Monetary Policy and Capital Accumulation Processes : How did the FED react to the Transition Phases ?

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Abstract

The present paper is related to the recent discussion about the efficiency of the Reserve Federal Bank on investment decisions. Our aim is not to propose an optimal policy rule but rather to appreciate and to understand the link between the monetary interventions of the FED and capital accumulation processes. Therefore, we propose to adopt a Smooth Transition Regression Model to take account of structural changes in capital stock for the sole equipment and computer goods. We also consider two sub-periods (1967-1981 and 1982-1997) that correspond to the policy changes of the Federal Reserve Bank occurring in the early eighties. We conclude to a strong heterogeneity of the exogenous variables between the sub-periods, and above all, to a modification of the effects of monetary policy during the transition phases. In fact, the different results over the two sub-periods could be explained by the instability of the relation linking the decisions of the FED to investment expenditures.

***JEL Classifications* :** C22, C52, E52, E58, 057.

Introduction

The present paper is related to the recent discussion about the role of the Reserve Federal Bank (FED) on investment decisions. More particularly, some authors argue that monetary interventions produce few effects on capital accumulation dynamics for the sole equipment and computer goods. Nevertheless, this result requires an econometric investigation that takes account of structural changes, and precisely, the important increase of equipment and computer investment expenditures during the 90's.

Therefore, our goal in this paper is not to consider an optimal definition of the FED's monetary rule, but rather, to understand and to appreciate the interactions between monetary interventions and capital accumulation process. We then consider capital stock accumulation in USA for the sole equipment and computer goods, over two sub-periods, (1967-1981 and 1982-1997) that correspond to the policy changes of the FED, occurring in the early eighties. Formally, we use Smooth Transition Regression models (STR models) to appreciate the relation between the monetary intervention and the investment dynamics. Within this framework, we estimate the relevant variables that influence investment decisions and insist both on real variables (GDP) and on monetary variables (Liquidity Constraints and Real Interest Rate). The estimation of a non linear model allows us to understand the evolution of the conduct of the monetary policy, and above all, to appreciate the impact of the interest rate variations on the « Out of Equilibrium » dynamics, (that is on the transition phases).

The present paper is organized as follow. **Section 1** is dedicated to the description and the estimation of the linear econometric models. On the one hand, our aim is to legitimate the substitution of the cost of capital (Formula Hall-Jorgenson) as exogenous variable, by the short term real interest rate. On the other hand, we try to demonstrate, by using the Cusum Squares Tests (Stability Tests), the existence of global instability of the parametric structure of these linear models. To take account the changes of the speed of the capital accumulation process, **Section 2** presents the main properties of the STR models we use for each sub-period (1967-1981 and 1982-1997). We discuss also the general features of the econometric results. **Section 3** concludes.

Section 1/ Linear Econometric Models for Investment Dynamics

The basic model we use to study the capital stock adjustments is the one introduced by S. Tevlin et K. Whelan (2000). This model considers the adjustment costs of the capital stock between two periods, and also the deviations separating the effective stock from the optimal one.

Formally, it consists in minimizing the following quadratic function :

$$\text{Min } E_t \sum_{m=0}^{\infty} \theta^m \left([k_{t+m} - k^*_{t+m}]^2 + \alpha [k_{t+m} - k_{t+m-1}]^2 \right) \quad (1)$$

with θ : the actualization rate.

The first order conditions of this program are :

$$E_t \left[-k_{t+1} + \left(1 + \frac{1}{\theta} + \frac{1}{\alpha\theta} \right) k_t - \frac{1}{\theta} k_{t-1} - \frac{1}{\alpha\theta} k^*_t \right] = 0 \quad (2)$$

To compute the equation (1), we consider the following characteristic equation:

$$X^2 - \left(1 + \frac{1}{\theta} + \frac{1}{\alpha\theta} \right) X + \frac{1}{\theta} = 0 \quad (3)$$

Equation (3) admits two (unit) roots that are defined by, $0 < \lambda < 1$, and $\frac{1}{\lambda\theta}$.

Then, if we consider $F\,K_t = K_{t+1}$ and $L\,K_t = K_{t-1}$, equation (2) takes the following form :

$$-F\,K_t + \left(1 + \frac{1}{\theta} + \frac{1}{\alpha\theta} \right) K_t - \frac{1}{\theta} L K_t = \left(-F + 1 + \frac{1}{\theta} + \frac{1}{\alpha\theta} - \frac{1}{\theta} L \right) K_t \quad (4)$$

Multiplying equation (4) by FL, we obtain (5) :

$$\left(-F^2 + \left(1 + \frac{1}{\theta} + \frac{1}{\alpha\theta} \right) F - \frac{1}{\theta} F \right) L K_t = -(F - \lambda) \left(F - \frac{1}{\lambda\theta} \right) L\,K_t$$

The first order conditions are :

$$E_t \left[-(F - \lambda) \left(F - \frac{1}{\lambda\theta} \right) L\,K_t - \frac{1}{\alpha\theta} K^*_t \right] = 0 \quad (6)$$

$$-K_{t+1} + \lambda K_t + \frac{K_t}{\vartheta\lambda} - \frac{1}{\vartheta} K_{t-1} - \frac{1}{\alpha\theta} K^*_t = 0 \quad (7)$$

