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Agriculture and Economic Growth in a Market Economy:

Analysis of the French Postwar Experience

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The model is then calibrated to France and the results of the simulations are compared to the pattern of structural transformations which has characterized the evolution of the French economy over the 1950-2000 period. The drastic reduction in agricultural workforce is reproduced as well as the phenomenon of de-industrialization (decrease in the relative importance of manufacturing) after 1970. The model is then used to analyze the evolution of the domestic competitiveness of the agricultural sector over the period considered and the negative effect on the farm sector of deteriorating domestic terms of trade is highlighted.

Key words: structural transformations, economic growth and agriculture, French agriculture

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1 Introduction

French agriculture has undergone tremendous changes over the post war period as highlighted by the following facts: in 1950, the farm sector employed the largest share of the country's work force, and it was a net importer of food (Eck). By 1992, agriculture accounted for only 6 % (USDA) of the work force and produced a $10 billion trade surplus, which offset by one third the French industrial trade deficit (USDA). In 40 years, an apparently very traditional and relatively backward sector has become a powerful, dynamic and modern industry, thanks to a level of performances that Ruttan (1978) qualifies as "little short of spectacular"[1] .

This study develops an analytical model which helps to provide key insights explaining the pattern of structural transformation which has characterized the evolution of the French economy over the last five decades, with a special attention given to the farm sector. We identify and explain the interplay of the main forces which concurred to shape French agriculture into its current form as described by macroeconomic data on output, employment in the context of the entire French economy. This same approach should also be applicable for other OEDC countries.

In order to define an appropriate approach, it must be noticed that the pattern of structural transformations followed by France does not constitute in any way an isolated phenomenon. The decrease in the importance of agriculture both in terms of value added share of GDP and in terms of the share of work force employed actually constitutes one of the most robust stylized fact of economic development. This can be checked empirically not only from historical individual experiences of countries[2] but also from cross section data of countries in the world (Sundrum).

These empirical findings lead us to the general view that changes affecting the farm sector can only be understood in the context of a growing economy taken as a whole. Unfortunately, the literature in the field of economic growth, which presents numerous models derived from the seminal work of Solow, has ignored almost completely the issue of structural transformation. The neo-classical growth model as well as the more recent endogenous growth models only consider one final output and are by nature unable to explain the reallocation of resources across sectors of a given economy.

The literature in the field of economic development, although usually of a descriptive nature as pointed out by Shin(1990), provides more insight into what really constitutes the engine of

[1] Ruttan actually refers to the period covering the late 1950s and the 1960s

[2] Shin(1990) reports that the US agriculture was employing 79% of the workforce in 1820, 53% in 1860, 40% in 1900, 20% in 1940 and currently less than 3%.

structural transformations, although no analytical framework of a general equilibrium nature is provided. In particular, the Engel effect, i.e. the fact that the income elasticity for agricultural output is typically less than one, while the income elasticities of demand for industrial output and services are typically greater than one, is widely recognized as one of the main forces driving structural transformations of a developing economy.

Technological progress, describing the outward shift in the production possibility frontier of a country over time, seems to play also a fundamental role in explaining structural transformations. First, it leads to higher per capita income which is a necessary condition for the Engel effect to apply. Second, it is not uniform across sectors of the economy (Pasinetti, 1981). Therefore, productivity of economy wide resources[3] in the different sectors of the economy varies over time which leads to a reallocation from low productivity activities to high productivity ones.

A few authors have tried to cast these elements into an analytical framework based on the theory of economic growth. For example, there was an early attempt (1972) by Henrichsmeyer who developed a two-sector (manufacturing and agriculture) model of exogenous growth and calibrated it to Germany. Pasinetti (1981), motivated by the inability of growth models to explain "uneven development - from sector to sector and region to region" of post-war Europe tried to integrate the input-output analysis and the macro-dynamic growth models but at a purely theoretical level. Shin (1990) studied the structural transformations of the US and Korean economies and elaborated an endogenous growth model including two distinct sectors (manufacturing and agriculture). However, the fact that his model ignored the services sector, which in most OECD countries constitutes a large share of value added GDP and is large in terms of the share of work force employed, constitutes a major drawback. Finally, Eschevarria (1992) built a three-sector model (agriculture-manufacturing-services) where growth originates in capital accumulation as well as exogenous technological progress occurring at a different rate in each sector. Her calibration, based on data for the US and other OECD countries, reproduces the typical logistic growth pattern[4] but leads to counter-factual results with regard to structural transformations in the sense that her model simulations predict a decrease in the importance of the services sector for high levels of per capita income while the manufacturing sector expands steadily.

