need, also at the national and EU level, to use the instruments of industrial and regional policies, in order to promote the growth of income and employment.

On the other hand, the theories and models of regional economics have only focused on the case of the individual regions and urban areas (Capello 2007), given national growth as exogenous. Similarly, also industrial economics has usually focused on the case of the individual sectors and companies. Therefore, this paper aims to define a theoretical framework which may allow to indicate the implications of these theories for promoting GDP and employment growth at the national and European level, not only in the long term, but also in the perspective of stabilization policies..

Technological change, the creation of new productions and the improvement in the sectoral structure of the economy are key factors, which determine national growth (Lundvall and Johnson 1994, Fagerberg 2005). Also at the firm level and in a regional and urban framework, employment may be promoted through the creation of new productions and innovation (Cappellin and Wink 2009, Cappellin 2010). On the contrary, the traditional macroeconomic model does not adequately consider these factors and it can't, therefore, be used in the evaluation of the impact of industrial and regional policies, which in fact have been largely ignored by the policy makers in Europe during the current long recession

In particular, the crucial factor on which the economic policies should act is the innovation. Innovation should not be understood as a specific ICT application or a new technological start up. Innovation is also different from technological change, which is often exogenous, while innovation is the result of an intentional and expensive effort of increasing the internal R&D or of promoting informal interactive learning with many other firms and actors. In a broader perspective, innovation is represented by changes in the needs and behavior of the users and in the demand of goods and services, by the discovery by the firms of new technological solutions, by the improvement of the goods and services already produced, by the production of new goods and services and by the reallocation of resources from existing to new firms and sectors and finally, also, by the design of new instruments of public governance, which facilitate the users to interact between themselves, to the producers to interact between themselves and with the users. In particular, the task of the industrial and regional policies is to manage these complex relationships between the producers and the users and to insure the continuous and interdependent changes in the demand and in the supply.

The paper illustrates a theoretical model, where growth is based on the interdependent changes of the sectoral structure of the supply and of the demand. A crucial role is attributed to the flows

of new knowledge, innovation and investment, as factors not only of the potential long term growth, but also of the current level of employment and GDP. Therefore, the economic policies should act not only on the level of the aggregate demand and supply but also on their sectoral and regional structure.

The paper first illustrates the role of new knowledge in determining the level of investment and the aggregate demand. Then, it illustrates the model of the cross-sectoral demand and of the cross-sectoral supply and the characteristics of their equilibrium and it compares this model with the traditional macroeconomic AD-AS model. Finally, it analyses the changes in the level of employment and GDP determined by technological change and by an industrial and regional investment policy, which create new productions, such as high tech products or public goods.

2. Innovation as the key factor of investment and GDP growth

The fall of the capital expenditure by the companies, the households and the governments is the main factor, which has determined the recession in Europe. Therefore, policies should identify the factors which have led to this fall of investments and those which may help in promoting investments.

The economic theory of investment indicates that the internal rate of return (IRR) of planned investment projects should be greater than the interest rates adjusted for the level of risk. The IRR is the discount rate, which equalizes the flow of the revenues (R) and of the costs (C):

$$1) \quad \sum_0^n (R_t (K_t, Z_t) - C_t (K_t, Z_t)) / (1 - IRR)^t = 0$$

Knowledge (K) and product innovations, together with other variables (Z), affect the revenues of the investment projects. Knowledge (K) and process innovations, together with other variables (Z), affect the costs of the investment projects. The length of the time horizon (t) is determined by technological and market factors and also by organizational and institutional capabilities and constraints and it is crucial in determining the financial viability of investment, since it determines the relative importance of the costs, which mainly accrue in the short term, and the revenues, which accumulate in a longer horizon.

The synthetic logic of the financial formula conceals the solid factors that lead to innovation within a firm and stimulate investment decisions. New productions require both innovation and investments. First of all, innovations stimulate investments by increasing the profitability of the new investment projects. On the other hand, it is not possible to elaborate innovative investment projects without a prolonged investment in R&D and technical design and a coherent effort in trying to anticipate wide and continuous changes in the consumer behavior, often lasting several years. Then, later, innovations in the productions can't be introduced without an even larger capital expenditure, especially in the case of the high tech sectors. Therefore, initial investments to support creativity in the design phase are a preliminary step in order to introduce major innovation in the production phase. Too low investments in R&D, technical design and market analysis do not allow precisely defining complex investment projects, and that will determine a longer period of completion of the investment project. The result is, as it is currently occurring in Europe, that the lack of innovative and high return investment projects discourages firms to increase the capital expenditure and leads the economy into a long term stagnation.

Industrial and regional policies should improve the internal capabilities of the firms but also facilitate those creative processes, which are based on the interaction between different actors and on the original combination of complementary pieces of knowledge which belong to different actors. In fact, innovation is not only determined by factors internal to the large and small firms, while it is the result of a process of learning by interacting (Lundvall and Johnson 1994) by the firms with the various clients and suppliers firms, the universities and research centers, various public institutions, the banks and other financial organizations and the specialized consulting services. That process can hardly occurs spontaneously, such as in the well know "industrial districts", while it is the result of an explicit "dynamic coordination" or "governance" process by the local and national institutions, as in the modern "Regional or National Systems of Innovation".

The governance of large, complex and long term investment and innovation projects requires the creation of new specialized intermediary organizations and infrastructures for the governance of the innovation networks (Cappellin and Wink 2009). The missing recovery of capital expenditure by the European firms is also the effect of the lack of an effective innovation and industrial policy in Europe, since the design of large innovation projects requires the preliminary public and private investments in building or strengthening open and flexible innovation networks.

In particular, product innovations require a favorable and stable macroeconomic framework, which increases the confidence by the firms. They also require advanced capabilities and courageous strategic decisions by the individual firms as also a change in the behavior of the users. In fact, new needs are expressed by the most innovative users (Von Hippel 1994) and are tightly related to the increasing knowledge and education level of population, such as the needs for a better quality of life, environment, culture, communication and mobility. That implies a new demand for specific innovative goods and services and it stimulates the firms and the institutions to create new production capacity in new sectors. The demand by specific innovative users often anticipates the new productions introduced by the innovative firms or by the government.

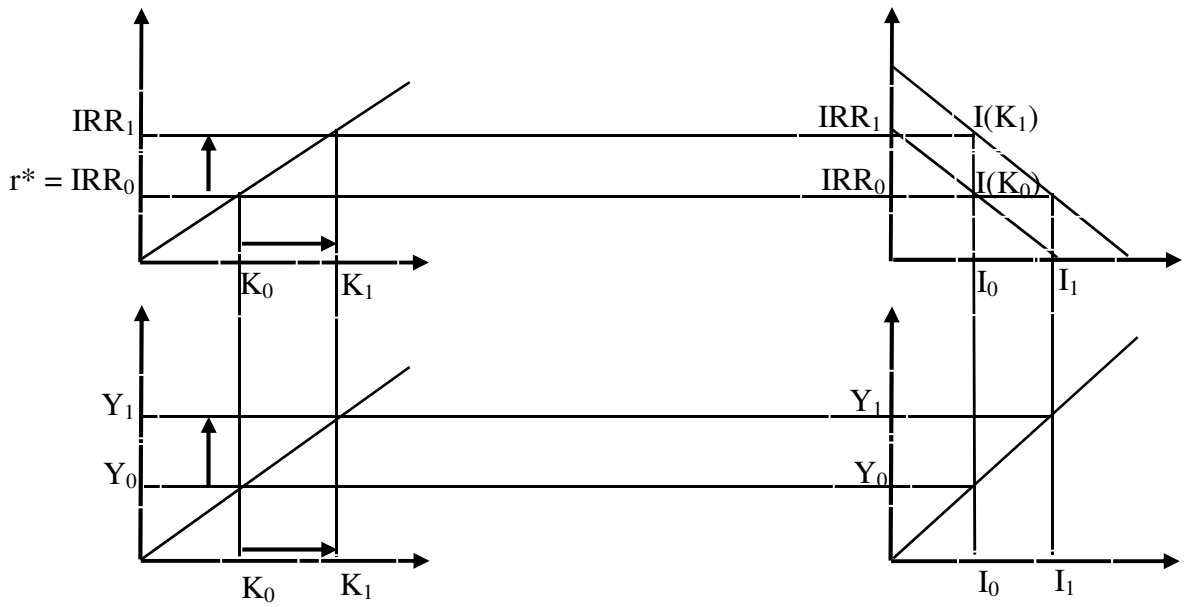

Figure 1: Knowledge and innovation promote investment and GDP growth

Innovation is not only occurring in the case of "private goods" and some new goods and services have a collective and not a private nature. Therefore, as in the case of "public goods" or of

"common goods", the government policies are needed, in order to aggregate the individual demands. Important areas where investments can be stimulated by appropriate industrial and regional policies in Europe are the sectors, which have an high capital intensity, such as construction and public utilities. Other strategic sectors are the sectors where the demand in the long term is dynamic and where it is most important to promote the creation of modern productions, such as transport, culture, health and tourism. As all these sectors are mainly concentrated in urban areas (Cappellin 1988), it is important that a European economic policy (European Commission 2008) aiming at promoting investments focuses on the innovations to be adopted in the urban areas (Ciciotti 2014).

In a stagnation situation or in a liquidity trap, such as the one which is occurring now in Europe, investments are not sensible to lower interest rates in the capital markets and can only be increased by major changes in the demand of productions due to technological breakthroughs or to the intelligent anticipation by the firms and the institutions of the ongoing changes in the consumer behaviors. Moreover, it must be underlined that a high positive rate of return of the investment projects is only a necessary condition for a "rational actor" and that in fact the decision by a firm to invest depend also on strategy, such as technological ambitions, or cultural values, such as the sense of belonging to the local community, or also the individual capabilities of the entrepreneurs and managers.

However, European firms are obliged to increase their investment in innovation in order to survive in very competitive markets, where the foreign firms can increase their technological advantage. However, according to a Schumpeterian perspective the large majority of entrepreneurs are risk averse and do not invest in innovative productions since they do not have innovative ideas and innovator almost by definition are a minority. Then, if few capable and not risk averse entrepreneurs urgently perceive the need to change and actually have innovative ideas, which allow a high positive rate of return, that will lead the other more traditional entrepreneurs to invest following their example. Moreover, the increase of the investments determines an increase of the aggregate demand, and that facilitates the realization of the optimistic expectation of the first innovators.

Therefore, new knowledge and innovation affect both the demand by the users or the revenues and the costs of the firms and they increase the internal rate of return of a specific investment project, as indicated in figure 1. If the internal rate of return increases by the same amount for all investment projects, the Keynesian investment schedule shift upward and also the number of projects, which have an internal rate of return greater than the current rate of interest (r* adjusted for the degree of risk), increases. That determines an increase of investment and the therefore an increase of the GDP (Y) thorough the Keynesian multiplier. This increase of the GDP also implies a shift of the IS curve and of the AD curve in the traditional macroeconomic model.

3. The negative slope of the demand curve and the sectoral structure of the economy

The evaluation of the macroeconomic impact of industrial policies requires a model, which does consider the sectoral structure of the economy, since industrial policies imply a sectoral breakdown and naturally have a selective nature. At the same time this model should allow to evaluate the impact of investments on the aggregate GDP, as in the traditional macroeconomic model.

