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ARE THERE GOODWIN EMPLOYMENT-DISTRIBUTION CYCLES? THEORETICAL AND EMPIRICAL EVIDENCE

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Eleonora Herrera

Resumen

El modelo predador-presa de Goodwin predice ciclos en el espacio empleo-distribución. Después de las controversias del capital de Cambridge, este modelo en particular no puede ser visto como teóricamente consistente. No obstante, se brinda evidencia a favor de comportamiento dinámico no lineal para una muestra de 67 países, algunos de los cuales presentan ciclos similares a los predichos por el modelo.

Palabras claves: modelo predador-presa, comportamiento dinámico no lineal, ciclos de demanda. **JEL:** E32, E19, O47.

Abstract

Goodwin's predator prey model predicts cycles in the employment distribution space. After the Cambridge capital controversies this particular model can not be seen as theoretically consistent. However, evidence is provided in favour of non-linear dynamic behaviour for a sample of 67 countries, some of which have cycles similar to those predicted by the model.

Key words: predator prey model, non-linear dynamic behavior, demand cycles. **JEL:** E32, E19, O47.

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Richard Goodwin's (1967, 1972) model of the growth cycle attempted to show how accumulation takes a cyclical form due to the interaction of capitalists and workers in a Marxian way. This simple theoretical model of endogenous cycles has been further explored in several directions including the realism of its assumptions, its stability and possible generalizations (Goodwin et al 1984); there has been less interest in performing empirical studies, although exceptions are Atkinson (1969), Desai (1984) Solow (1990), Harvie (2000) and Moreno (2002). This literature has provided evidence on single countries or on a small number of them, the largest sample so far being 10 OECD countries in the case of Harvie (2000).

The aim of the article is to provide evidence about employment distribution cycles *à la* Goodwin for a larger number of countries, including several degrees of development.

The model's central dynamics is a cyclical relationship between distributed shares and employment. This behaviour should underlie the dynamics of developed capitalist economies but it should also at least partially explain the behaviour of capitalist developing countries. If this relationship holds, it should appear in the scatterplots of the worker's share against the employment rate. On a quantitative level, the model's estimated centers can be compared with the actual centers of the cycles. Finally, Goodwin's assumptions can be tested to check for their validity. The procedure of looking for qualitative and quantitative evidence and testing the assumptions was performed by Harvie (2000), who found a quarter of a cycle for 10 OECD countries during the period between the late 1960's and the mid 1990's, which qualitatively supported the idea of a cycle. However, the estimated centers lied outside the actual cycles, while the assumptions were not justified, which meant that, at a quantitative level, the model was not adequate. Harvie's methodology is used here for a wider sample of countries in order to have a better grasp of the extent to which the model holds empirically and the directions for future developments.

However, before providing empirical evidence, care should be taken as this is an aggregate capital model and after the Cambridge capital controversies this is no lesser issue. This matter is discussed in section 2. Even if the model has theoretical problems, the question remains whether there are cycles in

the employment-distribution space. Section 3 provides evidence in this regard from a sample of 67 countries with different levels of development. Section 4 discusses the evidence and concludes with suggestions for future study.

Goodwin's model

Goodwin (1967, 1972) models the cyclical behaviour in the workers share of national income and the employment rate by means of the Lotka–Volterra predator–prey model (Lotka, 1956; Volterra, 1931A, 1931B, 1937). The model attempts to formally present Marx's idea that the interaction between distribution and employment was at the root of capitalism's booms and crises.

Assuming a constant relation of constant (the value of the means of production) to variable (wages) capital, both constant and variable capital will grow until full employment of labour is reached. In the vicinity of full employment, real wages will rise (i.e. a real Phillips curve), but rising real wages dampen accumulation, and thus the downturn begins.

Higher real wages diminish profits and, as a result, there is a lesser accumulation rate. However, the lower rate of accumulation will create unemployment, removing the disproportion between capital and exploitable labour-power. Real wages fall and accumulation starts again.

Goodwin assumes two factors of production: capital and labour. All quantities are real and net. Labour productivity (a) and the labour force (n) grow at constant rates (equations 1 and 2). Sigma is the fixed capital output ratio (equation 3), which determines the employment level, l (equation 4). k is the total stock of capital, q is real output, l is employment, w is the real wage, u , the workers' share of national income (equation 5); and v , the employment rate (equation 6).

$$a = a_0 e^{\alpha t}; \alpha > 0 \quad (1)$$

$$n = n_0 e^{\beta t}; \beta > 0 \quad (2)$$

$$\sigma = k/q \quad (3)$$

$$l = q/a \quad (4)$$

$$u = \frac{wl}{q} = \frac{w}{a} \quad (5)$$

$$v = \frac{l}{n} \quad (6)$$

$$\dot{k} = (1-u)q \quad (7)$$

$$\frac{\dot{w}}{w} = -\gamma + \rho v, \quad \gamma > 0, \rho > 0 \quad (8)$$

Capitalists are assumed to save and invest all their profits and workers to consume all their wages (equation 7). Finally, a linear real Phillips curve is assumed, i.e. real wages rise as employment increases (equation 8).

From equations (1)–(8) a pair of differential equations in the state variables u and v can be obtained:

$$\dot{u} = [-(\alpha + \gamma) + \rho v]u \quad (9)$$

$$\dot{v} = \left[\frac{1-u}{\sigma} - (\alpha + \beta) \right] v \quad (10)$$

The solution of the model is a family of closed cycles around a centre, i.e., the economy comes back to the initial point and starts the cycle again.

Capital theory problems

As it is clear in the equations, the model assumes aggregate capital. It should be noted that the model is inspired in an explanation given by Marx in Chapter 25 of volume I of *The Capital*. (Goodwin, 1972, p. 442). (Marx, [1887] 1974, p. 575). Here Marx assumes a given rate of constant to variable capital, which is equivalent to Goodwin's constant ratio of output to capital.