This paper intends to show that a simple multi-sector growth model incorporating non-

[3]By economy wide resource we understand a factor of production which can be used indifferently in all sectors of the economy, one example of which is labor

[4]Or as stated by Lucas(1988): "The poorest countries tend to have the lowest growth; the wealthiest next; the "middle income" countries highest".

homothetic preferences and endogenous technological change can reproduce a typical pattern of structural changes and help us understand how agriculture evolves as an economy grows . Section 2 presents the model and its dynamic properties. A calibration procedure is then developed in section 3 and the outcome of the simulations are analyzed. Section 4 concludes the paper.

2 The Model

A. The environment

The economy is supposed autarchic and features three sectors: agriculture, manufacturing and services. Although trade has been evidently important in determining the evolution of the French economy, the present model must be understood as a first step toward a more appropriate approach. Furthermore, the analysis of a closed economy can be justified by making two simple observations. First, trade still remains small as compared to total GDP even for economies usually considered open[5]. Second, as pointed out by Ventura(1994), a world of open economies is a closed economy so that our analysis can also give some insight into the functioning of agriculture in the context of the world economy.

(i) Supply side Each sector is composed of a finite number of identical producers. All producers in a sector $j = a, m, s$ make use of the same neo-classical, constant returns to scale technology which employes two inputs to generate a single output. One of these inputs, referred to as labor, is "economy wide" in the sense that it can be used in all three sectors while the other input is sector specific. Such a formulation was adopted because of our focus on agriculture where land plays a major role but has little alternative use in other industries[6]. Producers behave competitively and treat prices parametrically. Under these conditions, it can be shown that the individual production functions can be aggregated and the resulting sectorial production functions can be written as[7]:

$$X_s^t = S_t H(n_{2t}),\ X_m^t = M_t F(n_{1t}),\ X_a^t = A_t G(1 - n_{1t} - n_{2t}) \tag{2.1}$$

[5]For instance, trade related activities amount to less tha 15% of GDP in the US.

[6]For the manufacturing and services sector, the formulation is somewhat less appealing. However, some kind of managerial capital can be thought of as playing the role of a sector specific factor in these two industries.

[7]Functions F, G and H are stricly increasing and strictly concave.

where n_{1t} and n_{2t} denote the shares of labor force employed in the manufacturing and services sectors respectively as to time t. M_t, S_t, A_t designate productivity indices in manufacturing, services and agriculture and X_j^t is the output of sector j.

The engine of growth in this economy lies in technological change in the three sectors originating in learning-by-doing: there is a positive link between the aggregate output of a sector and its rate of total factor productivity growth. Learning-by-doing can be justified by considering that as a sector attracts more resources and increases its output, more knowledge relating to the technology is accumulated and such knowledge is then used to improve the production process. It is important to note, however, that learning-by-doing effects are purely external to the firms that generate them: knowledge only accumulates as a by-product of the activity of each firm.

Formally, productivity indices change over time according to the following laws of motion [8]:

$$\dot{M}_t = \delta X_m^t, \quad \dot{S}_t = \rho X_a^t, \quad \dot{A}_t = \mu X_a^t \tag{2.2}$$

where a dot designates a variables derivative with respect to time.

Parameters δ, ρ and μ, strictly positive, are exogenous and represent the speed of the learning process which can vary across sectors.

(ii) **Demand side** The demand side of the economy results from constrained utility maximization of a representative consumer who owns the sector specific factors as well as one unit of labor services.[9] The agent maximizes a discounted flow of instantaneous utility of the Stone-Geary type subject to a sequential budget constraint :

$$\underset{C_a^t, C_m^t, C_s^t}{Max} \quad \int_0^{+\infty} \left[\beta_a \log(C_a^t - \gamma_a) + \log(C_m^t) + \beta_s \log(C_s^t + \gamma_s)\right] e^{-\rho t} dt \tag{2.3}$$

$$s.t. \ C_a^t + p_m^t C_m^t + p_s^t C_s^t \leq \omega_t + \pi_t \tag{2.4}$$

$$C_a^t \geq 0, \ C_m^t \geq 0, \ C_s^t \geq 0 \tag{2.5}$$

where C_a^t, C_m^t, C_s^t denote aggregate consumption of each good as to time t , $\rho > 0$ is the discount rate, p_m^t and p_s^t correspond to the prices of manufactures and services in terms of food, ω_t is the wage rate and π_t the returns to sector specific factors

[8]This formulation is similar to those of Lucas(1988), Shin(1990) and Matsuyama(1992).