In fact, the aggregate demand schedule in the traditional macroeconomic model does not indicate the demand of the individual sectors of the economy, although the aggregate production is the summation of the production of the various sectors and the aggregate price is an average of the individual prices.

The case of an aggregate economy, such as in a macroeconomic model, is similar to that of a monopolist firm, as there is only one product. However, this assumption does not fit the real world. On the contrary, the model described below is based on the observation that in the overall economy there are an almost infinite number of goods and services and each of these latter has a different and specific price. The price is higher the higher is intrinsic quality of the good and service considered or the value that the user is willing to pay. The price of these goods and services are also related to the technological level of the producing sector considered, as high tech products have higher prices than the medium tech and the low tech products.

Thus, there is a large number of products, which are differentiated and yet are partially substitutes of one another in the individual consumption of the buyers, as indicated by their price cross elasticities. We may also make the hypothesis that each production of a lower level is capable to satisfy although less well the same needs of the productions of an immediate higher level and that allow them to be sold, although at a lower price.

In particular, in a cross-sectoral perspective, the aggregate demand may be constructed by hierarchically adding the quantity of each output, starting from those with the highest price, and this cross-sectoral demand represents the relationship between the sequence of the prices of the various sectors (or the implicit deflator), considered according to a decreasing level, and the total level of the production (or the real value added), which may be obtained by sequentially adding the production of the various sectors, starting from the sectors having the higher price. This procedure of construction of the cross-sectoral demand schedule, adopted in the model, insures the comparability of the schedules of the demand with that of the supply, as it will be illustrated below.

Thus, the decreasing slope of the cross-sectoral demand curve is determined by the specific procedure adopted for its construction. It also corresponds to the decreasing shape of the individual demand of each production and to the hypothesis that the community of the final and intermediate users tries first of all to satisfy the most qualified needs, which correspond to an higher price of the respective productions, and afterward the needs for the other less qualified productions, for which they are willing to pay a lower price. Clearly also the opposite procedure of starting from the satisfaction of the less qualified goods and services is also valid and compatible with the model.

The cross-sectoral demand schedule in this model is similar to the microeconomic demand schedule of an individual product in the case of “perfect price discrimination” or “first level discrimination”, which represents the case when each producer is capable to sell its respective good and service at a different price than that of the other similar goods and services, due to their different characteristics and the different willingness to pay by the respective users. Thus, the producer is capable to reap all consumer surplus. For example, higher quality goods or services (i.e. a concert of classical music or an iPhone 6) or high tech sectors require higher prices (p_d) than traditional or lower quality products (a concert of pop music or an iPhone 4) or low tech sectors.

In this model, as in the traditional microeconomic demand model, the demand of a specific good and service depends on the relative price and quality with respect to the substitute goods or

services. In particular, the demand schedule depends on two factors: a) the prices which the users are willing to pay and their individual preferences, b) the relative quality of the considered productions with respect to the productions with an higher or a lower quality, which depend on the capabilities of the producers. Thus, the price of the goods and services that the consumer is willing to pay is determined by the individual characteristics of the users (i.e. income, free time, knowledge) given the quality characteristics of the good and service considered. On the other hand, the quality characteristics of the good and service depend on the product innovation adopted by the firms producing the good or service considered, the investment in R&D and technical design and on the skills of the firms and their workers.

This cross-sectoral model of the aggregate demand indicates a negative relationship between the GDP and the price level, similar to the aggregated demand curve (AD) in the traditional macroeconomic model. However, the theoretical base is different, since in the traditional model the negative slope is due to the effect of lower prices on an increase of the real money supply and on lower interest rate and greater investment and GDP.

Finally, in a macroeconomic perspective, the quantity of the output or the quantity of the product at constant prices of each individual sector in the cross-sectoral demand curve corresponds to the value, which may be obtained by taking into account both the final and the intermediate demand of each sector. That may be computed by multiplying the vector of the final demand components: consumption, investment and public goods and services, measured at constant prices and disaggregated by producing sector, by the Leontief inverse ($(I-A)^{-1}$). Therefore, the cross-sectoral demand schedule of this model, as the traditional macroeconomic demand schedule (AD), may shift to right in the case of an increase of the various components of the aggregate demand, due to monetary or fiscal expansionary policies.

4. The sectoral structure of economy and the cross-sectoral supply schedule

In a traditional neo-liberal macroeconomic model (Blanchard et al. 2011) the supply side of the economy is described by the so called AS schedule:

1) $P = P^e (1 + \mu) F (1- Y/L, z)$

where P^e is the expected level of prices, $(1+ \mu)$ is the mark-up, L is the labor force, z is a set of variables, which indicates all the other variables which may influence the determination of wage, and output and employment are supposed to be equal (Y = N). When the output is equal to its "natural" level ($Y = Y_n$) , which corresponds to the natural level of unemployment (u_n), the effective price level is equal to the expected price level ($P = P^e$).

In this macroeconomic model, the production function is not even considered and the productivity of labor is constant and unitary. Therefore, it is surprising to observe that, in a neoclassical microeconomic model, the supply side of the economy basically coincides with the labor supply and no consideration is given to the firms, the productivity of resources, the market structure, the sectoral composition of the economy. That contrasts with the reality, where not the workers but rather the firms are producing the investment goods, the consumption goods and the public goods, which together determine the aggregate demand. Historically, the AS schedule is derived from the Phillips curve corrected with the inflation expectations (π_t^e) and with the natural rate of unemployment (u_n), where π_t represents the current inflation rate and u_t the current unemployment rate:

2) $\pi_t - \pi_t^e = - \alpha (u_t - u_n)$

Therefore, according to the traditional neo-liberal macroeconomics if due to a decrease or a shift to the left of the AD, the short run equilibrium between the AD and the AS determines a level of output lower than its natural level (or a unemployment level higher than the natural rate of unemployment), , then an automatic process in the long term will lead again to the full employment and to an increase of the output. In fact, the AS will shift downward and the price level will decrease and that will lead to an increase of the output along the AD. In the traditional IS-LM framework, that is determined by an increase of the real money supply, a decrease of the interest rates and by an increase of investment and therefore of the aggregate demand. Thus, the only solution for solving the existing historically extremely high unemployment is the decrease of the current wages and a deflation. That, contrasts with the current reality since the decrease of the inflation rates in the European Union has coincided with a decrease of the output level and an increase of unemployment. Thus, there is the need to elaborate a different theoretical framework which is explicitly capable to consider the productivity of the firms, the sectoral structure of the economy, investments and innovation.

While the cross-sectoral demand curve indicates the sold quantity of each production at the respective price, the cross-sectoral supply curve indicates the level of the costs for the various productions. Both the demand and the supply curves may increase either because the productions of the already produced goods and services increase, or because new goods and services are produced. Clearly, this second case is the most relevant in an investment strategy perspective.

To construct the cross-sectoral supply curve it is possible to start from the relationship between productivity and employment, as indicated in figure 2. In fact, since the various sectors (such as: high tech, medium tech and low tech sectors) have different technological level (K) and labor productivity, the various sectors may be ordered according to a decreasing level of average labor productivity.

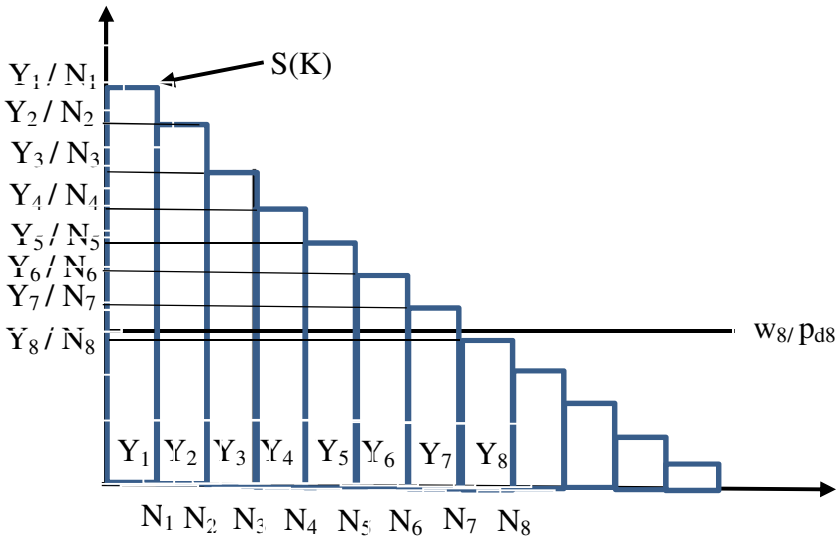

Figure 2 : The cross-sectoral supply side of the economy and the employment and GDP levels

For construction, the value added of each sector is given by the product between the productivity and the employment or by the surface of the each column. Therefore, the value of the GDP corresponds to the area below the superior border line and the growth of the GDP corresponds to an increase of the product or the surface of each sector in the figure. The growth rate of the GDP is an average of the growth rate of the various sectors. In particular, table 2 in

the appendix indicates the level of productivity of 16 sectors in a decreasing order and also the employment level of these sectors and the growth rate of product, productivity and employment in the 2008-2013 period in the Euro (12) area. It is important to clarify that the level of productivity of the individual sector does not depend only on its technological characteristics, but also on the capital intensity of that sector, such as in the case of the no-manufacturing network industries ("public utilities").

The table 2 indicates that in the traditional sectors, such as manufacturing, construction and trade, the increase of the product is the result of the increase of productivity and of employment. As in these sectors there is normally excess productive capacity, investment apparently are not needed in order to increase output and employment. However, even in these rather traditional sectors, investments are useful in order to increase productivity and the competitiveness of the companies, although that may imply a decrease of employment, which may be compensated by a shift of employment toward new more modern sectors. On the other hand, in the more modern sectors, such as the financial, information services and the network no-manufacturing industries and cultural services, there is the need of an investment both in fixed assets and in qualified human resources, in order to increase the production capacity and the productivity. Therefore, the total supply of the economy may be represented as a decreasing schedule, which is constructed by adding the actual employment level in each sector to the total employment level of the other sectors starting with the sectors which have a higher labor productivity. From construction, the total GDP of the economy is measured by the surface of the area below the supply schedule.

However, not all sectors may actually have a positive production level, since that depends on the condition that the production costs are lower than the market price, which the users are willing to pay and which is indicated by the cross-sectoral demand, described above. In fact the profitability condition is:

3) $p_{di} > p_{si} = w_i N_i/Y_i$ or $Y_i/N_i > w_i/ p_{di}$

where w_i represents the unit labor cost and N_i the employment and Y_i the production of the sector i. For example, some sectors, such as sector 8 in figure 2, may not be economically viable, since is is characterized by a too low productivity (Y_i/N_i) or has a unit cost (p_{is}), which is higher than the market price (p_{id}):

The production and also the employment level of each sector may vary up to a maximum level, which we may suppose depends in a long term perspective on the total production capacity of the sector considered or on the capital stock, which is the result of the previous investments and the rate of technological obsolescence and also in the market demand. Thus, the actual level of production and employment of each sector, in a short term perspective, has an intermediate value, which depends on the level of the actual demand for the considered sector, given its market price, as it will be indicated below for the cases of monopoly and monopolistic competition.