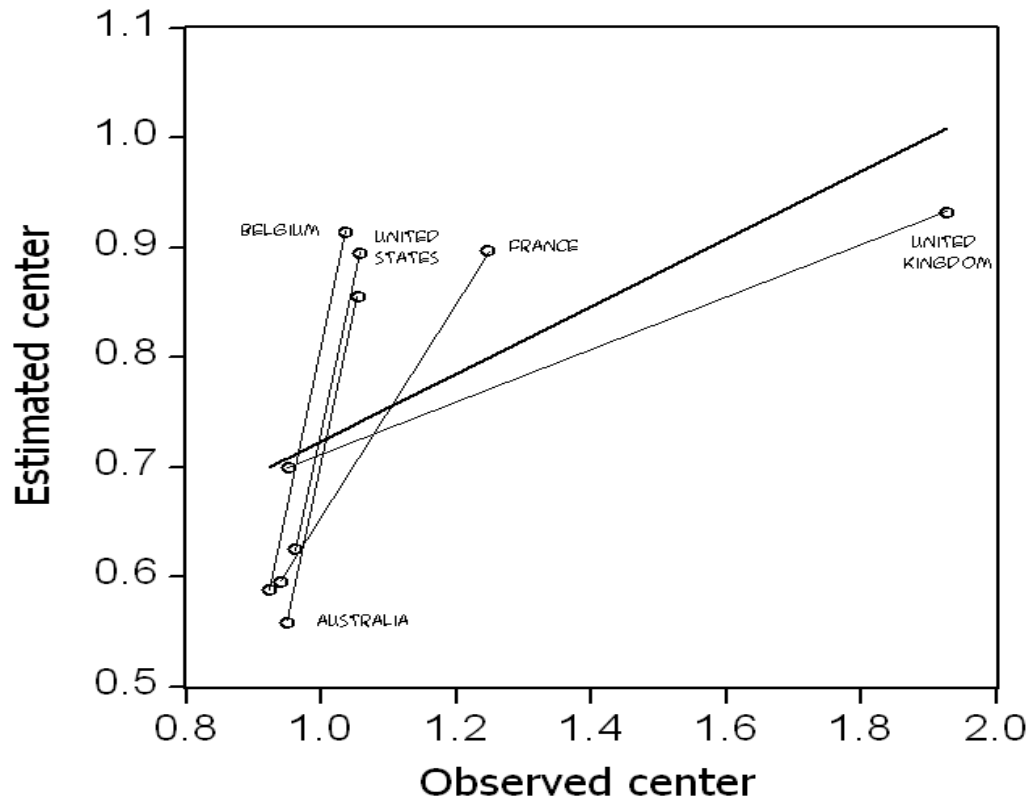
However, it should also be noticed that, as this is Volume I, Marx assumes equal organic composition in all sectors, i.e. a single capital good (Pasinetti). This would not be a problem for Marx, as he is concerned with the behaviour of social capital and in Volume III he would consider the transformation problem and the existence of several organic compositions of capital among sectors, but Goodwin's model remains in a one commodity world.

After the Cambridge controversies (Harcourt, 1975) and Sraffa's (1960) contribution, it is clear that any measure of capital as an aggregate will be dependent on distribution, hence, dealing with aggregate capital would not be a big problem, provided distribution remained constant or its effect on the value of capital were taken into account.

Nevertheless, this is precisely Goodwin's weak point. For what he tries to explain is the cyclical behaviour of distribution. Therefore, capital cannot be taken as independent variable. Assuming a constant technology and a constant rate of growth, the value of capital could vary in the same or the opposite direction of the rate of profits depending on the concavity of the wage profits curve, i.e. on the price Wicksell effects. If several techniques are available, real Wicksell effects should also be taken into account. This amounts to say that empirical measures of capital would be biased in any direction along a Goodwin cycle, which might explain why the estimated centers lie outside of the observed cycle (Figure 1)¹. But this is not the only problem as, during an estimation period of several decades, technology is bound to change, and therefore new potential Wicksell effects will appear and others disappear. Hence, quantitative evidence based upon the calculation of the centre using the amount of capital would only be valid if positive or negative Wicksell effects were shown to be not important during the period. Hence, the centers lying outside the circle is not really empirical evidence against the model. However, the dependence on a given path for aggregate capital at the same time as endogenous changes in distribution speaks against the consistency of this particular model.

¹ Figure 1 is on the employment distribution plane. Actual centres tend to be closer to the x axis than estimated centres and the distance is large among the two point for countries with actual cyclical behaviour.

Figure 1: Difference between observed and estimated centers points



It should be said in favour of Goodwin that he was trying to make a first didactical approximation to the problem of endogenously explaining cycles. However, this would not be a solid explanation to explain real world phenomena unless we take this problem seriously. Otherwise, we would be accepting Goodwin's model as a *parable* in the same way Samuelson accepted the neoclassical production function.

Several ways ahead are possible. One would be the improvement of non-linear estimation methods appropriate for the model, such as that of Dibeh et al (2007). This would account for better estimates although it would not solve in principle the theoretical problem of treating capital as measured independently on a changing distribution.