[9]Aggregate demands derived from this set up are the same as those generated by a continuum of consumers with identical preferences as long as income inequalities are not too "high" (as long as all the agents consume services).

There is no asset in the economy allowing the consumer to smooth consumption over the entire time horizon. Therefore, this dynamic problem can actually be solved as a succession of static problems where each agent spends his full income on current consumption of the three goods.

Parameters β_a, β_s, γ_a, γ_s are strictly positive. γ_a is usually interpreted as a subsistence level and we impose the condition that the economy has reached a stage of development where it can actually feed its population : $A_o G(1) > \gamma_a$.

In addition to the fact that it allows for a simple aggregation, the utility function was chosen because it features non-homotheticity which is believed to be a fundamental component of any model of structural change. Computation of the income elasticities for the three goods ε_a^I, ε_m^I, ε_s^I shows that the choice of preferences implies food to be a necessary (but not inferior) good $(0 < \varepsilon_a^I < 1)$ while services present the characteristics of a luxury good $(1 < \varepsilon_s^I)$. The case of manufactures is more ambiguous but it is possible to establish that $\varepsilon_a^I < \varepsilon_m^I < \varepsilon_s^I$. Therefore, the demand for services can be expected to increase and the demand for food to decrease (at least in relative terms) as the economy grows due to technological progress in the three productive sectors.

(iii) **Equilibrium path** The evolution of the economy over time is now computed as the competitive outcome of the environment specified above. In each sector, a representative producer minimizes cost subject to an aggregate production function given by equations 2.1. Prices as well as productivity indices are treated parametrically by this representative producer. Equilibrium on the market for the economy wide factor requires the marginal productivity of labor in the three sectors to be equal to the wage rate at any point in time :

$$\omega_t = A_t G'(1 - n_{1t} - n_{2t}) = p_m^t M_t F'(n_{1t}) = p_s^t S_t H'(n_{2t}) \tag{2.6}$$

with the price of food normalized to one.

Aggregate demands solve problem 2.3. The first order conditions to the maximization allow us to establish an expression for the product mix of final demand :

$$C_a^t = \beta_a p_m^t C_m^t + \gamma_a \tag{2.7}$$

$$C_s^t = \beta_a \frac{p_m^t}{p_s^t} C_m^t - \gamma_s \tag{2.8}$$

Using equations 2.6, 2.7, 2.8 and the market clearing conditions for the three final goods leads to the following equilibrium conditions:

$$A_t\left[G(1-n_{1t}-n_{2t})F'(n_{1t})-\beta_a G'(1-n_{1t}-n_{2t})F(n_{1t})\right]=\gamma_a F'(n_{1t}) \tag{2.9}$$

$$-S_t\left[H(n_{2t})F'(n_{1t})-\beta_s H'(n_{2t})F(n_{1t})\right]=\gamma_s F'(n_{1t}) \tag{2.10}$$

These equations define an allocation of labor across sectors $(n_{1t}; n_{2t})$ given any set of productivity indices A_t, M_t, S_t. Once the proportions of the work force employed in each sector are determined, it is straightforward to compute all the variables of the economy: equations 2.9-2.10 completely characterize the static equilibrium.

The evolution of the economy over time is then given by the association of 2.9-2.10 with the laws of motion for productivity indices 2.2 as well as initial conditions A_0, M_0, S_0. However, it is possible to reduce the equilibrium conditions to a system of two differential equations and two initial conditions which helps clarify the dynamic properties of the model. Taking the logarithm of 2.10 and differentiating with respect to time we obtain :

$$\dot{n}_{2t}=\rho H\frac{[\beta_s H'F-HF']}{[H'F'-\beta_s H''F]}+\dot{n}_{1t}\,\beta_s\frac{[H'F'-H'FF''/F']}{[H'F'-\beta_s H''F]} \tag{2.11}$$

where the arguments of all the production functions have been dropped for clarity.