Looking to the aggregate economy, the maximum level of production, which is graphically indicated by the right extreme of the cross-sectoral supply curve, is usually lower than the level of full employment for two reasons. First of all, the actual production and employment level of each sector may be lower than the level which corresponds to the full utilization of the capital stock, which has been determined by the investments in the previous periods. Secondly and most important, the supply schedule in a given period may be too low since it does not consider some new sectors, which may be created in the future in order to increase the total

employment, if the appropriate conditions on the demand and the supply realize, as it will be indicated below.

The cross-sectoral model of the supply of figure 2, which indicates a relationship between the productivity level and the employment level of the various sectors, may be easily transformed into a new model, which indicates a relationship between the price level and the production level. This model, which is indicated in figure 3, has the advantage to be compatible with the above illustrated cross-sectoral demand schedule and also the traditional macreoeconomic model of the AD-AS curves.

By construction, the product level of each sector measured at constant prices, indicated on the horizontal axis of figure 3, corresponds to the product of the employment level and the productivity level in the figure 2 for the same sector or to the surface of the corresponding column. On the other hand, the surface of the area below the demand schedule in figure 3 indicates the product measured at current prices for each sector and the GDP at current prices for the overall economy. Therefore, the aggregate price level can be computed as a weighted average of the prices of the individual sectors. Otherwise, the aggregate price level or the deflator of the GDP is represented by the ratio between the integral of the cross-sectoral demand curve or the area below the cross-sectoral demand curve, which corresponds to the GDP at current prices, and the GDP at constant prices, indicated on the horizontal axis, in figure 3. Therefore, the model of the cross-sectoral demand and supply curves indicates the same variable (P, Y) of the traditional macroeconomic AD-AS model.

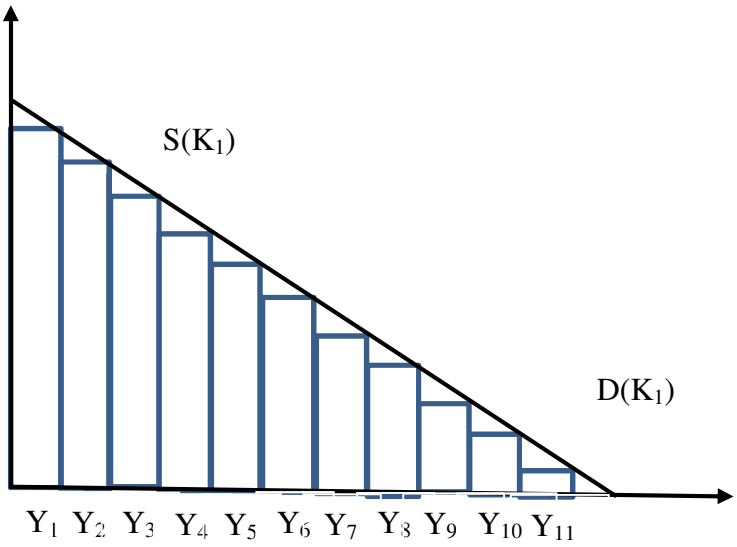

Figure 3 : The balance between the supply and demand of the various sectors in the economy

In particular, given the values of the productivity (Y_i/N_i) and the unit wage rate (s_i) in each sector and the interest rate (r) and the cost of capital which is required by each job place ($K/N=\beta_i$), it is possible to calculate the unit production cost (p_{si}):

4) $p_{si} = s_i N_i / Y_i + r K_i / Y_i =$
$(s_i N_i + r \beta_i N_i) / Y_i =$
$w_i N_i / Y_i$

Where (w_i) may be defined as the total unit production cost, which includes the cost of labor and the per capita cost of capital. The total unit production cost increases with the level productivity of the individual sectors and in the case of two sectors 1 and 2, we may have:

5) if $Y_1/N_1 > Y_2/N_2$ then $w_1 > w_2$

In fact, the more advanced sectors have to use more skilled labor resources, having a higher wage (s_i), and they also need a greater capital per capita (β_i), since they use more modern techniques.

We may also suppose that the price that the users are willing to pay for the various products and services considered is related to their respective quality and that this latter is related to the labor productivity level (Y_i/N_i) of the respective sectors, since the sectors which are more technological advanced can produce goods and services, which have an higher quality and an higher price. Thus:

6) if $Y_1/N_1 > Y_2/N_2$ then $p_1 > p_2$

From the expressions 5 and 6 indicated above it is possible to derive that:

7) $w1/w2 > p1/p2$

which indicates that the total unit production cost in the more productive sectors increases more than the price of the respective production. That implies that the supply schedule increases more than the demand schedule and it may eventually become higher than the demand schedule.

The figure 3 indicates the specific case when the demand and the supply of each sector are exactly equal. That implies that the market price (p_{di}) is equal to the unitary cost of production (p_{si}). In fact, as indicated above also in figure 2, the productions which are economically efficient should satisfy the condition:

8) $p_{di} \geq p_{si} = w_i N_i/Y_i$

Finally, we may suppose that the cross-sectoral demand schedule increases due to an increase of the aggregate investment by the firms. In this case, which is indicated in figure 4, the new and greater cross-sectoral demand will be distributed between the various sectors according to the quality characteristics of their productions and according to the specific pattern of preferences of the users. Therefore, that may determine either an increase of the quantity produced by the previously existing sectors or also the creation of a new demand for some new productions.

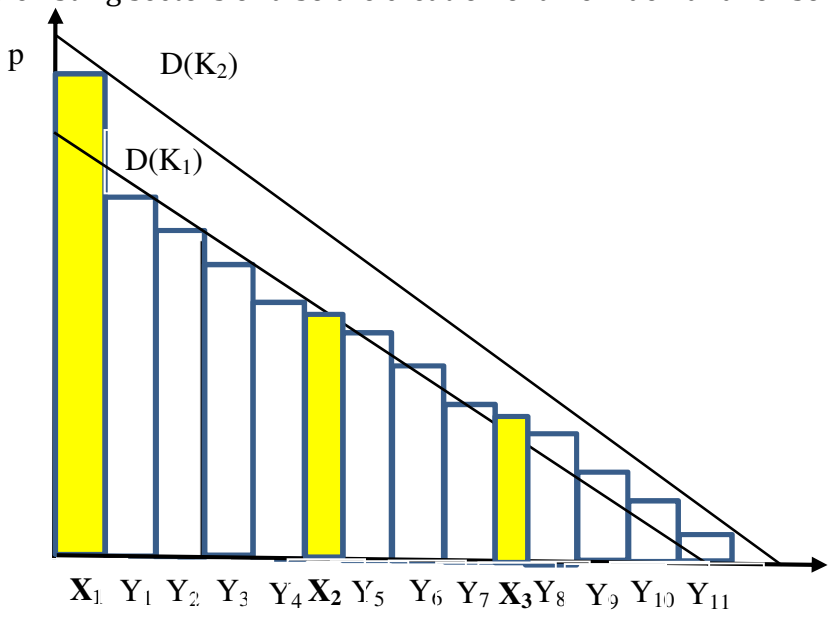

Figure 4 : The creation of new sectors determined by an increase of cross-sectoral demand

In particular, an increase of the cross-sectoral demand, determined by an increase of the knowledge and the needs by the users or an increaseof the total investments by the firms , may allow the production of the new goods and services (X_i), additional with respect to the previous productions (Y_i), due to a "speciation" process (Marshall 1920) or to a change in the production coefficients and in the income demand elasticities (Pasinetti 1981 and 1993). To be efficient, the new productions should have a production cost lower than the market prices that the users are willing to pay, as indicated by the demand schedule, and also the firms should have previously increased their production capacity through appropriate investments.

In particular, figure 4 indicates not only a shift upward of the demand but also a shift of the supply schedule to the right determined by the creation of new sectors. X_1 indicates a high tech good which has a very high production cost. After the increase of the demand, the cost becomes lower than the market price and the good can be bought by the users. Moreover, X_2 and X_3 indicate two new medium tech goods or services, which can be produced after the increase of the demand, since they are preferred by the users to some of the other existing productions, being more qualified than these latter.

Therefore, in this case, the *ex ante* decision by the firms to invest for expanding the capacity in these new specific sectors has proved to be correct, since not only the investments have increased the aggregate demand, but also they have led to an increase of the production capacity of the same firms, which *ex post* corresponds to the level of the demand for the new productions considered, due to a specific change in the patterns of the user preferences.

In conclusion, investments increase the production capacity of new sectors and determine a shift of the supply schedule to the right. The increase of investment increases the cross-sectoral demand. Finally, the increase of the demand in the specific sector considered allows the overcoming of the barriers to entry and the creation of new productions.

5. The balance between the demand and the supply in the general case

The previous figures have considered a limited number of sectors, similar to those considered in the national accounting statistics, such as those indicated in table 2 of the appendix. When the number of sectors and of productions become very high, then the shape of the cross-sectoral supply schedule becomes continuous and it may have an irregular form, as indicated in figure 5. Then, the demand (Y_d) and the supply (Y_s) schedules may intersect in various points. Clearly also the cross –sectoral demand curve may have an irregular form.

The areas A, B and B' have a particular significance. In order that production is feasible it is required that the demand schedule is greater than the supply schedule, as in the intervals: Y_1 - Y_2 and $Y_3 – Y_4$, where the prices which the users are willing to pay are greater than the costs of the producers. If the various goods are different one from the other and the producer can discriminate the users, they can ask the highest price that the users can pay. Thus there is a rent, indicated by the area A, determined by the difference between the market price and the production cost for each sector.

On the other hand, when the supply schedule is higher than the demand schedule, as indicated by the area B and the interval $Y_2 – Y_3$, the costs of the producers are higher than the price that the users are paying and production is not economically efficient. In this case, we may suppose that the users are willing to consume more of the lower quality goods and substitute them to the more qualified and too expensive goods. That implies that the interval $Y_2 – Y_3$ indicates an

additional production of the good or service which has a price (p_3), as indicated by the intersection between the demand and the supply schedule.

Moreover, if the users are willing to buy less qualified goods and services in alternative for the higher quality goods which, as indicated by the area B, can't be economically produced, then the difference between the market price and the cost of the producers represents a rent for these latter and that is indicated by the area B'. The cost of the less qualified goods and services, which the users are willing to buy in alternative for the higher quality goods, is indicated by the new point of intersection between the cross-sectoral demand and the cross-sectoral supply curves (p_3).

Also, the two extreme areas B (before Y_1 and after Y_4) indicate the cases of goods and services, which can't be produced, unless there is a shift of the demand or of the supply schedule. In fact, the continuous increase of the wages costs and of the capital costs for the most technologically advanced productions, where productivity is very high, may lead to the situation when the costs are higher than the market price, notwithstanding the higher prices that the users are willing to pay for these more qualified products or services. Similarly, in the case of the least qualified productions, a too low decrease of the wages and of the capital required may imply that the decrease of the costs may be lower than the decrease of the price, that the users are willing to pay. In fact, when the quality and the productivity of the goods and services decrease, the consumers may not be interested in too obsolete products or services even if the price is very low. However, also in these two cases the production may become possible after changes of the demand or of the supply schedules, determined by appropriate industrial policies, as it will be indicated below.