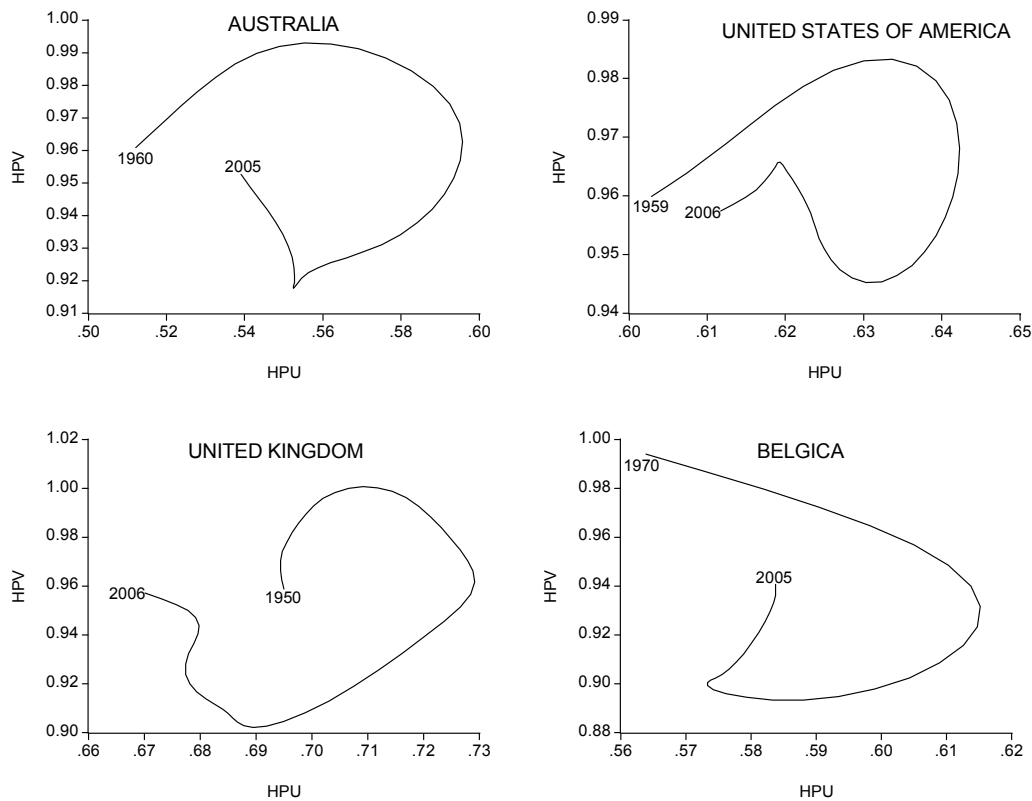
A second possibility would be to work on heterogeneous capital versions of the model. This avenue would take some time to develop due to the complications of non-linear multiple commodity modeling.

A third possibility would be to expand qualitative assessments to wider groups of countries in the hope of eventually finding stylized facts that can be introduced in more realistic versions of the model. A first step in this direction will be given in the next section.

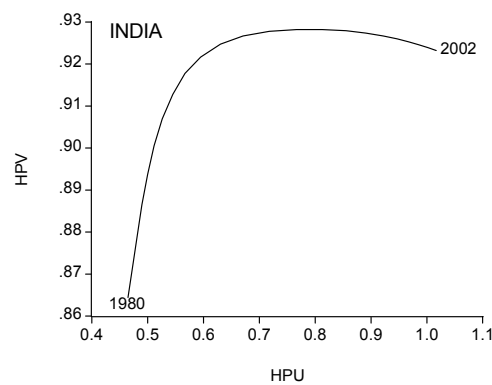
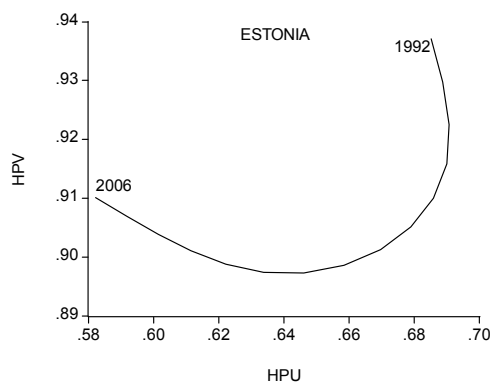
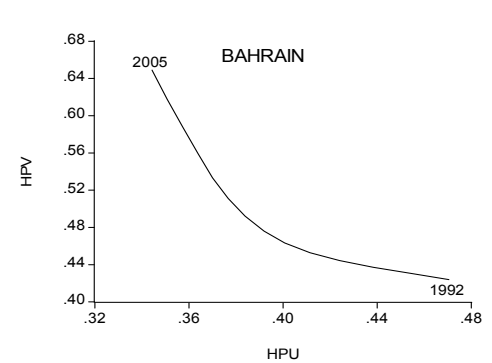
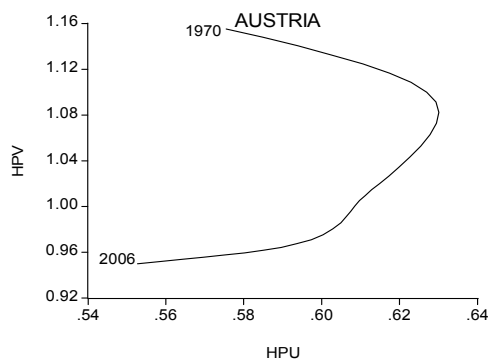
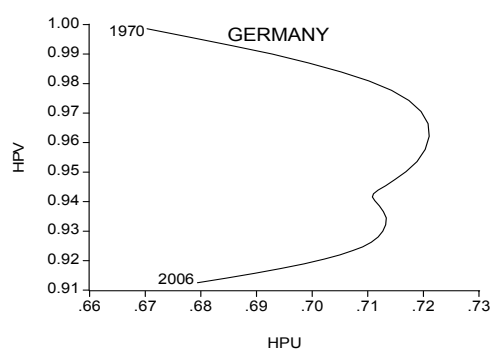
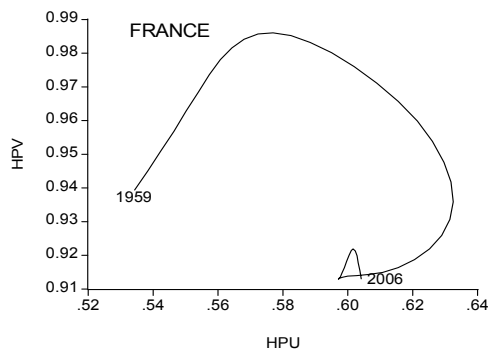
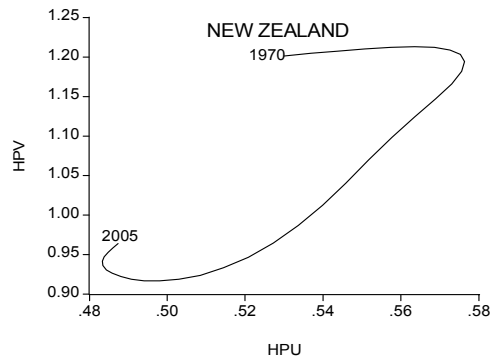
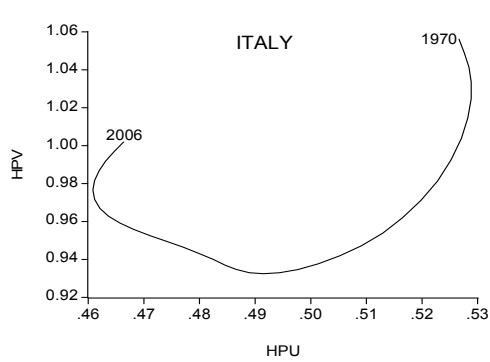
Are there distribution-employment cycles?