Multiplying equation (7) by $\theta\lambda$, we obtain (8) :

$$-\theta\lambda K_{t+1} + \lambda^2 \theta K_t + K_t - \lambda K_{t-1} - \frac{\lambda}{\alpha} K_t^* = 0$$

Substituting and considering :

$0 < \lambda < 1$ et $0 < \theta < 1$ so that limit $(\lambda\theta)^n = 0$ when $n \to +\infty$,

we obtain :

$(\lambda\theta)^n (I - \lambda F) K_{t+n} = 0$ (9)

A solution of the maximization program is then :

$$k_t = \lambda k_{t-1} + \frac{\lambda}{\alpha} E_t\left[\sum_{n=0}^{\infty} (\theta\lambda)^n k_{t+n}^*\right] \quad (10)$$

Taking equations (5) and (6), the coefficients should respect the followings :

$- (1 - \lambda)*(1 - 1/\lambda\theta) = 1/\alpha\theta$
$-1 + \lambda + 1/\lambda\theta - 1/\theta = 1/\alpha\theta$

Multiplying by $\theta\lambda$, we obtain the following conditions :

$-\lambda\theta + \lambda^2\theta + 1 - \lambda = \lambda/\alpha$
$(1 - \lambda)(1 - \lambda\theta) = \lambda/\alpha$ (11)

Taking conditions (11), equation (10) takes the form :

$\Delta k_t = (1 - \lambda)(k_t^{**} - k_{t-1})$ (12)
with $k_t^{**} = (1 - \lambda\theta) E_t\left[\sum_{n=0}^{\infty} (\theta\lambda)^n k_{t+n}^*\right]$

If we compute profit maximization, we obtain the following first order conditions (one can note that S. Tevlin and K. Whelan (2000) use a CES production function) :

$k_t^* = \eta_t + y_t - \sigma r_t$

with η_t, corresponding to the effects of technologic changes ; y_t and r_t the amounts of sales and the short term real interest rate.

Following S. Tevlin and K. Whelan[1] (2000), the capital accumulation process is defined by the following equation :

$$k_t = \lambda k_{t-1} + (1 - \lambda)(1 - \theta\lambda)(\kappa(L)y_t - \sigma\,\mu(L)r_t) + \eta'_t \quad (13)$$

with κ(L) and μ(L), respectively the approximations of the effects of the product and the capital cost on k_t^{**}.

If we suppose that the technological bias cannot be observed, the estimated equation becomes :

$$K_t = \alpha + \lambda^* K_{t-1} + \sum_{i=0}^{N} \beta_i Y_{t-i} + \sum_{i=0}^{N} \gamma_i R_{t-i} + u_t \quad (14)$$

with K_t : the capital stock

Y_t : GDP.

R_t : the capital cost

This equation is estimated over two sub-periods, 1967-1981 and 1982-1997, that take account the policy changes of the FED, occurring in the early 80's. The cost of capital is calculated from the Hall-Jorgenson formula.

Formally, the cost of capital takes the following form :

$$R_t = P_t\,(r_t + \delta - \Delta P_t/P_t)^*(1\text{-}ITC - \tau^*DEP)/(1 - \tau) \qquad (15)$$

With :

R_t : Cost of Capital ;

P_t : Price of capital relative to the price of output ;

r_t : Real interest rate ;

ITC : Investment tax credits ;

DEP : Present value of depreciation allowances per dollar invested ;

τ : Marginal corporate income tax rate.

δ : Capital depreciation rate.

[1] For more details on their modelling, see S. Tevlin and K. Whelan, 2000, pp. 11-12. One can note those equations (4), (5), (7), (8) and (9), and conditions (11) are not explicit in S. Tevlin et K. Whelan (2000).

The cost of capital comes from a combination of price components (Real interest rate and variation of the ratio Price of capital on price of output) and non price components (i.e. fiscal components). The investment tax credits allow to decrease the cost of capital, by reducing the unit price after taxes of equipment and computer goods. The same effect can be obtained with a decrease of marginal corporate income tax rate.

A this stage, we estimate the equation (14), over two sub-periods, that is to say, 1967:04 -1981:04 and 1982:01 – 1997:03, for equipment and computer goods. Because the regressions over the two sub-periods contain non stationary variables (i.e. I(1)), we adopt a differenced version of this equation, in order to avoid a spurious regression.

The data we use for capital stock, price indexes and GDP are taken from NIPA tables. The short term real interest rate is then calculated as the difference between the short term nominal interest rate and the expected inflation (i.e. measured by the average inflation rate over the last three years).

In accordance with the Neoclassical Theory, we obtain an inverse relation between the variations of cost of capital and the variation of equipment and computer expenditures (See Tables 1 and 2), even if this coefficient is quite small. The coefficient of output is significantly positive, whatever the sub-periods.