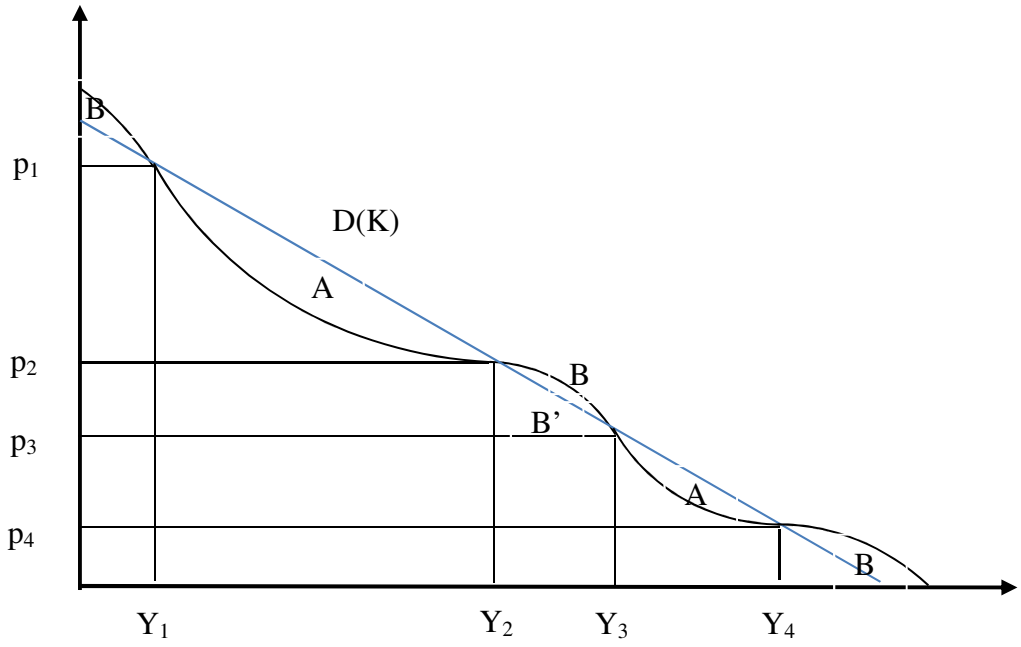

Figure 5: The cross-sectoral demand and supply schedules in the general case

The demand and the supply schedules in figure 5 define a level of total production (Y_4), which is normally lower than the level which corresponds to a full employment situation. Thus, appropriate industrial and regional investment policies may increase the level or change the form of the demand or supply schedule. That is required in order to promote a change of the cost structure of the various sectors and of the patterns of the demand and to increase the employment and production in the existing sectors and/or to promote the creation of new

sectors. Otherwise, if employment is greater than the full employment level, the salaries of the workers (s) would increase and that would lead to an upward shift of the supply schedule and to a lower production by the firms and a lower demand of labor.

Another characteristic of this model is that the value added at market prices or the revenue by the producers is indicated by the surface of the area below the demand schedule. These revenues are distributed to the different production factors of the various sectors and correspond to the incomes of the workers ($s_i N_i$) and of the owners of the capital ($r K_i$) and to the profits or rents to the firms. Therefore, "ex post" or in an equilibrium situation, the value of the total demand is equal to the value of the total supply. On the contrary, "ex ante" or in a dynamic perspective, the model indicates that the development or the improvement of the supply facilitates the growth of the demand and also that a new and more modern demand stimulates the respective supply, whether these changes are accompanied by appropriate industrial and regional policies, promoting the required investments and structural adjustments

Finally, in a microeconomic perspective, it is important to establish the relationship between the equilibrium of the cross-sectoral demand and the cross-sectoral supply curves in the overall economy and the equilibrium of the micro-economic demand and the supply curves of the individual productions in their respective markets.

The equilibrium of the cross-sectoral supply and demand, indicated in the model, is based on the idea that the market prices exclude those productions, which are much less efficient than the average of the other productions, as in the sector X_8 of figure 2 or in the areas B of figure 5. That is similar to the indications of the Von Thünen - Alonso model of the urban rent, the Keynesian investment schedule and also the barriers to entry model, where the less efficient productions are excluded from the market.

In particular, as indicated in figure 6, we may assume that each production is sold in a different market, which is characterized either by a monopoly or, when the firm is one of a large number of sellers, by monopolistic competition a la Chamberlin-Robinson. In these models, both the demand and the cost curves have a declining shape and the price should be equal or greater than the costs, in order to allow to the producers to overcome the barriers to entry, similarly to the cross-sectoral demand and supply curve described in the model of the figures 4 and 5, where the areas A and B in figure 5 indicate the existence of barriers to entry in specific productions.

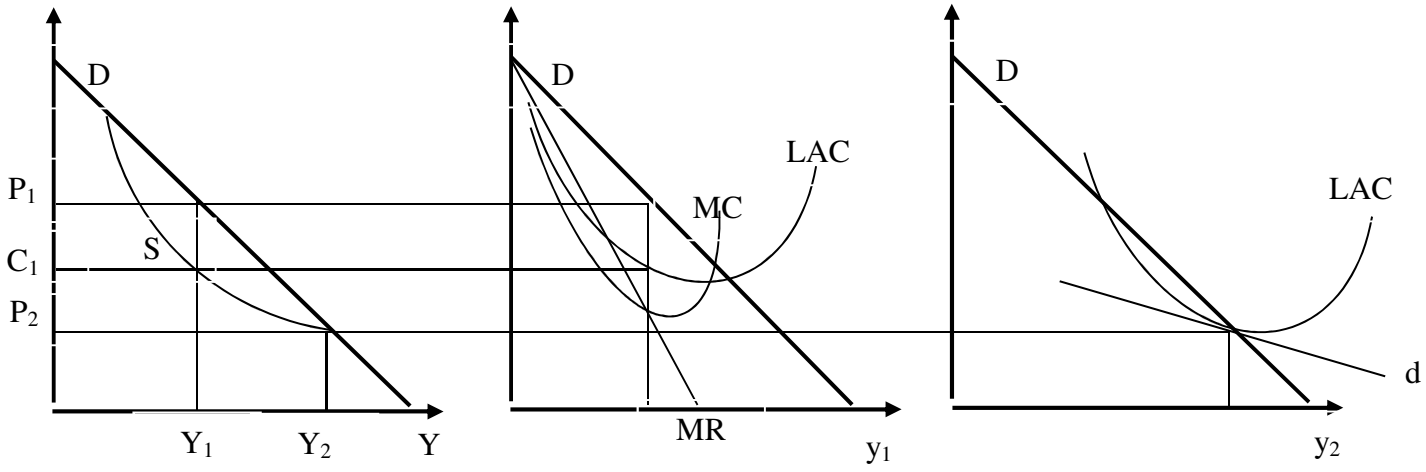

Figure 6: The price and the production levels in two sectors: monopoly (y_1) and monopolistic competition (y_2)

The long run equilibrium is achieved through the adjustment of the prices by the existing firms and by new firms entering in the economy. In particular, in the case of the monopolist the price is greater than the cost and the quantity produced allow the marginal revenues and marginal cost to be equal. The profit would be even greater if there would be a case of first level discrimination, the market price is equal to the marginal cost or the average cost. On the other hand, in the case of the monopolistic competition, equilibrium for each production is determined by the entry of new firms and the tangency of the demand curve with the long run average cost curve and profits are just normal. This equilibrium is stable unless innovation does not occur in the technology of the firms and in the needs and behaviors of the customers.

As indicated in figure 6, the level of the equilibrium price and of the cost, determined in each specific market of the various productions, are the same as those in the cross-sectoral demand and supply curves. Then, the specific procedure of construction of the cross-sectoral demand and supply schedules adopted in the model requires that the equilibrium quantity, determined in the markets of each production, is added to the quantities sold of the other productions, which have a higher price, as they are preferred by the customers. This assumption allows indicating the equilibrium of the individual production and of the total economy in the same diagram.

6. The impact of higher knowledge on the rotation of the demand and supply

Technological progress works both on the supply and on the demand side of the economy and it has a positive effect on the production of high tech goods and services, while it may have a negative impact on the low tech sectors, due to the lower demand and the increase in the wages and costs. In particular, technological change may determine a shift of both the supply and the demand schedule.

Thus, greater knowledge and technological change determines a clockwise rotation of the demand schedule, as indicated by figure 7, since the increasing knowledge and education leads the users to increase their propensity to consume high quality goods and services and decreases their demand for more traditional goods. Users are willing to pay higher prices for more qualified or more innovative goods or services and lower prices for less qualified or obsolete productions or even they do not want them anymore.

This structural change of the demand patterns may be further increased by an upward shift of the demand schedules. That, as indicated above, can be determined by an increase of the aggregate investment, as a greater knowledge increases the internal rate of return (IRR) of the investment projects by the firms.

On the other hand, greater knowledge and technological change determine both a downward shift and an anti-clockwise rotation of the supply schedule, since they determine a decrease of the costs, due to a process of learning by doing and of gradual imitation, or an increase of average labor productivity (Y_i / N_i) and a decrease of the capital inputs, which are greater for the more qualified goods and services, than for the more traditional productions. On the contrary, the cost of these latter productions may even increase due to an increase of the minimum wage to be payd to the workers.

These two simultaneous shifts of the demand and of the supply schedule may determine the possibility to produce new high quality goods and to increase the total employment, since the intersection between the demand and the supply schedules in figure 7 shifts to the left from O_1 to O_2.

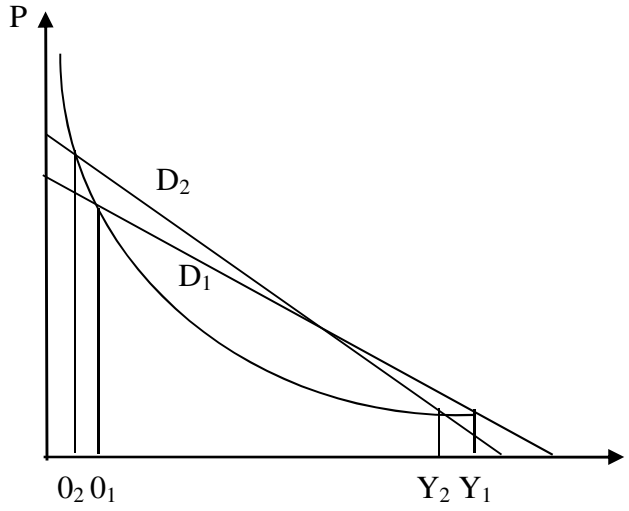

Figure 7: The effects of the evolution of the demand on the production area ($0_2 - 0_1$; $Y_1 - Y_2$)

The introduction of new more qualified goods and services increases total employment and that contradicts the widely diffuse belief that technological progress determines a decrease of employment. In particular, the increase of the productions of more qualified products is usually greater than the decrease of the production of the more traditional and less qualified goods and services, as a downward shift of the demand for these latter goods and services could be at least partially compensated by the downward shift of the supply and of their costs.

The Schumpeterian process of "creative destruction" works both on the supply and also on the demand side. Consumptions shifts upward or toward higher quality goods and services and the demand decreases in the lower quality sectors. That creates excess capacity in these sectors and determines a disinvestment and the workers and the capital shift to the sectors where the production increases. Therefore, the model indicates the importance of policies aiming to increase the rate of knowledge creation, leading to joint shifts of the demand and the supply schedule.