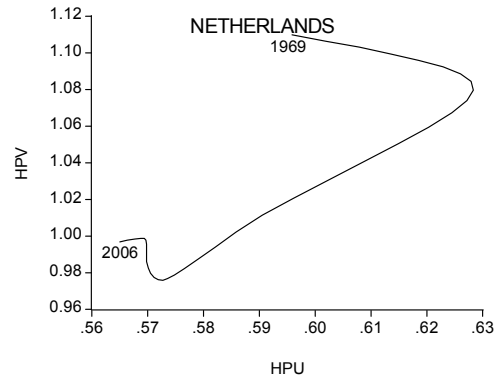
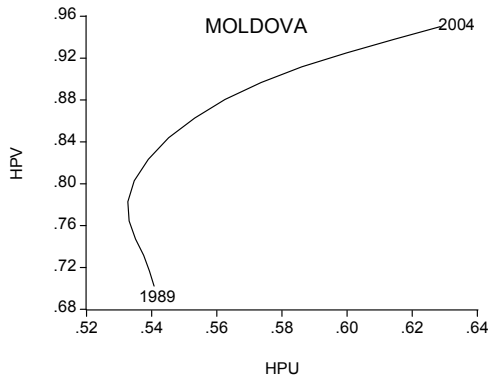
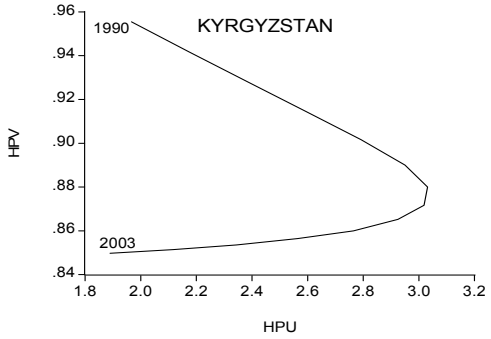
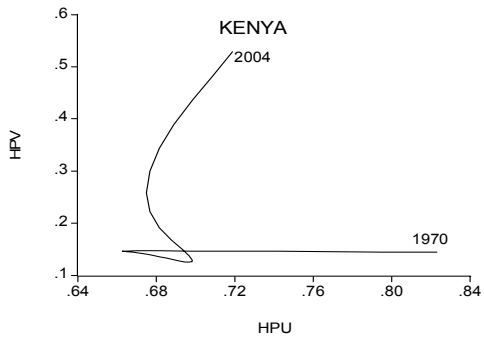
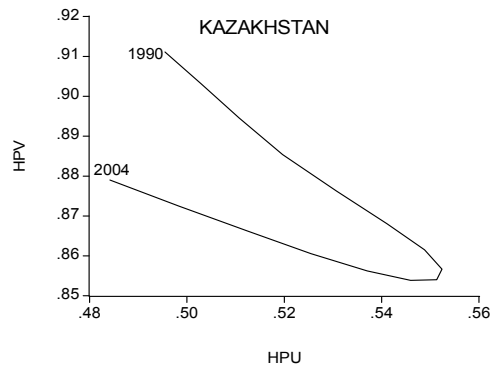
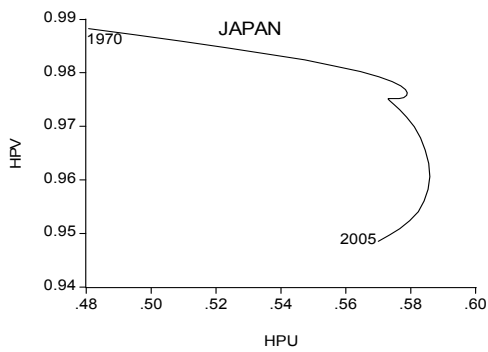
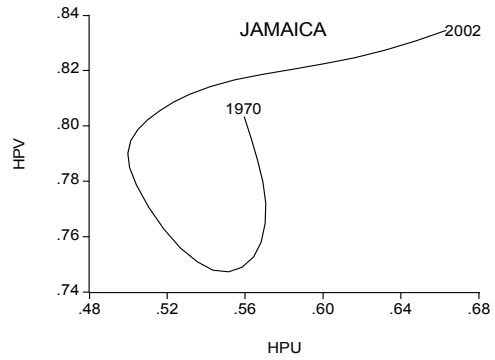
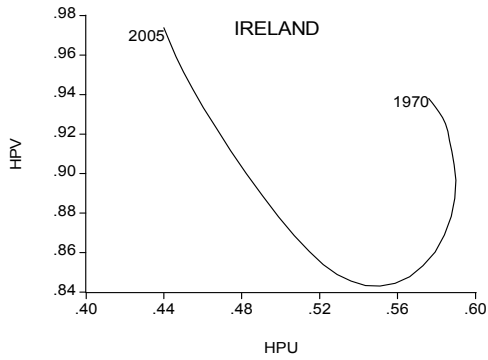
The scatterplots of the share of wages against the employment rate were made for 67 countries. The results were widely diverse. A group of twenty-six countries (Australia, Austria, Belgium, France, Germany, Italy, New Zealand, United Kingdom, United States, Bahrain, Estonia, India, Ireland, Jamaica, Japan, Kazakhstan, Kenya, Kyrgyz Republic, Moldova, Netherlands, Panama, Slovakia, Sri Lanka, Thailand, Tunisia and Zimbabwe) behaves in the way predicted by the model.