Table 1 : Period 1967:04 – 1981:04

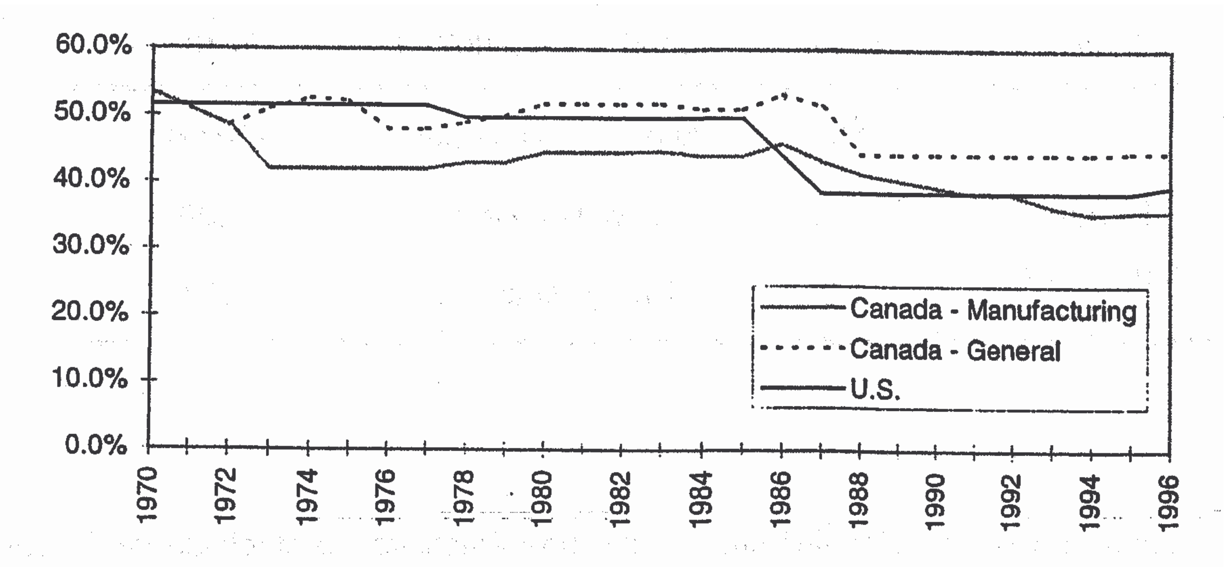
	Coefficients	Student Error	t-Statistic	Prob.
C(1)*$\Delta(K_{t-1})$	0.9	0.05	34.75780	0.00
C(2)* Δ(Output)	0.3	0.1	5.415574	0.00
C(3)* Δ(Cost of Capital)	-0.03	0.01	-11.67294	0.04
R^2	0.60	Akaike info criterion		-7.28
Ajusted R^2	0.58	Schwarz criterion		-7.15
Durbin-Watson stat	2.03	Prob(F-statistic)		0.00

Table 2 : Period 1982:01 – 1997:03

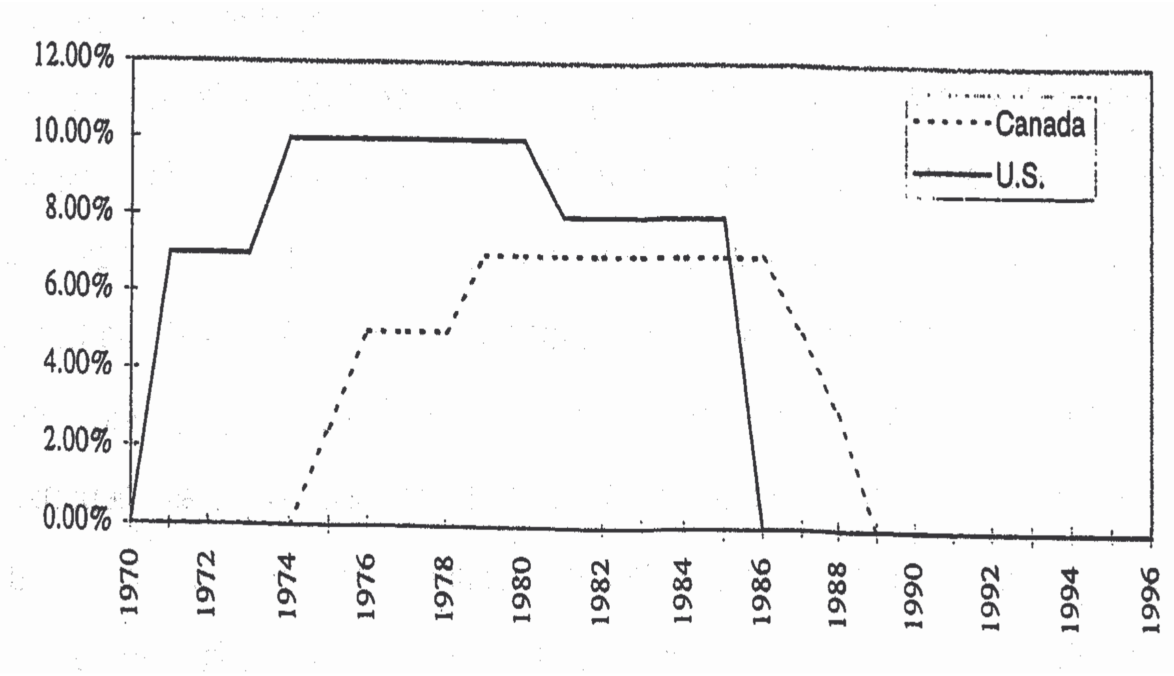
	Coefficients	Student Error	t-Statistic	Prob.
C(1)*Δ(K_{t-1})	0.89	0.03	27.38741	0.0000
C(2)* Δ(Output)	0.15	0.035257	4.448857	0.0000
C(3)* Δ(Cost of Capital)	-0.008	0.005	-0.790739	0.13
R^2	0.86	Akaike info criterion		-10.06
R^2 Ajusté	0.85	Schwarz criterion		-9.96
Durbin-Watson stat	1.9	Prob(F-statistic)		0.00

The estimation of this linear model points out a small but significantly elasticity of the stock of capital with respect to the output, whatever the period. On the other hand, the cost of capital divides these two sub-periods. Precisely, the cost of capital appears to be significant only over the period 1967-1981. It is really surprising, especially if we consider the fiscal policy changes. In fact, from 1986 (US Tax Reform), the Marginal corporate income tax rate have been decreased by 10% (See Graph 1). This fiscal policy is favourable to an increase of investment expenditures. However, and for the same period, the Investment Tax Credit have been stopped (See Graph 2).