7. The limits of the supply and demand policies in the traditional macroeconomic model

According to the neo-liberal model the flexibility of prices and wages brings back the economy to full employment. In the traditional macroeconomic model the aggregate supply is determined by the supply of labor or by the relationship ("Phillips curve") between the increase in wages and the unemployment rate (the non-accelerating wage rate of unemployment: NAWRU) or the ratio between current product and the "potential output". In fact, since the central bankers still believe in this model, they paradoxically are more interested in their documents on the labor markets, rather than on the demand and the supply of credit to the non-financial companies. Moreover, since the traditional macroeconomic model does not consider the sectoral structure of an economy and it is not suitable to evaluate the impact of industrial policies on the GDP, these policies have almost been completely forgotten by the policy-makers.

The "structural reforms" of the labor market introduced in recent years in all European countries have determined a decrease of the rate of increase of wages and a decrease of the costs for some firms. But they have also determined a decrease of the income of the workers and therefore of the aggregate demand and of the revenues for all firms. Thus, the "structural reforms" of the labor market have not lead to an increase of employment, as in a standard microeconomic model of the demand of labor, but to a decrease of the inflation rate and to a situation of deflation or of too low inflation. In fact, the AS and the AD schedules of the traditional macroeconomic model have shifted downward, without increasing the GDP and employment. That is also indicated in the cross-sectoral model illustrated here, where these policies on the labor market would have determined a parallel downward shift both of the cross-sectoral supply and of the cross-sectoral demand schedules of figure 5. Moreover, this deflation or very low inflation is discouraging both firms and households to spend and has decreased the aggregate demand. Finally, they have determined a major change of the distribution of income between the employees and the self-employed or the company profits and that has determined a decrease of consumption.

A selective decrease of wages may be only useful in those productions which are less efficient and may risk disappearing. Instead, contrary to the policy of "structural reforms", for the medium and high technology sectors, wages can and should be increased in Europe (as many propose in the US, Japan, UK and even in Germany), since that would stimulate the internal demand. In fact, the competitiveness of the firms in these rather advanced sectors very little depends on labor costs and much more on the use of modern technology and especially on the development of new innovative productions, which are the only one where the European economy can be competitive at the international level.

In general, only innovation and investments, through "structural changes" or the reconversion of the firms and of labor to new productions, may increase employment and GDP in the long term. In fact, the model of the cross-sectoral demand and supply, indicated above focuses on the sectoral structure of the economy and on the role of innovation and investments in determining the growth of new sectors and the increase of aggregate productivity.

If investments are rigid to the interest rate, then the IS and the AD curves of the traditional macroeconomic model are rigid. Therefore, the equilibrium is not changed by an increase of the money supply, since a lower rate of inflation and lower interest rates do not have any impact on investments and hence on GDP and employment. As it is said: "it does help to bring water to a horse who does not want to drink". On the contrary, a step change in innovation, technology and consumer preferences may stimulate a major program of private and public investments capable to increase the domestic demand and the GDP.

Companies have greatly increased their sale of corporate bonds, but not for increasing capital expenditure, but in order to restructure their debts, increase their cash deposit in the banks, invest in short term assets, such as public debt and even to distribute of extra dividends to shareholders and to purchase their own shares. Only recently M&A have marginally increased. Moreover, the large supply of money created by the central banks has increased the Stock and Bond Markets and the companies have found more profitable the financial investments rather than the risky capital expenditure. This abnormal propensity to the liquidity is the effect of mistakes in monetary policies. The European monetary authorities have forced a policy of "deleveraging" on the banks with stricter capital requirements and on the governments with the "fiscal compact" and the refusal to buy the public bonds, thus determining the "sovereign debt" crisis. The volatility of the macroeconomic environment, due to the errors and delays in

macroeconomic policies, has determined a lack of confidence and a financial uncertainty, which have shorten the time perspective of firms, leading them to evaluate more the immediate costs than the medium term benefits of investments. That has compelled both the companies and also the households to "deleverage" and to postpone capital expenditure and decrease debt. Clearly if all actors save more than invest, the final effect is a recession, as the European economy represents almost a third of the world economy and can't live on a large export surplus.

As indicated above, investments in Euro 12 area have decreased by 370 billions of Euro from 2008 to 2013 and are the major factor of the current stagnation. The European Central Bank has not intervened on the structure of the financial market. Monetary policy has only insured the financial stability of the commercial banks, but it has been un-capable to respect the goals of the inflation around 2% and to insure that the credit will reach to the real economy through the project financing. Therefore, the transmission mechanism from the monetary base to the finance of the capital expenditure by the companies is still lacking after so many years of recession or stagnation. That would require new financial institutions, which can perform the role of intermediaries between the demand of funds by the firms and the supply of funds by the large commercial banks and insurance companies and other institutional investors.

For example, the European Central Bank could have promoted a better cooperation with the European Bank of Investments, a new regulation on the "project bonds" to be sold on the European market by the large public investment banks (Cassa depositi e prestiti, KFW, Banque publique de investissements), the creation of new Asset Backed Securities specialized in the loans to efficient and innovative firms and not only in the distressed loans of the banks, the deployment of the large unspent funds by the large international Private Equity firms, the creation of a market for the "*private placement*" of the *minibonds* by the innovative SMEs, the creation of investment funds on the SMEs, such as the American *Business Development Companies,* and new regulations stimulating the commercial banks and the insurance companies to lend funds to these new intermediaries. In conclusions, there is need for more market-based finance to replace the retreating banks.

8. Industrial policies promoting the creation of new productions.

From an industrial and regional policy perspective, the creation of new productions requires that prices in these productions are higher than their production costs, in order to overcome the barriers to entry. That requires a change in the demand and/or in the supply and especially an increase of investments and one of the following three types of innovation:

a) a product innovation, which determines an increase of the quality of productions and the increase of the price that the users are willing to pay allow: that may allow overcoming the barriers to entry in new productions by making prices higher than the costs;
b) a process innovation, which determines a decrease the costs below the level of the market prices and allow overcoming the barriers to entry into new productions;
c) a innovation in the public regulations, which facilitate the reciprocal coordination of the innovative producers with the innovative users. In fact, a public intervention is required either to coordinate the many private actors, which should cooperate in large, long term and risky investment in new productions, and should aggregate the demand of the many users of collective goods and services, to be financed either through tariffs on the individual users (i.e. the case of club goods) or through taxes imposed by the State (i.e. the case of public procurement or direct public production).

As indicated above, these innovations are required in order to determine an increase of the revenue or a decrease of the cost of the investment project in the new productions and that allows that the internal rate of return (IRR) of the investment project will be greater than the cost of financial funds. Therefore, innovation represents a preliminary condition for a recovery of investments and of an increase of the aggregate demand and GDP in the current long term stagnation of the European economy.

The cross-sectoral model illustrated in figures 3 and 5 above indicates the expected impact of an alternative European program of innovation and investment. First of all, greater investments would determine an increase of the cross-sectoral demand through the Keynesian multiplier and an upward shift of the demand schedule in the figures 3 and 5. That increases the revenues of all existing sectors and, in particular, it may also allow overcoming the barriers to entry in new productions, such as those, which correspond to the two B areas at the extremes left and right of the supply and the demand schedules in figure 5. These two areas respectively correspond to the adoption of the so called "smart specialization or diversification" strategy (Foray 2015, McCann and Ortega-Argilés 2015), which focuses on the high-tech sectors, and to a strategy focusing on the factors of "weaknesses", such as the low-tech sectors, rather than on the factors of "strength" in a regional or national development strategy.

A third case may be illustrated by the area B in the middle of the figure 5, which indicates a production which was not economically efficient. In this case the demand was satisfied by a lower quality production (area B'), having a lower price. Therefore, a policy of innovation and investment may lead to an improvement of the quality of the product, to an increase of the price, that the users are willing to pay, and/or to a decrease of the production costs. That would allow overcoming the barriers to entry into the new production. Clearly, a decrease of the demand of the more traditional goods and services would also occur and, as in a process of Schumpeterian innovation, labor and capital would have to shift from the more traditional to the more innovative productions.

A fourth case, illustrated in figure 8, is when the new investments would lead to an expansion of the production capacity in completely new sectors, which may satisfy a completely new need or do not substitute an existing sector, thus determining an increase the overall production and employment in the economy.

The new productions may be addressed also to the international market according to a traditional "export led" growth model, but they should first of all be addressed to the internal demand and aim to exploit the untapped opportunities in the large domestic market of the European economy. The new production may be respond to the needs of the individual citizens and users, which are quickly changing their behaviors and often anticipate the investments by the producers and the policies by the institutions.

However, the new productions may not be addressed to the individual demand of numerous users, but aim to respond to the implicit collective needs of large local communities, as many new goods and services requires the joint use by many consumers. That is the case of the production of "common goods" (Becchetti et al. 2008) or "club goods", which aim at improving the well-being of the citizens in a strategy of sustainable and inclusive economic development. In the case of the "common goods" the demand can only be satisfied by aggregating the individual demands and the vertical summation of the prices, which the users would be willing to pay, should be equal to the production costs of the good or service, which is jointly used. In fact, these goods are characterized by positive externalities in consumption and economies of scale in production.

For example, the need for investing in the production of new "common goods" is demonstrated by the undercapitalization of the European cities and the need for their renewal, as congestion represents a constraint to development and the quantitative and qualitative indicators of well-being are inadequate. The collective needs of the citizens in the large European urban areas indicate the existence of unexploited opportunities for greater private and public investments in: housing, transport and communication, environment, health, culture, sport and tourism. Example of large public-private investments in the urban areas, capable to promote a national economic recovery, are the renewal of the central historic centers in many cities with the creation of new housing and commercial activities or a plan for the expansion and improvement of sub-urban and urban rail transport in large metropolitan areas or a plan for energy saving thorough the restructuring of the existing buildings. These investment projects require the creation of new institutional instruments to coordinate the various private and public actors, similar to the IBA (International Bauastellung Emscher Park), which was created for the renewal of large carbon basins in the Ruhr region of Germany.

The public institutions, together with the university research centers, have a crucial role in the governance of these projects, as they should first of all launch the original idea, then promote the coordination of the many private stakeholders and finally finance the long and fundamental phase of research and technical design phase, when private investors are often reluctant to commit their funds. That implies that immaterial investments in R&D or analytic project design are required well before the material investment in the creation of new production capacity.

Industrial and regional policies are needed in the governance of the financial relations between the industrial and service firms and the financial investors, such as the commercial banks, the insurance companies and the pension funds. In fact, a recovery of investments in Europe is hindered also by the failure by the European and national central banks and in insuring a balance between the demand and the supply of funds for capital expenditure. "Structural reforms" in the capital markets and in the financial and bank industry in Europe are required and there is the need to create new financial non-bank intermediary organizations, which are still lacking in a mainly bank based system, such as that in continental Europe.

If the demand and the supply schedule in a new potential sector are as those indicated in the right hand graph of figure 8, an innovative firm, for example a "temporary" monopolist producer, could anticipate the less innovative competitors and decide to produce (y_1) and sell it at the price (p_1), which maximize the profit. The positive difference between the market prices and the cost indicates that an investment in these new productions would be convenient or that the internal rate of return (IRR) is higher than the capital costs. Otherwise, if the new sector is a "public good", which is characterized by a high production cost (AC_1'), the public sector could buy or subsidize the production by paying a price (p_1), which is equal to the production cost.