Proceeding similarly with equation 2.9 and using the expression for $\dot{n}_{2t}$ derived above, we can derive the following expression :

$$\dot{n}_{1t}=\frac{\mu G[GF'-\beta_a G'F][H'F'-\beta_s H''F]-\rho H[G'F'-\beta_a G''F][\beta_s H'F-HF']}{[H'F'-\beta_s H''F][-\beta_a G'FF''/F'+G'F'(1+\beta_a)-\beta_a G''F]+\beta_s[H'F'-H'FF''/F'][G'F'-\beta_a G''F]} \tag{2.12}$$

Equations 2.11 and 2.12 form a system of two differential equations in two variables n_{1t} and n_{2t}. The initial values n_{10} and n_{20} can be computed from equations 2.9-2.10 and initial conditions A_0, S_0. Therefore, this dynamic system is completely defined and we can derive the whole pattern of resource reallocation simultaneous to the growth of the economy.

B. A few important properties

It should be clear at this point that the structural transformations affecting the economy can be characterized by solving numerically the system of differential equations 2.11-2.12. However, before proceeding to the next section, we can derive a few general properties that are imposed by the structure of the model[10].

(i) **Long-run state of the economy** The first question that arises concerns the long-run state of the economy: will economic growth evolve in such a way that the economy reaches some form of stability? It turns out that the reallocation of economy wide resources (labor) is going to grind to a halt so that the economy will eventually reach a steady state as claimed in the following proposition.

Proposition 1[11]: *The economy, over time, converges to the unique steady state* $(n_1^*; n_2^*)$ *defined by the following system of equations:*

$$\beta_s H'(n_2^*)F(n_1^*) - H(n_2^*)F'(n_1^*) = 0 \tag{2.13}$$

$$G(1-n_1^*-n_2^*)F'(n_1^*) - \beta_a G'(1-n_1^*-n_2^*)F(n_1^*) = 0 \tag{2.14}$$

It must first be pointed out that these equations are identical to system 2.9-2.10 characterizing the static equilibrium for values of γ_a and γ_s equal to zero. In other words, had the preferences been of the Cobb-Douglas type (hence homothetic) $U = c_a^{\beta_a} c_m c_s^{\beta_s}$, the economy would have "jumped" directly to the steady state without any resource reallocation. This result confirms that the non-homotheticity of preferences constitutes a fundamental drive of structural transformation.

It can be shown that at the steady state, changes in relative prices exactly offset differences in rates of technological progress across sectors so that the marginal product of labor evolves at the same speed in the three industries, preventing any further reallocation of the work force.

(ii) **Characteristics of the pattern of structural transformations** **Proposition 2**[12]: *The proportion of the work force employed in the services sector monotically increases along the growth path of the economy. Simultaneously, labor steadily flows out of agriculture.*

It can not be determined in which way the manufacturing sector is going to evolve over time. These properties appear highly desirable for any model of structural change. They fit nicely

[10]Demonstrations of all the results are not presented here due to the lack of space. They are however available from the author upon request

[11]The steady state is determined by finding conditions ensuring $\dot{n}_{1t}$ and $\dot{n}_{2t}$ to be simultaneously equal to 0. The convergence property can be established by drawing the equivalent of a phase diagram in plane $(n_1; n_2)$.

[12]The proof comes from transformations of expressions 2.11-2.12 and from the observation that $HF' - \beta_s H'F < 0$ and $GF' - \beta_a G'F > 0$ along any equilibrium path (see eq. 2.9-2.10)

the typical pattern of resource reallocation that an economy experiences as it grows richer as described in the introduction.

3 An example of calibration

A. Method of calibration

The sectorial production functions are chosen of the Cobb-Douglas form so that they can be written as: $X_a^t = A_t(1 - n_{1t} - n_{2t})^{\alpha_a}$, $X_m^t = M_t(n_{1t})^{\alpha_m}$, $X_s^t = S_t(n_{2t})^{\alpha_s}$.

Therefore, calibrating the model entails defining 10 parameter values:

- α_a, α_m, α_s for the sectorial production functions
- β_a, β_s, γ_a, γ_s which define the Stone-Gary utility function
- μ, ρ, δ which determine the speed of learning-by-doing in each sector

We also need to define three initial conditions A_0, M_0, S_0.

The procedure of calibration can be briefly summarized as follows.