Figure 2: GOODWIN CYCLES

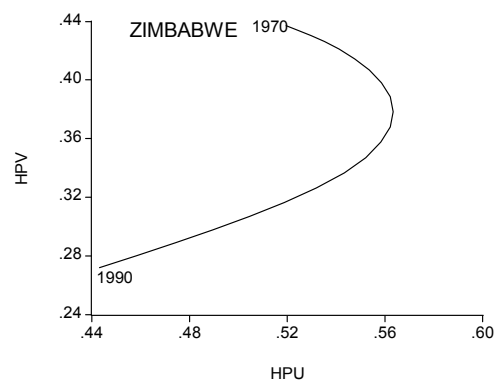
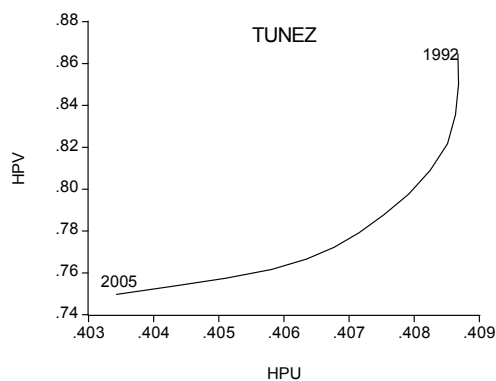
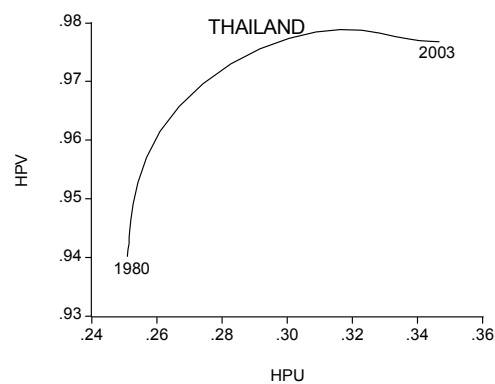
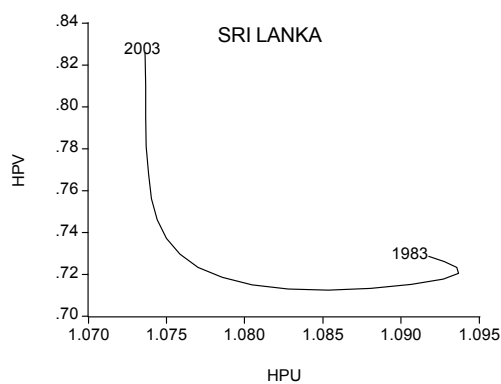
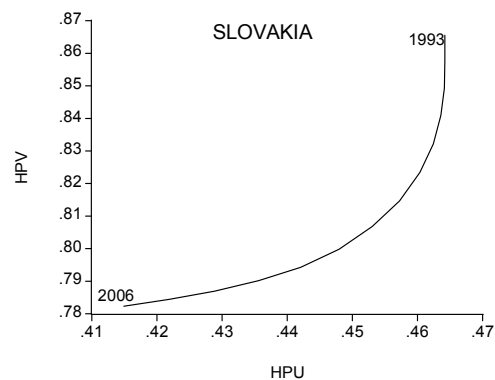
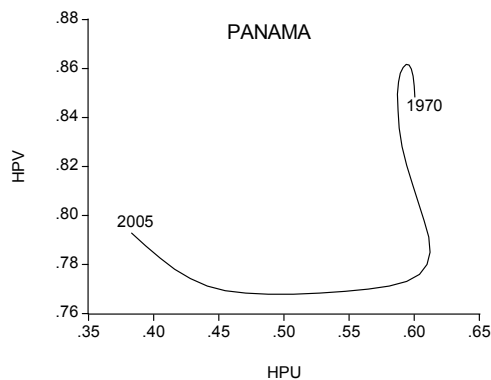