In the left hand graph., the creation of new productions determines a shift of the cross-sectoral supply schedule to the right from S_1 to S_2, equal to (Y_3 - Y_4), starting from a price (p_1) and determines an increase of the total GDP. The revenue of the producers in the new sector is indicated by the shaded area.

Therefore, a modern industrial policy should increase the knowledge or the innovation both on the supply (by developing the production of new modern collective services) and on the demand (by stimulating the needs and the demand of these services by an increasing number of citizens) and that would determine a shift to the right of the S curve and an upward shift of the D curve.

The investment required for the creation of the production capacity in the new sector may have an additional effect since it also determines an increase of the cross-sectoral demand schedule, which shifts from D_1 to D_2. This increased demand would allow the creation of new high-tech and low-tech productions, indicated at the extremes of the cross-sectoral demand schedule, at the left of O_1 and at the right of Y_1 and the total production (GDP) of the economy would increase from (O_1 – Y_1) to (O_2 – Y_2).

The case of the investment in the creation of new productions clarifies the difference between the cross-sectoral D-S model and the traditional AD-AS macroeconomic model. In fact, according to this latter model the supply side of the economy is represented by the supply of labor and not by the production capacity and the cost structure of the various sectors. On the contrary, The traditional macroeconomic AD-AS model does not indicate the equilibrium between the supply and the demand in a specific new sector, created by the investment. The increase in the production capacity of a sector does not have any effect in the short term and only a long term decrease of average wages and prices may determine an increase of the GDP.

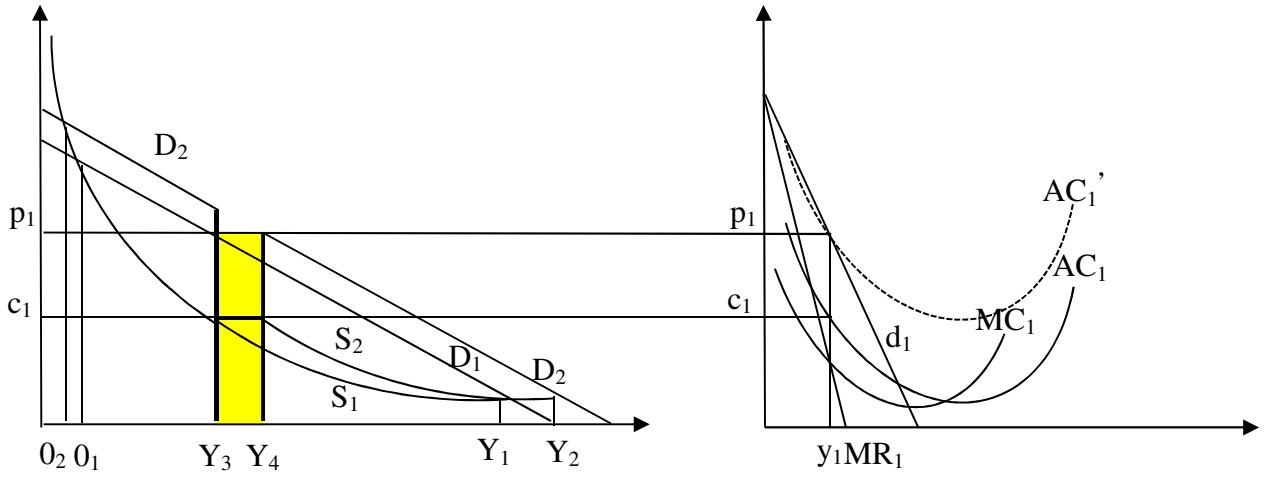

Figure 8: The effects of investment and of the creation of new productions on GDP growth

Moreover, in the cross-sectoral D-S model, an investment in new high-tech sectors determines not only an increase of employment, but also an increase of the average wages, since in these high tech sectors the wages are greater than in the other sectors of the economy, and it would determines an increase of the average price of the productions or of the GDP deflator. On the contrary, in the traditional macroeconomic AD-AS model, the increase of the production capacity of a sector does not have any effect until the wages, the prices and the AS curve start to decline, along the AD curve. However, this deflationary process, as it is indicated in the model of the cross–sectoral demand and supply, would have a negative impact on the incomes and consumption of the workers and on the GDP.

In a technological perspective, the new productions develop "at the margins" of existing productions and, in fact, the shaded area in figure 8 are contiguous to the existing productions, similarly to what is indicated by the concept of "related variety" (Boschma 2013). In fact, looking on the supply side, the creation of new productions implies a reconversion of the material and immaterial resources previously used by more traditional productions. Instead, looking at the demand side, the new productions allow a better satisfaction of the emerging needs, which often are the evolution of previous traditional needs of the users. This process may also be described as a "creative destruction" process, as it implies a shift of production factors

from less efficient to more efficient productions and an evolution of the consumption patterns from lower to higher quality goods and services.

In an aggregate perspective, the model of the cross-sectoral demand and supply indicates that the creation of new productions and the increase of the value of total production determine an increase of the incomes of the workers and of the other factors used in the production of the various sectors and that corresponds to an equal increase of the aggregate demand or GDP. Thus, demand and supply are equal at the aggregate level.

In a sectoral perspective, the cross-sectoral D-S model indicates the need to solve the problem of determining a balance between the increased supply, created by the increased investments in a new sector, and the future or "expected" demand for the production of the specific goods and services of the same sector. This balance between the supply and demand may be reached as the result of a strategic investment decision by a policy-maker, in the case of a public good, which will be produced for public demand and will be financed through new taxes.

Otherwise, if the the product is sold to the individual private consumers, the balance between demand and supply may occurs according to iterative spontaneous marginal adjustments. In fact, if various innovative firms make available a new production, that facilitates the diffusion of its use between the various innovative users ("lead users" according to Von Hippel, 1994). On the other hand, the existence of an emerging demand by innovative users stimulates the innovative firms to produce new goods and services. For example, the increasing capabilities of the new hardware facilitate the development of more complex software programs, while the increased requirements of this improved software stimulate the advances of the hardware. That dynamic balance between the innovative demand and the innovative supply may be represented by the example of a boat with eight rows, where the four left rows pull to the right and the four right rows pull to the left, but their forces are balanced and they jointly push the boat forward, while the skipper give the timing and the direction, as also public institutions should do with their regional and industrial policies. In fact, the complex and original combination of the new needs by the users and the improved competencies of many complementary firms and the intelligent governance of these combinations by the public institutions seem to be the most significant dimension of the concept of the so-called "smart innovation" strategy (Foray 2015).

This process of increasing specialization and market selection is very similar to the creation of variety and the increasing division of labor through the birth of new firms described by the modern evolutionary approach, and also by Marshall (1920) in the case of the 'industrial districts' consisting of small industrial firms, where the division of labor and increasing returns are more the result of a dynamic process of learning, variety creation and specialization than the result of static economies of scale, as in Adam Smith's approach.

The model of the cross-sectoral demand and supply is also similar to the model developed by Pasinetti (1981 and 1992) that considers the case of producer learning, which results in productivity growth and product innovations, and of consumer learning, which leads to the adoption of new consumer goods and a change in the composition of final demand. The diffusion of new consumer goods requires not only the use of new knowledge in production technologies but also new knowledge among consumers, who learn new preferences and discover new needs. A higher per-capita income entails a qualitative change of preferences, which shift towards higher quality goods and services, and also a quantitative increase in the demand for goods. Thus the increase of output capacity in the aggregate supply will be balanced by an increase in the aggregate demand.

9. Industrial policies promoting new sectors through taxes and incentives

The use of public subsidies to the users or to the producers is often needed, at least in an initial period, in order to exploit the learning economies by the users and/or by the producers and to avoid that the investment projects are abandoned, due to the fact that the short term costs often are overestimated with respect to the medium and long term benefits.

Monetary subsidies to the producers or monetary incentives to the users represent a different instrument of industrial and regional policy, with respect to additional investment in product or process innovation and in capital expansion. Public intervention may stimulate the creation of new productions either through subsidies to the producers (lowering the supply schedule) or with incentives to the users (increasing the demand schedule). The respective cost for the public budget may be financed either with direct taxes on the producers (workers, capital owners and firms) or with indirect taxes to the users. These public interventions promote the creation of new productions and the increase of employment, as also the increase of the GDP.

The use of these instruments are tightly related to the areas, which in the model of figure 5 indicate that the demand schedule is lower with respect to the supply schedule. In particular, the areas B (and also the area B') indicate the revenue of a possible tax, which would not decrease the well-being of the users but only the rent of the producers. This tax could be used by the State in order to subsidize the production of innovative sectors, which have too high production costs. For example, taxes on the high prices of electric energy could be used in order to finance the development of new productions, such as energy networks or renewable energies. In some cases, the domestic production capacity may exist, but it may not be activated since the prices that the consumers are willing to pay are too low or the costs are too high, as in the case of education, culture, health, environment protection, etc. and many other goods, that the citizens consider as "public goods" and they are not willing to contribute to the cost or only in a minimal part.

Otherwise, the tax can be used in order to reduce the market price of new goods and services and/or to increase the revenues and the demand by the households. For example, the too high tolls on private highways are determined by a natural monopoly and are very similar to a tax, since they almost can't be avoided by the citizens. That decreases the purchasing power of the households and the internal consumption of other useful goods or services, produced in competitive markets.

Industrial policies may directly intervene with monetary subsidies and incentives and promote (for a limited time) a convenience by the firms (downward shift of the supply) and by the users (upward shift of the demand) for specific new productions. With time the firms could learn to increase the productivity orate f these productions and the many more traditional users could imitate the behavior of the few most innovative users. Clearly, industrial and regional policy have distributive effects, as they may improve the well-being of the users and decrease that of some producers.

10. Conclusions

The model of the cross-sectoral demand and of cross-sectoral supply illustrated in this paper indicates the relationships between the level of GDP and the price of production. The model illustrates the effect of important factors of development, such as the change in the sectoral

structure of the economy, the profitability of the productions in the various sectors and the barriers to entry into new productions. It demonstrates that innovation and knowledge are factors which affect both the aggregate supply and the aggregate demand and can determine an increase of the GDP in the perspective of short-medium term stabilization policies and not only of long term development.

In particular, on the demand side, the model indicates that new knowledge and innovation may be a very important factor in determining an increase of the aggregate investment and of the level of aggregate demand and GDP, much more than a minor decrease of rate of interest determined by an expansionary monetary policy.

The model is complementary to the macroeconomic IS-LM and AD models, while it is alternative to the macroeconomic AS model, which is based on the neoclassical theories of the labor supply, or of the Phillips curve, and of the production function. In fact, the cross-sectoral D-S model, differently from the traditional AS model, is capable to represent the frontier of the production possibilities or the scope of production capabilities in a modern economy, where the crucial factors are the change of the demand and of the needs of the consumers, the product, process and organizational innovation, the investment and the governance of the changes and of the firms and actors of the economy. On the contrary, the traditional macro-economic model is not capable to consider the role of the sectoral structure of the economy on the level of GDP and that explains why it underestimates the role of industrial and regional policies. Therefore, industrial and regional policies may determine an increase of GDP, employment and price level and are complementary to the monetary and fiscal policies, which have been unable to promote a recovery from the economic recession and stagnation.