The parameters of the production functions α_a, α_m, α_s are straightforward to calibrate since they represent the share of labor cost in total production cost in each sector.

Coefficients β_a and β_s from the utility function can be computed from equations 2.13-2.14 given a steady state allocation of labor $(n_1^*; n_2^*)$. It is assumed at that level that the US have reached the steady state which is therefore defined by the following allocation of the work force across sectors: $n_1^* = .32$, $n_2^* = .65$.

The system of differential equations 2.11-2.12 shows that the pattern of resource reallocation does not depend upon parameters A_0, S_0, M_0, γ_a, γ_s once the initial values for n_1 and n_2 have been established. Furthermore, it appears from equations 2.9-2.10 that these initial values n_{10} and n_{20} only depend upon two ratios : $\frac{A_0}{\gamma_a}$ and $\frac{S_0}{\gamma_s}$.

Therefore, we decide to set all three productivity indices equal to one at $t = 0$. Parameters γ_a and γ_s can then be deduced from an initial allocation of labor $(n_{10}; n_{20})$ by solving equations 2.9-2.10. An initial allocation $n_{10} = .34$, $n_{20} = .33$, corresponding to the state of the French economy in 1950 as documented by Sundrum (1991), was chosen.

At this point, only values for the three parameters defining the speed of learning-by-doing in each sector need to be determined. Gopinath and al.(1996) obtain a measure of the rate of TFP change in the French agriculture over the 1974-1993 period equal to 6% while Martin and Mitra(1996) report a 2% rate of growth in TFP in the French manufacturing sector. While no estimate of the rate of TFP change in the services sector was found, there seems to be a consensus in the literature that this rate is lower than in other sectors of the economy (Sundrum p.144) and we therefore set it to 1%. Ultimately, values for μ, ρ, δ were set to .15, .04 and .02 respectively.

The following table summarizes the choice of parameters:

Cobb-Douglas production functions						Stone-Gary Utility				Learning-by-doing		
α_a	α_m	α_s	A_0	M_0	S_0	β_a	β_s	γ_a	γ_s	μ	ρ	μ
.6	.7	.8	1	1	1	.109	1.78	.461	.450	.15	.04	.02

B. Results

(i) Pattern of resource reallocation Figure 1 presents the result of the numerical simulation of the model (that is, the solution to the system of non-linear equations (2.11-2.12)). As claimed by proposition 2, labor is continuously drawn out of agriculture and into the services sector. But the main support to the model comes from the magnitude of these changes: while the parameters determining the speed of the dynamics[13] have been defined from estimates of rates of technological change in each sector, they lead to a very plausible profile of labor reallocation across sectors. In particular, the French agriculture still employes 6% of the work force which corresponds precisely to the result of the simulation.

The simulated evolution of the manufacturing sector lends some more credibility to the approach followed. From 1950 to 1970, labor is attracted to the manufacturing sector but this trend grinds to a halt and is eventually reversed from 1970 to year 2000. This result reproduces the phenomenon of "de-industrialization" of developed economies (Sundrum p. 144) that is documented for the European Community as a whole by Stoeckel (1985) for the period 1971-1982.

Simulated values of other economic variables are now presented to better understand how this pattern of resource reallocation was obtained and to show that the model provides a very coherent picture of the development of the French economy over the last 50 years.

(ii) Overall growth performance of the economy The rate of growth in real GDP was computed and figure 8 presents the result. Starting from 4% in 1950, the growth rate diminishes sharply to eventually stabilize around 1.5%. Although this profile appears too steep, the model reproduces the fact that the French economy was growing quickly after the second world war while the 70s and 80s were characterized by low rates of economic growth. In the model, the reduction in

[13] That is, parameters μ, δ, ρ.

the rate of growth in GDP can be associated with the transfer of resources from sectors undergoing fast technological change (agriculture and manufacturing) to a sector characterized by a slow rate of technological progress (services).

(iii) Analysis of sectorial competitiveness Although the concept of competitiveness is rather elusive, we give it a clear meaning following the definition of Gopinath and Roe[14]: if within an economy, the rate of growth in sector j's real GDP exceeds that of the economy, i.e., $d(\ln GDP_j)/dt > d(\ln GDP)/dt$ then sector j is increasing its competitiveness relative to the other sectors of the economy.