Graph 1 : Evolution of the Marginal corporate income tax rate (MCITR).

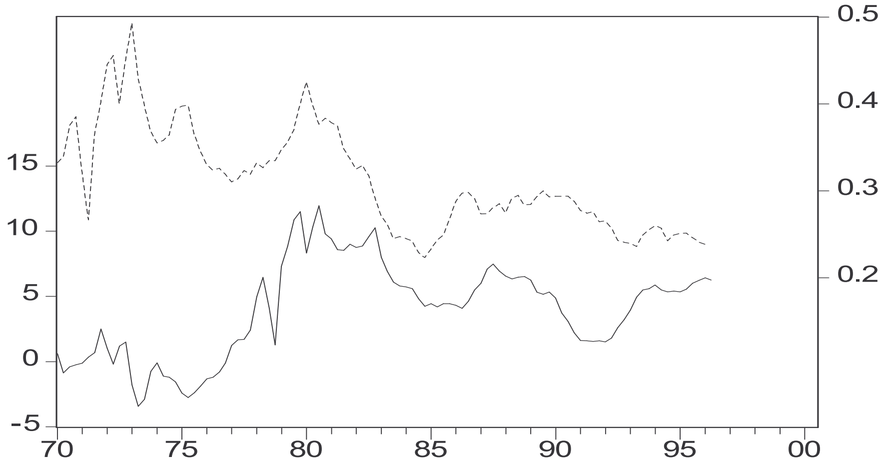


Graph 2 : Evolution of the Investment tax credit (ITC).



Considering the compensatory evolution of the real components of the cost of capital (i.e. ITC and MCITR), we think that the evolution of the cost of capital depends mainly on the evolution of the real interest rate. The following graph (Graph 3) seems to confirm this hypothesis.

Graph 3 : Real Interest Rate and Cost of Capital.



Contrary to S. Tevlin and K. Whelan (2000), we take the short term real interest rate as the relevant variable. In fact, the following « modified » model differs from the model developed by S. Tevlin and K. Whelan (2000) for two main reasons : first, we choose the short term real interest rate as the relevant monetary variable instead of cost of capital calculated by using Hall-Jorgenson Formula. Moreover, we introduce a liquidity constraint through the Cash Flow/Capital Stock ratio. We think that liquidity constraint influences the self-financing of the firms. According to J. Hicks (1973), self-financing capacities contribute to capital accumulation process.

The estimated equation then takes the following form :

$\Delta K_t = c(1)^* \Delta K_{t-1} + c(2)^* \Delta Y_t + c(3)^* \Delta r_t + c(4)^* \Delta CF$. (15)

With :

ΔK_t : Variations of capital stock ;

ΔY_t : Variations of output ;

Δr_t : Variations of real interest rate and

ΔCF : Variations of liquidity constraints.

The results of estimation of the modified model are presented in Graphs 4 and 5.

Table 3 : Period 1967:04 – 1981:04

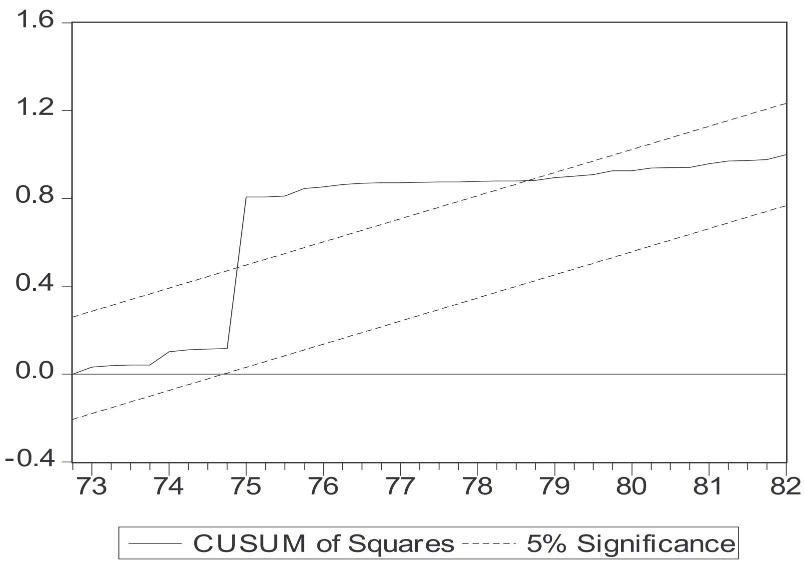
	Coefficients	Student Error	t-Statistic	Prob.
$C(1)^*\Delta(K_{t-1})$	0.91	0.04	20.58	0.00
C(2)* Δ(Output)	0.17	0.07	2.29	0.02
C(3)* Δ(Real Interest Rate)	-0.01	0.004	-2.14	0.03
C(4)* Δ(Cash-Flow)	0.027	0.02	1.43	0.15
R^2	0.64		Ajusted R^2	0.62
Durbin-Watson stat	1.98		Prob(F-statistic)	0.00