ARE THERE GOODWIN EMPLOYMENT-DISTRIBUTION CYCLES? THEORETICAL AND EMPIRICAL EVIDENCE





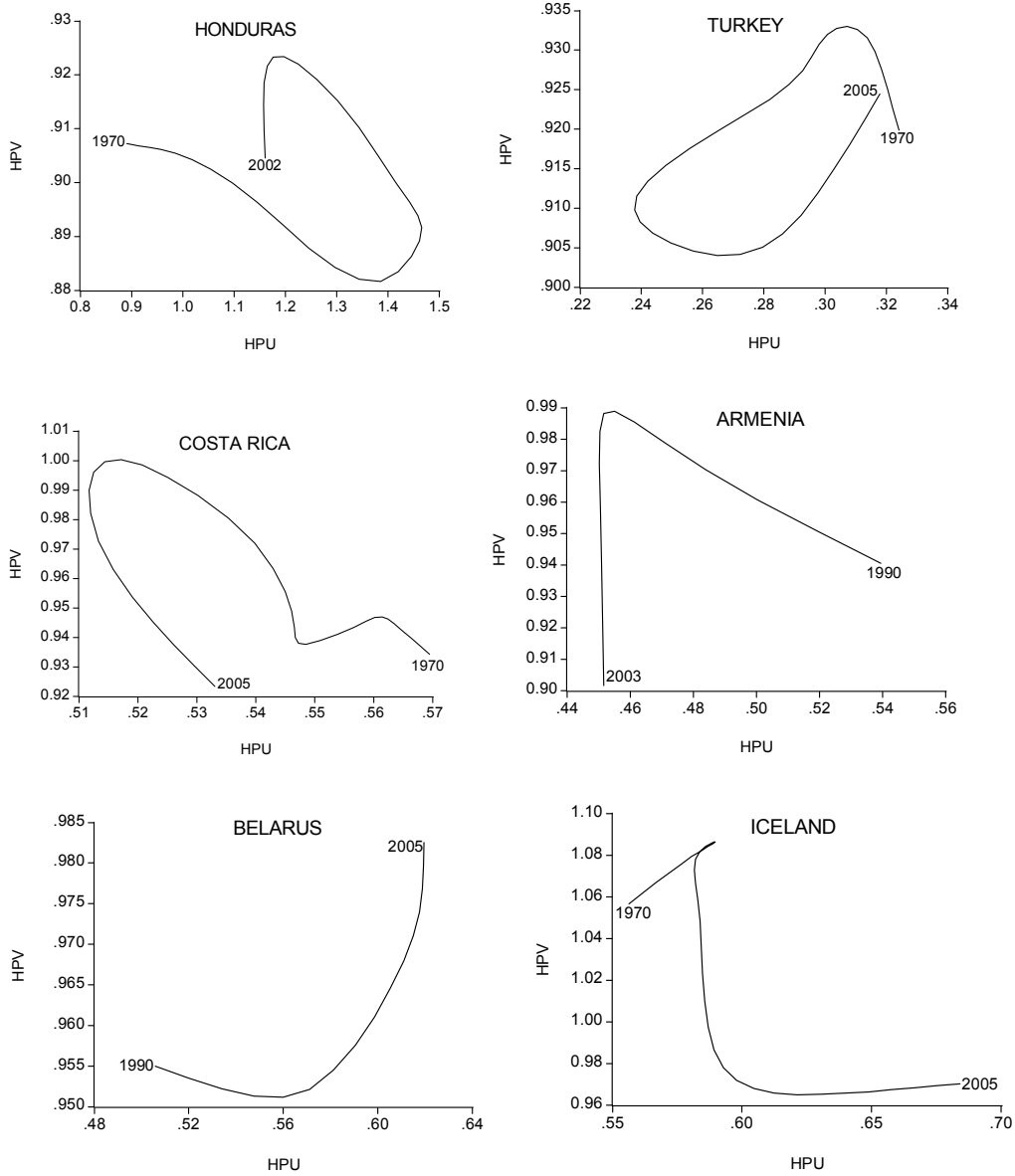
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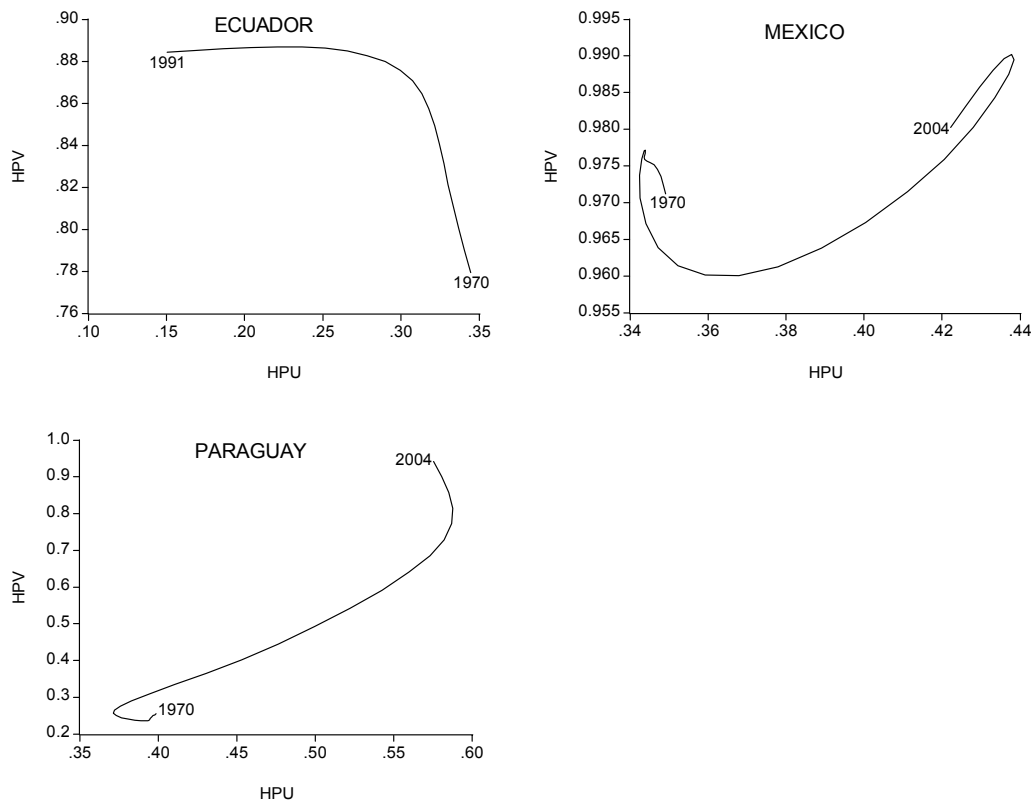
A second group comprised of nine countries (Costa Rica, Honduras, Turkey, Armenia, Belarus, Iceland, Ecuador, Mexico and Paraguay), have a cycle in the opposite direction, that is, they do not show evidence of profit squeeze but rather of Keynesian-like or demand-pushed cycles such as the one found by Barbosa-Filho and Taylor (2003) for the United States. For a third group of thirty two countries (Algeria, Bolivia, Botswana, Brazil, Canada, Chile, Colombia, Czech Republic Denmark, Finland, Greece, Hong Kong, Jordan, Kuwait, Luxembourg, Malta, Mauritius, Namibia, Norway, Peru, Poland, Portugal, Russian Federation, South Africa, South Korea, Spain, Sweden,

Switzerland, Tanzania, Trinidad and Tobago Ukraine and Venezuela) there is no evidence of a cycle.