In the most developed economies the higher level of knowledge of the population implies that the changes in the demand anticipate the changes in the supply. Given the almost saturation of the demand of the traditional goods and services, growth policies should aim to satisfy the new unsatisfied needs of the citizens, which may create new opportunities for the growth of new efficient productions. That also leads the most innovative firms to the design of innovative investment projects and to demand new funds to the financial markets. These investments and new productions will allow to diversify the European economy with respect to the existing sectors of specialization and to create new employment for thousands of increasingly qualified workers. Moreover, the revenues created by the new jobs and the investment made in order to create them will sustain the aggregate and the cross-sectoral demand through the Keynesian multiplier and increase the revenues also of the firms in the other sectors of the economy. That will help to validate the expectations by the innovative firms on the growth of the market demand of the new product and services. Therefore, a recovery of investment is crucial in the actual deflation and economic crisis, due to the lack of aggregate demand, while there are not significant constraints on the supply side.

The model of the cross-sectoral demand and supply indicates that the expansionary monetary policies and the policy of “structural reforms” on the labor market have been ineffective and can’t increase the GDP, due to the fall in the propensity to invest by the private companies and the high propensity to liquidity. This failure of the traditional macroeconomic policies indicates the need to find alternative policy instruments, such as the industrial and regional policies.

The model of the cross-sectoral demand and supply, by explicitly considering the sectoral structure of the economy, aims to guide industrial policies, which are selective by nature and should focus on the demand and the production capacity of specific high, medium and low tech sectors. In particular, this model illustrates a theoretical and statistical framework, which may

help in the evaluation on the effects of industrial and regional policies on the macroeconomic objectives of GDP, employment and inflation.

A modern industrial policy should aim to increase the knowledge or the innovation both on the supply (by developing the production of new modern collective services) and on the demand (by stimulating the needs and the demand of these services by an increasing number of citizens). That determines a shift to the right of the S curve and an upward shift of the D curve.

In fact, the complex and original combination of the new needs by the users and the improved competencies of many complementary firms and also the intelligent governance of these combinations by the public institutions seem to be the most significant dimension of the concept of the so-called "smart innovation" strategy (Foray 2015).

The task of industrial policy is to promote a change in the sectoral structure of the economy and a dynamic adjustment of the demand and supply in the various sectors, leading to the creation of new productions and to the increase both of employment and of the average productivity of the economy.

This dynamic process of interdependent development of the demand and of the supply of new productions within an individual national or regional economy increases the per capita income, quite independently from the effect of the exports to the external markets.

Industrial policies promote a dynamic balance between the new demand by the innovative consumers and the new supply by the innovating firms and this process may be represented as a boat with eight rows, where the four left rows pull to the right and the four right rows pull to the left, but their forces are balanced and they jointly fast push the boat forward, while the skipper give the timing and the direction, as also public institutions should do with their regional and industrial policies.

The model of the cross-sectoral demand and supply indicates a new approach in the policy for the recovery of the European economy. That implies a change of course: from an emphasis on the aggregate supply to an emphasis on the aggregate demand, from an increased international competitiveness to the focus on the growth of the European internal demand, consumption and investments, from a focus on the labor markets and labor costs to a focus on the capital markets and the supply of finance, from an overall "quantitative easing" of the money supply to a reorganization of the financial intermediaries specialized in the investment finance in the industrial and service firms.

Only a large wave of innovation, finance and investment will lift the economy out of the stagnation. That requires a step change from the traditional monetary and fiscal policies to a major program of private and public investments (European Commission 2014) capable to increase the domestic demand and the GDP and to an industrial policy aiming may promote innovation both in the firms and in the consumer preferences.

However, the real challenge of the industrial and regional policies in Europe is to tackle two related problems: the design of new financial instruments and institutional instruments. First of all, there is the need to define a "structural reform" of the financial sector, which is more crucial than the "structural reform" of the labor market, in order to insure an effective transmission mechanism of the monetary policy to the real economy. That requires a change of the actual fiscal regulations and incentives, which have changed the corporate governance in the large industrial firms. In fact, they actually prefer to adopt a "deleveraging" strategy and to invest in

financial short term assets, purchase of own shares and M&A, rather than to increase the long term debt and the fixed investments in plants or on innovation for internal long term growth.

There is also need for a key role by new non-bank financial intermediaries (such as the European Investment Bank, the national investment banks, the private equity firms, an European market for the bonds and loans of SMEs and for the "project" or "territorial" bonds of large infrastructure projects) between the demand of funds by the industrial and service ("public utilities") firms and the supply of funds by the commercial banks, insurance companies and pension funds. The European Central Bank has a crucial role in providing liquidity to these new intermediaries rather than only to the commercial banks at almost zero interest rate.

Secondly, there is the need to define the new governance mechanisms of a modern industrial and regional policy, capable to promote the design and coordination of very innovative investment projects in the various regions and countries, having a high rate of financial return for the private industrial and service firms. In fact, due to the lack of private long term investors, large, innovative and long term industrial and infrastructure projects require public funds to be devoted not only to basic research and development, but also to the long and complex phase of analytic design. In fact, the financial viability of the projects depends on their degree of innovation, quality and user satisfaction, construction costs, coordination and speed of execution. That requires the help of universities, knowledge intensive business services, special coordination organization, such as the German IBA (Internationale Bauaustellungs), the British Regional Development Agencies, the Competence centers of the French "Poles de Competitivitè". Thus, the most difficult problem is not the availability of funds for the construction phase, but rather how to finance the long phase of technical, economic and institutional design of large, complex, long term projects, such as the renewal of large regional and urban areas.

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Innovation and investments in an urban cross-sectoral growth model: a change of course is needed in macroeconomic policies

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STATISTICAL APPENDIX

APPENDIX

Table 1: Contribution to GDP growth by the final demand components

Table 1.1

Euro countries 12	**2008**	**2013**	**Difference 2008-2013**	**Growth rate 2008-13**	**Share 2013**	**Change in share 2008-2013**	**Contribution to GDP growth**
Gross domestic product at market prices	8.577.351,9	8.394.525,4	-182.826,5	-2,13	100,00	0,00	-2,13
Household and NPISH final consumption expenditure	4.787.620,7	4.706.392,6	-81.228,1	-1,70	55,82	0,25	-0,95
Final consumption expenditure of general government	1.758.938,1	1.806.121,5	47.183,4	2,68	20,51	1,01	0,55
Gross capital formation	**1.864.302,3**	**1.494.421,7**	**-369.880,6**	**-19,84**	**21,74**	**-3,93**	**-4,31**
Exports of goods and services	3.556.620,4	3.842.499,6	285.879,2	8,04	41,47	4,31	3,33
Imports of goods and services	3.388.448,2	3.450.241,2	61.793,0	1,82	39,50	1,60	-0,72
External balance of goods and services	168.172,2	392.258,4	224.086,2	133,25	1,96	2,71	2,61
Source: elaboration on Eurostat data							

Table 1.2

United States	**2008**	**2013**	**Difference 2008-2013**	**Growth rate 2008-13**	**Share 2013**	**Change in share 2008-2013**	**Contribution to GDP growth**
Gross domestic product at market prices	10.965.461,1	11.616.051,0	650.589,9	5,93	100,00	0,00	5,93
Household and NPISH final consumption expenditure	7.421.193,7	7.934.741,6	513.547,9	6,92	68,31	0,63	4,68
Final consumption expenditure of general government	1.672.810,9	1.659.521,6	-13.289,3	-0,79	14,29	-0,97	-0,12
Gross capital formation	**2.277.754,6**	**2.324.005,9**	**46.251,3**	**2,03**	**20,01**	**-0,77**	**0,42**
Exports of goods and services	1.325.328,2	1.537.740,1	212.411,9	16,03	13,24	1,15	1,94
Imports of goods and services	1.733.118,1	1.839.958,2	106.840,1	6,16	15,84	0,03	-0,97
External balance of goods and services	-407.789,9	-302.218,1	105.571,8	-25,89	-2,60	1,12	0,96
Source: elaboration on Eurostat data							

Table 1.3							
Japan	**2008**	**2013**	**Difference 2008-2013**	**Growth rate 2008-13**	**Share 2013**	**Change in share 2008-2013**	**Contribution to GDP growth**
Gross domestic product at market prices	3.786.853,5	3.838.990,1	52.136,6	1,38	100,00	0,00	1,38
Household and NPISH final consumption expenditure	2.150.623,3	2.291.049,3	140.426,0	6,53	59,68	2,89	3,71
Final consumption expenditure of general government	682.523,9	746.736,6	64.212,7	9,41	19,45	1,43	1,70
Gross capital formation	**825.021,6**	**742.955,8**	**-82.065,8**	**-9,95**	**19,35**	**-2,43**	**-2,17**
Exports of goods and services	638.693,5	608.529,0	-30.164,5	-4,72	15,85	-1,01	-0,80
Imports of goods and services	510.008,8	550.280,6	40.271,8	7,90	14,33	0,87	-1,06
External balance of goods and services	128.684,7	58.248,4	-70.436,3	-54,74	1,52	-1,88	-1,86
Source: elaboration on Eurostat data							

Table 1.4							
Italy	**2008**	**2013**	**Difference**	**Growth rate 2008-13**	**Share 2013**	**Change in share 2008-2013**	**Contribution to GDP growth**
Gross domestic product at market prices	1.475.412,4	1.365.226,8	-110.185,6	-7,47	100,00	0,00	-7,47
Household and NPISH final consumption expenditure	861.925,0	802.990,1	-58.934,9	-6,84	58,82	0,40	-3,99
Final consumption expenditure of general government	295.442,3	282.702,4	-12.739,9	-4,31	20,71	0,68	-0,86
Gross capital formation	312.906,0	228.155,8	**-84.750,2**	**-27,08**	**16,71**	**-4,50**	**-5,74**
Exports of goods and services	416.005,6	415.163,6	-842,0	-0,20	30,41	2,21	-0,06
Imports of goods and services	410.432,7	364.641,6	-45.791,1	-11,16	26,71	-1,11	3,10
External balance of goods and services	5.572,9	50.522,0	44.949,1	806,57	3,70	3,32	3,05