Table 4 : Period 1982:01 – 1997:03

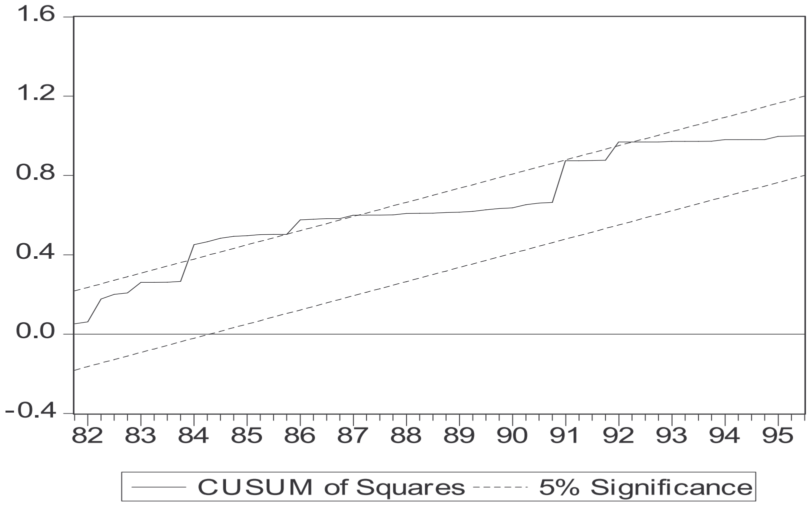
	Coefficients	Student Error	t-Statistic	Prob.
C(1)*$\Delta(K_{t-1})$	0.91	0.03	24.80	0.00
C(2)* Δ(Output)	0.12	0.04	3.03	0.003
C(3)* Δ(Real Interest Rate)	-0.004	0.002	-1.06	0.29
C(4)* Δ(Cash-Flow)	0.02	0.01	1.99	0.05
R^2	0.85		Ajusted R^2	0.84
Durbin-Watson stat	2.20		Prob(F-statistic)	0.00

To test the stability of the parameters over the various periods, and for the different models (Basic and Modified), we use Squares Cusum Tests. Precisely, these tests are built on the recursive regression procedure. According to this methodology, the amount of observations is progressively incorporated to estimate a succession of regressions. Within this framework, a potential structural break of the estimated equation occurs when the evolution of the coefficients exceeds the interval of confidence (called the « stability corridor »). A simple look at the graphs is then sufficient to conclude to instability of the coefficients (See Graph 4-7).

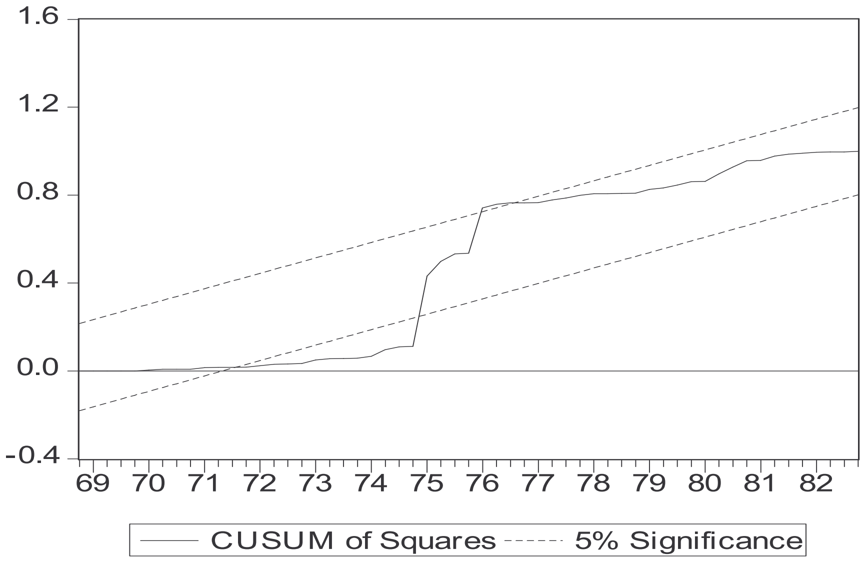
Graph 4 : Squares Cusum Test for the Basic Model over the period 1967-1981.