Figure 3: DEMAND CYCLES

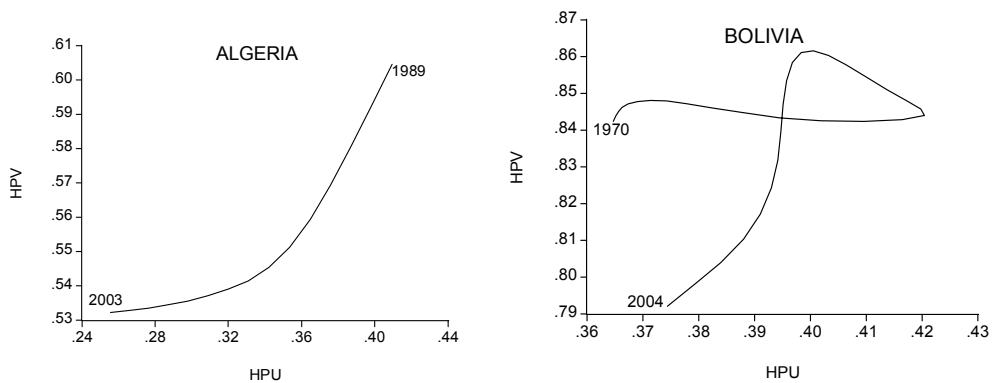


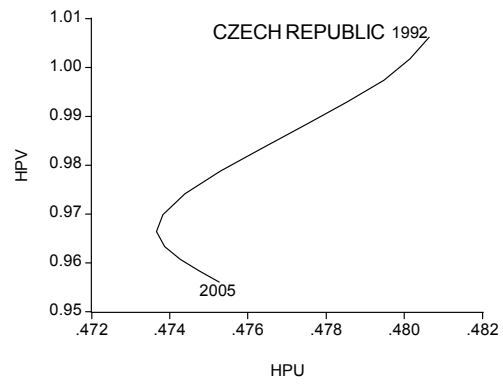
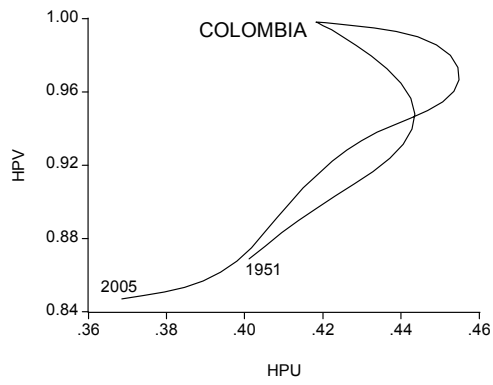
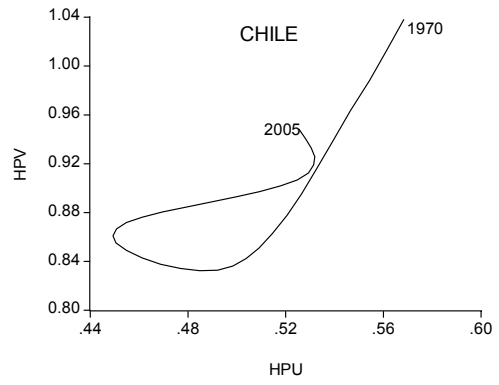
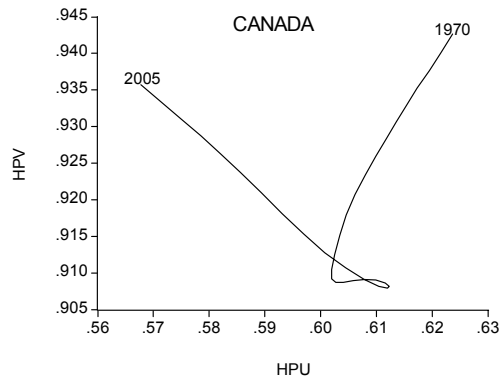
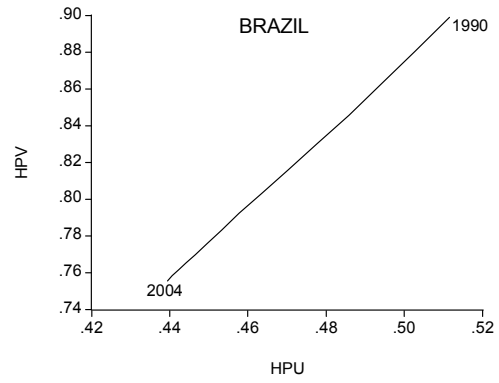
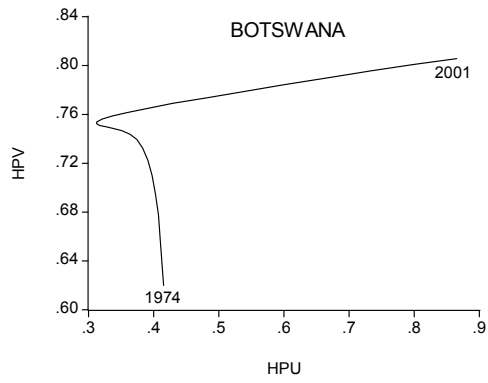
ARE THERE GOODWIN EMPLOYMENT-DISTRIBUTION CYCLES? THEORETICAL AND EMPIRICAL EVIDENCE