Table 2: Productivity and employment by sector in the EU-12								
Euro area (12 countries)	**Productivity**	**Employment**	**Product change**	**Product change**	**Productivity change**	**Productivity change**	**Employment change**	**Employment change**
	2013	**2013**	**2008-00**	**2013-08**	**2008-00**	**2013-08**	**2008-00**	**2013-08**
Real estate activities	694,78	1.214,50	15,71	3,89	- 2,85	10,45	19,11	- 5,93
No manufact. industry	122,63	1.774,20	9,12	- 1,98	9,43	- 2,79	- 0,28	0,84
Financial and insurance activities	110,86	3.927,90	22,53	1,07	18,05	3,42	3,79	- 2,27
Information and commun.	104,33	3.925,50	45,81	7,15	30,64	7,57	11,61	- 0,40
Industry (except construction)	67,96	21.729,10	11,29	- 3,55	17,67	6,66	- 5,42	- 9,58
Manufacturing	63,10	19.954,90	11,67	- 3,82	18,54	7,34	- 5,80	- 10,40
Total - All NACE activities	53,95	140.728,10	15,51	- 1,68	6,06	1,82	8,91	- 3,44
Professional, scientific and technical activities; administrative and support service activities	43,68	17.899,30	20,35	- 1,05	- 9,70	- 3,57	33,27	2,61
Public administration, defence, education, human health and social work act.	43,51	33.420,10	12,31	3,82	2,04	1,88	10,07	1,90
Construction	43,16	8.733,20	9,49	- 21,14	- 0,20	0,36	9,72	- 21,42
Wholesale and retail trade, transport, accomodation and food service activities	41,24	34.533,00	16,14	- 4,31	4,74	- 1,41	10,89	- 2,94
Agriculture, forestry and fishing	28,04	4.710,30	5,46	- 6,81	22,56	1,55	- 13,96	- 8,23
Arts, entertainment and recreation; other service activities; activities of household and extra-territorial org. and bodies	25,15	10.635,10	11,91	- 0,42	- 4,61	- 2,75	17,32	2,39
Source: elaboration on Eurostat data								

Table 3			
Italy - Gross fixed capital formation			
(Nace Rev.2)	Growth rate 2008-2013	Absolute change 2008-2013	Share of the absolute change
Total economic activities	-23,84	-72.637,73	100,00
Agriculture, forestry and fishing	-20,90	- 2.253,23	3,10
Mining and quarrying, Electricity, gas, steam and air conditioning supply, water supply; sewerage, waste management and remediation activities	-29,40	- 4.230,14	5,82
Manufacturing	-27,70	-15.999,76	22,03
Construction	-30,46	- 3.599,30	4,96
Services	-22,18	-46.566,58	64,11
Wholesale and retail trade; repair of motor vehicles and motorcycles, Transportation and storage, Accommodation and food service activities	-24,87	-13.640,04	18,78
Information and communication	-5,37	- 743,15	1,02
Financial and insurance activities	-42,13	- 2.161,40	2,98
Real estate activities	-25,60	-22.522,12	31,01
Professional, scientific and technical activities, Administrative and support service activities	-16,27	- 2.313,67	3,19
Public administration and defence; compulsory social security, Education, Human health and social work activities	-14,99	- 4.371,36	6,02
Arts, entertainment and recreation, Other service activities	-8,04	- 388,03	0,53
Source: elaboration on Istat data			

Table 4				
Italy fixed assets and investments				
ITALY	Fixed assets 2012	Average net investment 2007-2008	Net investment 2012	Change of fixed assets 2008-2012
Total - All NACE activities	8.687.273,6	151.918,00	70.513,4	4,5%
Agriculture, forestry and fishing	431.693,5	182,90	-3.511,4	-2,2%
Mining and quarrying	57.563,7	573,15	-128,2	0,2%
Electricity, gas, steam and air conditioning supply	163.209,0	878,90	-3.399,0	-5,9%
Water supply; sewerage, waste management and remediation activities	93.659,0	1.611,55	327,9	3,5%
Manufacturing	1.050.662,1	11.074,00	-4.584,2	-0,6%
Construction	219.255,0	6.284,10	1.262,4	4,1%
Wholesale and retail trade; repair of motor vehicles and motorcycles	387.515,1	10.365,10	4.097,4	6,3%
Transportation and storage	509.873,5	14.082,20	7.794,6	8,3%
Accommodation and food service activities	198.953,0	6.344,55	1.555,7	4,4%
Information and communication	163.577,5	2.914,75	2.495,5	8,4%
Financial and insurance activities	130.412,9	2.119,65	527,5	3,0%
Real estate activities	3.776.933,3	68.768,80	50.941,9	6,4%
Professional, scientific and technical activities	109.454,5	2.914,10	1.152,1	6,5%
Administrative and support service activities	97.925,5	4.520,10	699,5	6,4%
Public administration and defence; compulsory social security	1.016.255,6	13.101,65	4.803,1	3,5%
Education	61.938,5	1.008,00	1.366,0	10,4%
Human health and social work activities	113.679,1	2.477,75	3.128,9	14,5%
Arts, entertainment and recreation	71.328,0	1.709,35	1.493,9	10,5%
Other service activities	33.863,6	1.069,35	504,1	8,3%
Source: elaboration on Eurostat data				

QUARTERLY DATA

Euro countries 12	2008	2013	Difference 2008-2013	Growth rate 2008-2013	Change in share 2008-2013	Contribution to GDP growth 2008-2013
Gross domestic product at market prices	8.571.388,3	8.399.407,5	-171.980,8	-2,01	0,00	-2,01
Household and NPISH final consumption expenditure	4.785.835,7	4.707.465,0	-78.370,7	-1,64	0,21	-0,91
Final consumption expenditure of general government	1.758.599,9	1.806.206,2	47.606,3	2,71	0,99	0,56
Gross capital formation	**1.862.085,2**	**1.496.444,0**	**-365.641,2**	**-19,64**	**-3,91**	**-4,27**
Exports of goods and services	3.550.986,7	3.848.116,8	297.130,1	8,37	4,39	3,47
Imports of goods and services	3.384.448,9	3.454.012,0	69.563,1	2,06	1,64	-0,81
External balance of goods and services	166.537,8	394.104,8	227.567,0	136,65	2,75	2,65

YEARLY DATA

Germany (until 1990 former territory of the FRG)	**2008**	**2013**	**Difference**	**Growth rate 2008-13**	**Share 2013**	**Change in share 2008-2013**	**Contribution to GDP growth**
Gross domestic product at market prices	2.407.913,0	2.482.430,4	74.517,4	3,09	100,00	0,00	3,09
Household and NPISH final consumption expenditure	1.334.034,5	1.405.134,2	71.099,7	5,33	56,60	1,20	2,95
Final consumption expenditure of general government	440.668,8	470.589,2	29.920,4	6,79	18,96	0,66	1,24
Gross capital formation	458.343,9	430.456,1	**-27.887,8**	**-6,08**	17,34	**-1,69**	**-1,16**
Exports of goods and services	1.154.168,1	1.301.403,1	147.235,0	12,76	52,42	4,49	6,11
Imports of goods and services	978.793,9	1.123.268,0	144.474,1	14,76	45,25	4,60	-6,00
External balance of goods and services	175.374,2	178.135,1	2.760,9	1,57	7,18	-0,11	0,11
Spain	**2008**	**2013**	**Difference**	**Growth rate 2008-13**	**Share 2013**	**Change in share 2008-2013**	**Contribution to GDP growth**
Gross domestic product at market prices	988.021,0	921.738,7	-66.282,3	-6,71	100,00	0,00	-6,71
Household and NPISH final consumption expenditure	562.171,1	509.883,3	-52.287,8	-9,30	55,32	-1,58	-5,29
Final consumption expenditure of general government	190.986,0	186.248,1	-4.737,9	-2,48	20,21	0,88	-0,48
Gross capital formation	289.523,9	189.065,1	**-100.458,8**	**-34,70**	**20,51**	**-8,79**	**-10,17**
Exports of goods and services	263.028,1	304.726,1	41.698,0	15,85	33,06	6,44	4,22
Imports of goods and services	317.399,4	271.751,7	-45.647,7	-14,38	29,48	-2,64	4,62
External balance of goods and services	-54.371,3	32.974,4	87.345,7	-160,65	3,58	9,08	8,84

France	**2008**	**2013**	**Difference**	**Growth rate 2008-13**	**Share 2013**	**Change in share 2008-2013**	**Contribution to GDP growth**
Gross domestic product at market prices	1.799.210,2	1.812.687,0	13.476,8	0,75	100,00	0,00	0,75
Household and NPISH final consumption expenditure	1.025.722,7	1.050.056,0	24.333,3	2,37	57,93	0,92	1,35
Final consumption expenditure of general government	425.386,7	460.082,0	34.695,3	8,16	25,38	1,74	1,93
Gross capital formation	380.797,4	330.586,0	**-50.211,4**	**-13,19**	**18,24**	**-2,93**	**-2,79**
Exports of goods and services	485.941,9	507.593,0	21.651,1	4,46	28,00	0,99	1,20
Imports of goods and services	518.745,1	533.905,0	15.159,9	2,92	29,45	0,62	-0,84
External balance of goods and services	-32.803,2	-26.312,0	6.491,2	-19,79	-1,45	0,37	0,36
United Kingdom	**2008**	**2013**	**Difference**	**Growth rate 2008-13**	**Share 2013**	**Change in share 2008-2013**	**Contribution to GDP growth**
Gross domestic product at market prices	1.969.053,7	1.958.337,2	-10.716,5	-0,54	100,00	0,00	-0,54
Household and NPISH final consumption expenditure	1.249.441,5	1.256.460,6	7.019,1	0,56	64,16	0,71	0,36
Final consumption expenditure of general government	412.104,4	426.428,3	14.323,9	3,48	21,78	0,85	0,73
Gross capital formation	340.580,4	294.383,7	**-46.196,7**	**-13,56**	**15,03**	**-2,26**	**-2,35**
Exports of goods and services	551.052,7	573.458,5	22.405,8	4,07	29,28	1,30	1,14
Imports of goods and services	584.417,7	584.625,2	207,5	0,04	29,85	0,17	-0,01
External balance of goods and services	-33.365,0	-11.166,7	22.198,3	-66,53	-0,57	1,12	1,13

	Productivity	Employment	Product	Product	Productivity	Productivity	Employment	Employment
Italy	**2013**	**2013**	**2008-00**	**2013-08**	**2008-00**	**2013-08**	**2008-00**	**2013-08**
Real estate activities	1.376,04	115,40	7,77	- 1,70	- 10,70	- 2,55	20,68	0,87
Financial and insurance activities	133,40	625,70	23,93	14,59	10,55	20,09	12,10	- 4,58
Information and communication	100,66	630,90	36,93	- 3,21	20,88	- 4,09	13,28	0,91
No manufact. industry	93,03	313,70	7,21	- 11,31	3,59	- 12,92	3,49	1,85
Total - All NACE activities	51,17	24.172,60	8,14	- 6,94	- 1,82	- 2,76	10,14	- 4,29
Industry (except construction)	50,50	4.609,70	2,57	- 14,22	1,91	- 3,57	0,65	- 11,04
Public administration, defence, education, human health and social work activities	48,89	4.378,60	10,64	- 1,51	7,54	2,01	2,89	- 3,45
Manufacturing	47,39	4.296,00	1,96	- 14,62	1,49	- 3,13	0,47	- 11,86
Wholesale and retail trade, transport, accomodation and food service activities	42,34	5.849,60	3,41	- 9,29	- 6,25	- 6,62	10,30	- 2,86
Construction	37,61	1.601,60	15,72	- 24,73	- 7,89	- 6,90	25,63	- 19,15
Professional, scientific and technical activities; administrative and support service activities	37,11	2.867,30	8,00	- 7,56	- 17,25	- 10,84	30,51	3,68
Agriculture, forestry and fishing	29,93	901,30	- 2,18	- 6,09	8,65	2,77	- 9,97	- 8,62
Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	17,22	2.592,50	6,72	1,86	- 15,51	- 6,15	26,32	8,54