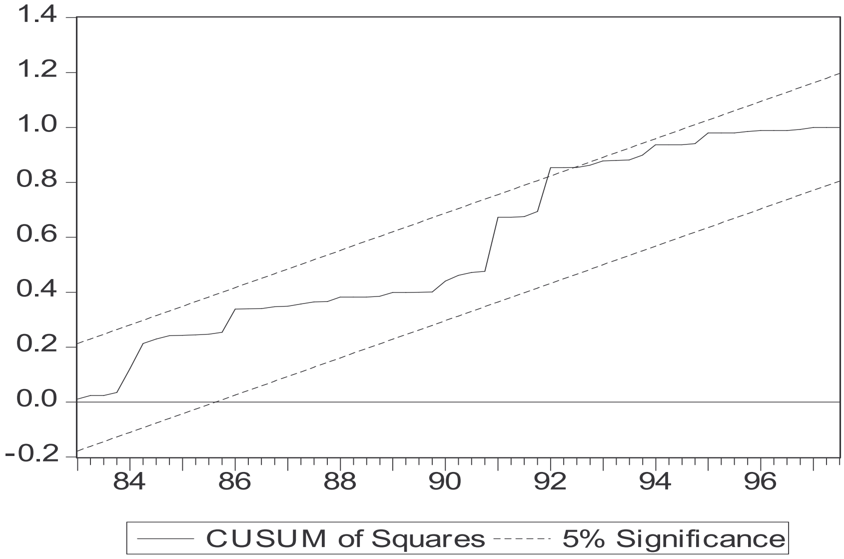
Graph 5 : Squares Cusum Test for the Basic Model over the period 1982-1997



Graph 6 : Squares Cusum Test for the Modified Model over the period 1967-1981.



Graph 7 : Squares Cusum Test for the Modified Model over the period 1982-1997.



Therefore, this Squares Cusum Tests reveal instability of the parameters, whatever the periods or the models. In other words, these tests reject the null hypothesis of stability of the coefficients. The breaks we observe within the corridor stability have justified the development of a non linear model. We implement a *Smooth Transition Regression* Model (STR model) so as to introduce the changes of regimes of the capital accumulation process. Effectively, STR models introduce transition functions that take account of structural changes.

The following **Section 2** introduces and explains the estimated STR models over the two sub-periods. Precisely, we insist on the impact of monetary policy during the out-of-equilibrium process, that is to say during the transition phases.

Section 2/ Transition phases of Capital Accumulation Process and Monetary Policy.

According to T. Teräsvirta (1994) and D. van Djik and *al* (2000), STR models present the following general form :

$y_t = [A + B*G(s_t ; \gamma ; c)] + \varepsilon_t$, ( )

with, y_t : the dependant (endogenous) variable; A et B : the parameters vectors ; G (s_t ; γ ; c) : a continuous function taking its values between 0 and 1 ; γ : the speed of changes of the constitutive values of the transition function (i.e. if γ is high then transition is fast from one regime to another) ; ε_t : a white noise ; c : the regimes' change threshold ; s_t : the lagged endogenous variables, or the exogenous variable, or else a function of lagged endogenous variables.

There exists different transition functions, each of them exibiting a specific adjustment mechanism of the endogenous variable's growth regimes (D. van Dijk and T. Teräsvirta, 2000).

Concerning the transition function G, a first order logistic function is commonly used and takes the following form :

$G (s_t ; \gamma ; c) = (1 + \exp\{(-\gamma(s_t - c)\})^{-1}, \quad \gamma > 0$, ( )

Equation ( ) represents a logistic function that admits a monotonic dynamics depending on the values of s_t. The corresponding STR model is called logistic STR (LSTR1).

Following the arguments of D. van Disk and T. Teräsvirta, (2000), this class of models is able to depict potentially different smooth transitions between phases of expansion and phases of contraction of the endogenous variable.

The logistic function is not the only candidate for supporting transition dynamics in STR models.
If we adopt the following transition function :

$G (s_t ; \gamma ; c) = (1 + \exp\{(-\gamma(s_t - c)^2\}, \quad \gamma > 0$ (6),

we obtain smooth adjustment dynamics that are similar between phases of expansion and phases of contraction of the endogenous variable. The STR model that incorporates this transition function is called exponential STR (ESTR).

It is also possible to use the second order logistic function :

$G (s_t ; \gamma ; c) = (1 + \exp\{(-\gamma(s_t - c_1)(s_t - c_2)\})^{-1}, \quad c_2 \geq c_1$ (7)

Using this function leads to the definition of a STR model called LSTR2.

Among the various classes of STR models, it is important to choose the one appropriate for the capital accumulation dynamics. To select a relevant STR model, we applied the methodology introduced by T. Teräsvirta (1994) that is a serie of embedded (overlapping) tests. From this methodology, we conclude that using an STR model is a relevant strategy to describe the dynamic process of capital accumulation, and more particularly LSTR1 models (equation (5)).

The generic model we implement is thus as follows :

$$\Delta k_t = c(1)^* \Delta k_{t-1} + c(2)^* \Delta Y_t + c(3)^* \Delta R_t + c(4)^* \Delta CF$$

{*Linear Component*}

+

$$(c(5)^* \Delta Y_t + c(6)^* \Delta R_t + c(7)^* \Delta CF)^*(1 + \exp\{(-c(8)^*(k_{t-1} - c(9))\})^{-1}$$

{*Non linear Component*} (8)

with, c(1) to c(4) the coefficients of the linear model ; c(5) to c(7) the possible parameters of the function ; c(8) = γ, the speed change of the constitutive values of the transition function ; c(9) = c, the regimes' change threshold ; the other variables are identical to those of the basic model.

At this stage, we need to specify its parametric structure. To estimate the parameters of the transition function (Non Linear Least Square), we use the results of the linear model, to define the vector of the initial values of the non linear component. Then, the Student Tests help us to select the relevant variables involved in the adjustment process. We thus eliminated the variables that were non significant at a 10% threshold (precision level). This contributes to explain why we cannot apply an identically calibrated STR model to each sub period (at least for the non linear component). Results of estimation are presented in the Tables 5-6. The shape of the various transition functions is presented in Graphs 8-9.