Figures 2 and 7 present respectively the sectorial composition of GDP and the rates of growth in sectorial GDP. According to the definition adopted, agriculture loses its domestic competitiveness over the entire period while the services sector gains competitiveness. The manufacturing sector, after strenghtening its position from 1950 to 1970, eventually undergoes a slow erosion of its competitiveness. This evolution can be better understood by decomposing the increase in value-added output of each sector into different sources.

(iii).1 **Evolution of relative prices.** Figure 3 presents the evolution of the sectorial terms of trade[15]. As expected from the combination of a low income elasticity of demand and a high rate of technological progress, the real price of agricultural output is dwindling steadily. In the same time, the real price of services increases while the manufacturing sector faces slightly decreasing terms of trade after 1955. Although data for the French economy were not found, one can notice that this evolution is very similar (both in shape and in magnitude) to the one reported by Gopinath (1995) for the US.

(iii).2 **Determinants of the domestic competitiveness of the agricultural sector.** The increase in sectorial GDP can be decomposed into a price effect, capturing the changes in the valuation of final output, an input effect (here increase in the production due to an increase in the labor input) and a technological rate effect (denoted TFP)[16]. Figure 4 presents this decomposition

[14] This is the domestice dimension of competitiveness. The authors also define the concept of international competitiveness, which is not considered here since the economy is functionning in autarky.

[15] Real prices were computed by deflating prices by the following price index: $P_I^t = s_a^t p_a^t + s_m^t p_m^t + s_s^t p_s^t$ where the weights s_j correspond to the sectoral value-added shares of GDP.

[16] For instance, the rate of increase in agricultural GDP can be decomposed as follows: $\frac{\dot{GDP^t}_a}{GDP_a^t} = -\frac{\dot{P_I^t}}{P_I^t} + \frac{\dot{A_t}}{A_t} - \frac{G'}{G}(\dot{n_{1t}} + \dot{n_{2t}})$;

for the agricultural sector and gives some insight into why the farm sector has lost its domestic competitiveness over the last five decades. In spite of a fast rate of technological progress, agricultural GDP decreases in real terms from 1950 to 2000. This is due to the conjunction of two very negative effects: first, the real price of food decreases quickly (from 6% a year in 1950 to 2.2% a year in 2000). Second, the agricultural work force has diminished at a rate comprised between 6% a year and 1% a year.

Corresponding results are presented in figures 5 and 6 for manufacturing and services.

4 Conclusion

This paper shows that a simple three-sector model of endogenous growth featuring non- homothetic preferences can replicate one of the major regularities of economic development: the steady expansion in the services sector and the simultaneous decrease in the farm sector in terms of work force. The numerical simulation of the model, calibrated to post war France, gave a very coherent and plausible picture of the growth pattern of a developed economy. In particular, the phenomenon of de-industrialization of a mature economy was reproduced and the evolution of the sectorial terms of trade obtained appears consistent with what is reported in the literature.

It is also believed that the paper highlights the close link between structural transformations and economic growth which have usually been analyzed in two different fields of economics; on one hand, economic growth results in higher per capita income and hence in a change in the composition of final demand if the income elasticities for final goods differ. On the other hand, the reallocation of resources across sectors characterized by different rates of technological progress influences the overall growth rate of the economy.

Finally, the model gives some insight into what constitutes the major determinants of the evolution of each sector. The work is seen as complementary to classical growth accounting exercises which have been used to analyze the competitiveness of the farm sector (Gopinath 1995) but whose results remain of a descriptive nature. By contrast, the model presented gives a fully consistent representation of an economy and can therefore be used as a tool for policy analysis.

The next step will consist in the development of an open-economy and more applied version of the model to assess the impact of the Common Agricultural Policy on the pattern of structural

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$-\frac{\dot{P}_I^t}{P_I^t}$ is the real price effect, $\frac{\dot{A}_t}{A_t}$ the TFP change effect and $-\frac{G'}{G}(\dot{n}_{1t} + \dot{n}_{2t})$ the input effect.

transformations followed by the French economy. It is believed that the formulation of technological progress chosen, which creates a link between economic policies and the evolution of the comparative advantage of a country, will have some interesting implications in the analysis of the competitiveness of the French agriculture.

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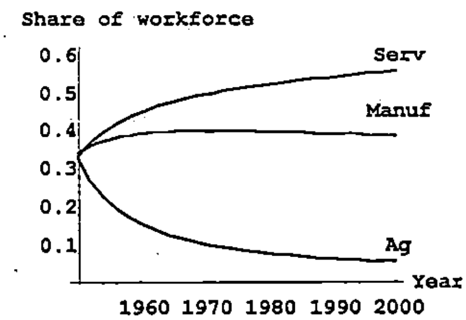

Figure 1: Reallocation of the workforce

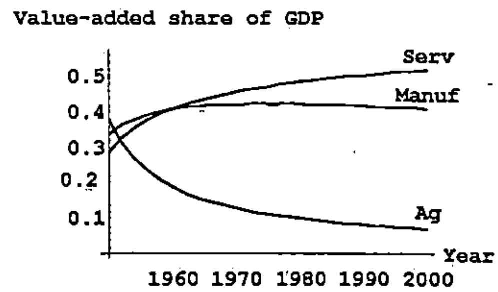

Figure 2: Sectoral composition of GDP

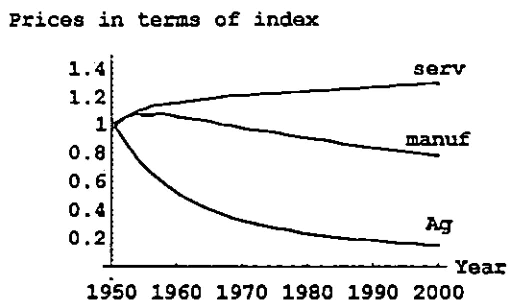

Figure 3: Evolution of sectorial terms of trade

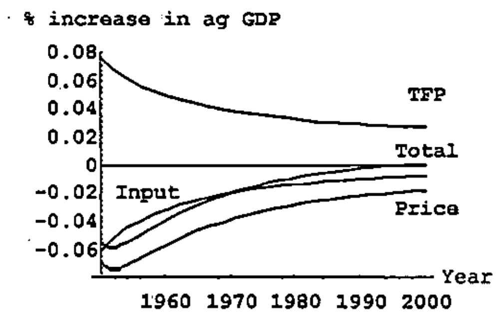

Figure 4 : Sources of growth in ag GDP

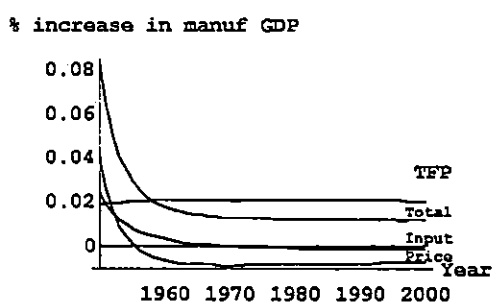

Figure 5: Sources of growth in man. GDP

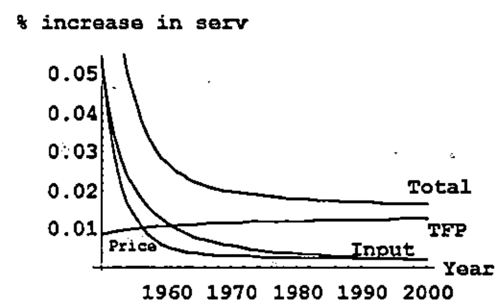

Figure 6: Sources of growth in serv GDP

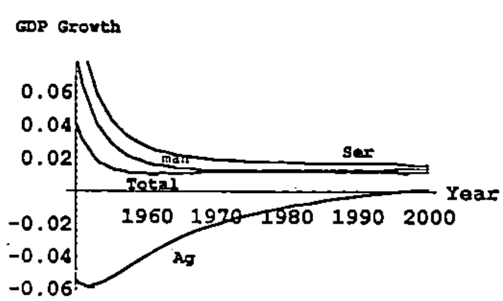

Figure 7:Evolution of sectorial competitiveness

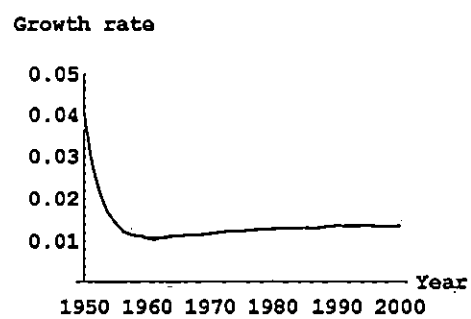

Figure 8: GDP growth rate