To our opinion, it is really important to notice that the transition functions reflect essentially the changes of the speed of the capital accumulation process. Indeed, the linear restriction tests do not conclude to the rejection of the *non-null* hypothesis of the constant parameter of the transition function. Comparing the transition functions does not offer any insight about changes of growth regimes, but only about dynamic reactions of the accumulation processes[2].

[2] According to D. van Dijk and T. Teräsvirta (2000), if the endogenous variable is a growth rate, and if the constant parameter is *null*, then STR models are able to discriminate periods of negative growth (depression) from periods of positive growth (expansion). This is not the case here.

We thus have the following relations :

- The speed of adjustment increases when the transition function tends to 1.
- Conversely, the speed of adjustment decreases when the transition function tends to 0.

One should note that the shape of the transition functions shows the reactions of the process to variations of the exogenous variables and also to exogenous shocks.

Table 5 : Period 1967:04 – 1981:01

	Coefficients	Student Error	t-Statistic	Prob.
C(1)*Δ(K_{t-1})	0.92	0.037	24.31475	0.0000
C(2)* Δ(Output)	0.15	0.055	2.73	0.0086
C(3)* Δ(Real Interest Rate)	0.002	0.004	0.47	0.64
C(4)* Δ(Cash-Flow)	0.014	0.013	1.09	0.28
C(5)* Δ(Cash-Flow)	0.325	0.047	6.85	0.00
C(6)* Δ(Real Interest Rate)	-0.026	0.007	-3.66	0.00
C(7)	1486.626	1456.205	1.02	0.31
C(8) * Δ(K_{t-1})	0.023471	0.00078	29.89	0.00

R^2	0.84	Ajusted R^2	0.82
Durbin-Watson stat	2.44	Prob(F-statistic)	0.00

Graph 8 : Transition Function (1967-1981).

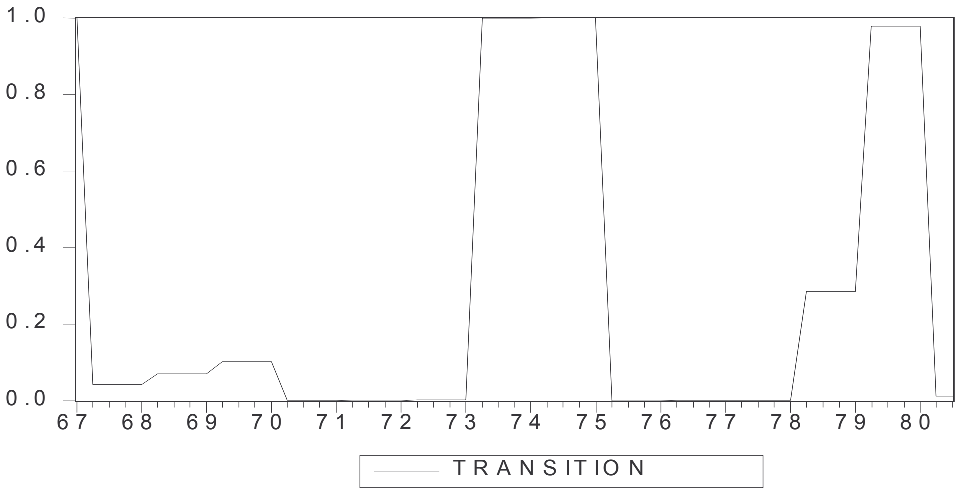
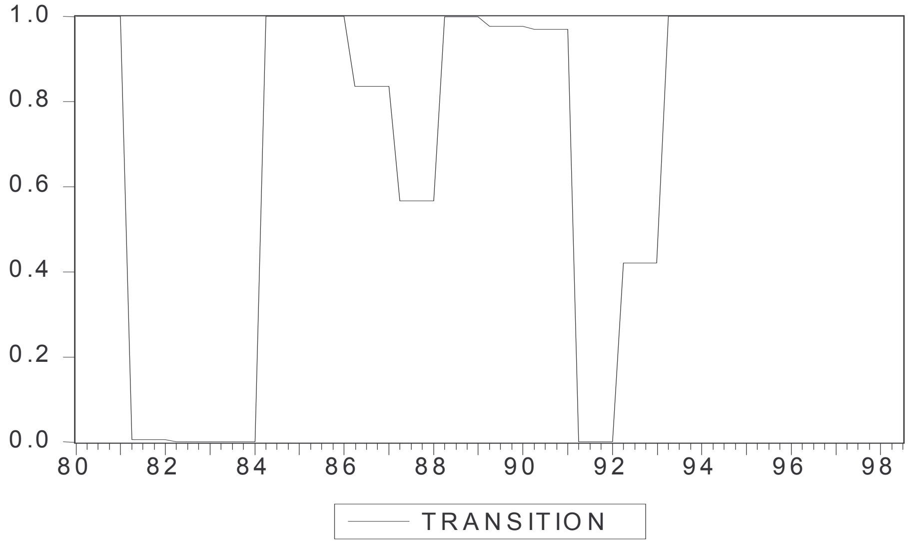


Table 6 : Period 1982:01 – 1997:03.

	Coefficients	Student Error	t-Statistic	Prob.
C(1)*Δ(K_{t-1})	0.88	0.034	25.55	0.00
C(2)* Δ(Output)	0.24	0.039	5.96	0.00
C(3)* Δ(Real Interest Rate)	-0.011	0.0057	-1.83	0.07
C(4)* Δ(Cash-Flow)	0.034	0.010	3.33	0.00
C(5)* Δ(Output)	-0.097	0.053	-1.82	0.07
C(6)	3940.861	12419.46	0.317313	0.75
C(7) * Δ(K_{t-1})	0.01	0.000528	18.65206	0.00

R^2	0.89	Ajusted R^2	0.88
Durbin-Watson stat	1.93	Prob(F-statistic)	0.00

Graph 9 : Transition Function (1982-1997).



This transition functions confirm the radical change of the shape of the equipment and software accumulation process, in the early 80's. More precisely, the first period (1967-1981) exhibits a deceleration of the transition function, while the second period (1982-1997) is characterized by a continuous acceleration of the accumulation process.

Moreover, and as a general feature, we notice a strong heterogeneity of the capital accumulation processes over the two sub-periods. More precisely, we observe that both the nature and the importance of the exogenous variables differ between 1967-1981 and 1982-1997. Even if the variations of GDP are always significant over the two periods, we should note that both interest rate and liquidity constraint are significant on the linear component of the model (i.e. on the long term accumulation process) only since 1982 (See Table 7). The results over the two sub-periods seem to confirm the impact of the major monetary policy change that occurs in the early 80's on the capital accumulation dynamics. Thus, the different impacts of the interest rate and the liquidity constraint confirm the Squares Cusum Tests about the variability of those parameters.

Table 7 : Impact of exogenous variables in the United States.

	USA (1967-1981)	USA (1982-1997)
Taux d'intérêt	NS	$S_{(-0.007*)}$
Produit	$SI_{(0.15**)}$	$SI_{(0.12**)}$
Cash-Flow	NS	$S_{(0.02*)}$

(Between brackets : coefficients values. ** : significant at 5% threshold. * : significant at 10% threshold. nS : non Significant impact. S : Significant impact. SI : Strong Impact.)

On the non linear component, we should note that USA exhibits different speeds of adjustment of the capital stock. In fact, the variables that are involved in the transition functions are not substitutes and are calibrated differently. Precisely, the real interest rate is directly implicated in the deceleration of the speed of equipment and computer expenditures over the period 1967-1981. On the other hand, and over the period 1982-1997, the real interest rate is not a significant variable, while the speed of capital accumulation increases. Those contrasted results over the two sub-periods could be explained by the evolution of the stability of the relation linking the decisions of the Federal Reserve Bank to investment expenditures.

To this respect, we distinguish between two cases :

1. Instability of the relation (1967-81) : the variations of the interest rate are directly involved in the observed changes of the speed of capital accumulation. This means implicitly that the monetary interventions have generated some distortions over the reactions of investment expenditures. Such distortions are captured by a strong variability of the transition function. One can note that the observed instability jointly came with a deceleration of the speed of capital accumulation dynamics over the 1967-1981 period. Liquidity contraints are also significant over the same period. In other words, monetary policy could generate important and lasting effects during the transition phases by affecting the speed of adjustment of capital stock.

2. Stability of the relation (1982-97) : the variations of the interest rate becomes neutral over the observed changes of the speed of capital accumulation[3]. This means implicitly that monetary interventions are no more a primary cause for the distortions of the transition function. One can note that the period of stability correspond to an acceleration of the speed of capital accumulation dynamics over 1982-1997 period. Within this period, the observed changes of the speed of capital accumulation are thus linked to the evolution of non monetary variables (variations of the amounts of sales) and also to exogenous shocks. The monetary policy produces *a priori* a neutral effect on the capital adjustment processes. This neutrality could be interpreted as a good management of the liquidity constraints of firms. The Neo-Austrian analysis (Hicks, 1973; Amendola-Gaffard, 1998) considers in fact, that during the transition phases, firms are affected by an increase of those liquidity constraints, because of the temporal dimension of production process and the irreversibility of investment. According to this theory, it is probable that the FED has fitted its interventions to the implementation of the new capital processes over 1982-1997 period.

[3] This observation concerns only the non linear component of the models …

Conclusion

A theme of this paper is that monetary policy is a relevant component of the capital accumulation processes. We explored the monetary impact both on the long term process and on the transition phases. In fact, the STR models we used reveal that the influence of the monetary policy on the investment decisions is totally different since the early eighties. Indeed, during the period 1967-1981, the monetary policy was directly implicated in the observed deceleration of the speed of the capital accumulation. We assume that the variations of short term interest rate were not appropriate with the economic conditions, because they contributed to destabilize the reactions of economic decision-makers, by generating some distortions over the investment expenditures. Unlike, since 1982, the variations of the interest rate are correlated with a substantial increase of equipment and computer stock, and moreover, with an acceleration of the speed of the capital accumulation.

Therefore, the STR models confirm the idea of change in the monetary regime of the FED, occurring in the early eighties. The stabilization of the reactions of firms, that is, the decrease of the variability of transition phases seems, to be a serious task for monetary policy. Furthermore, that research program will be making significant progress toward the development of a framework that will consider the appropriate monetary rule associated with the durability of investment decisions.

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