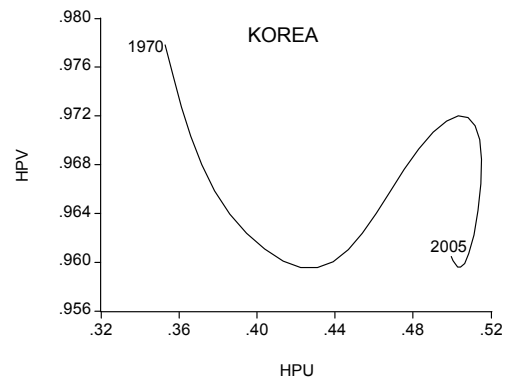
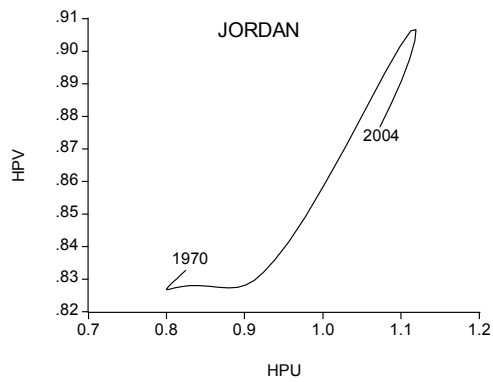
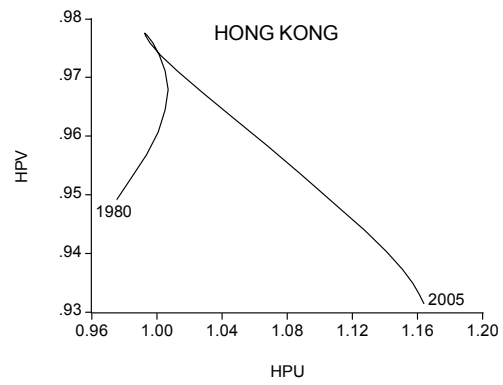
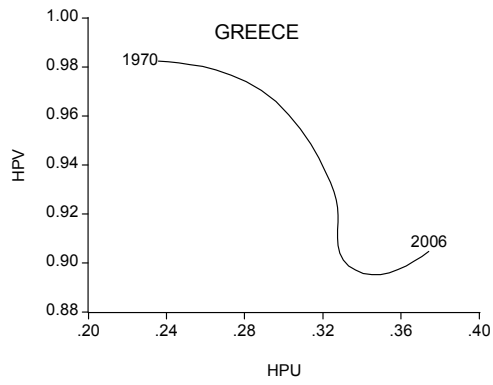
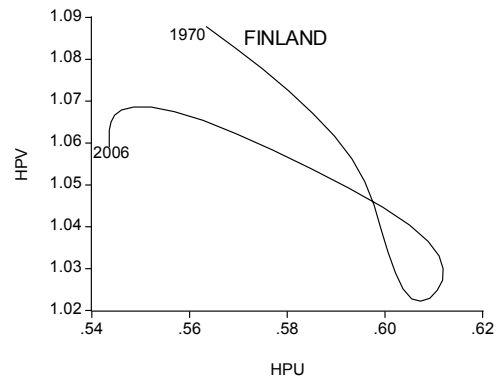
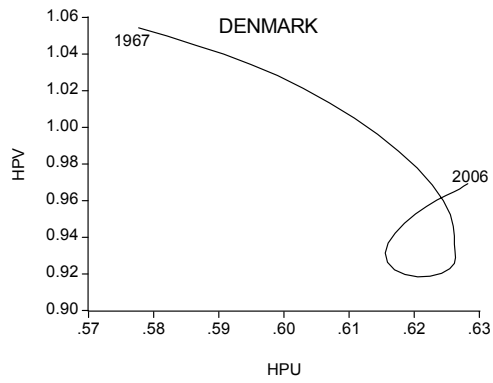
A third group of countries has no clear tendency but behaviour is too diverse to be catalogued here.

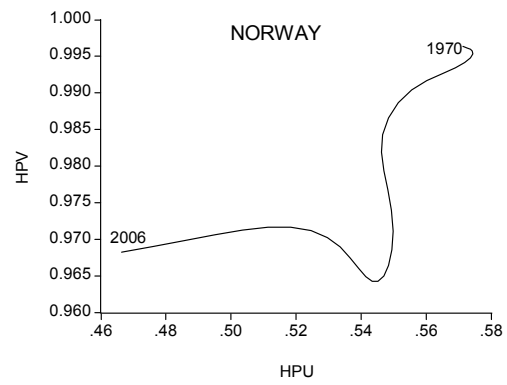
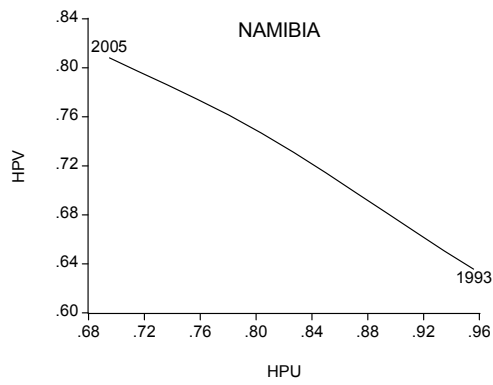
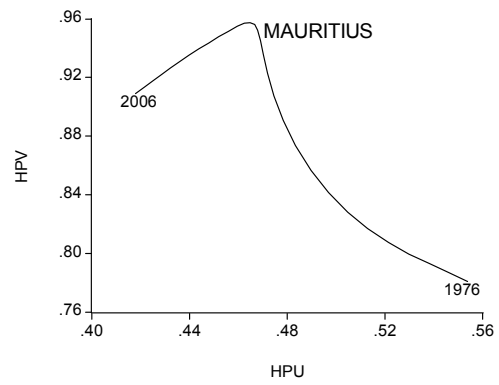
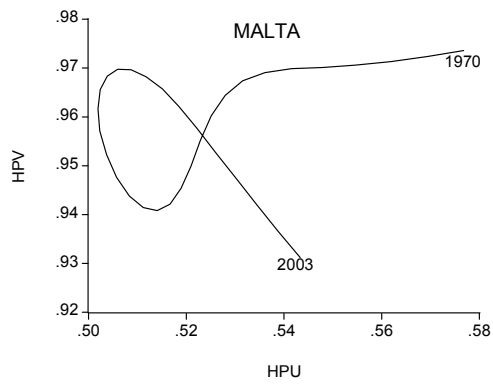
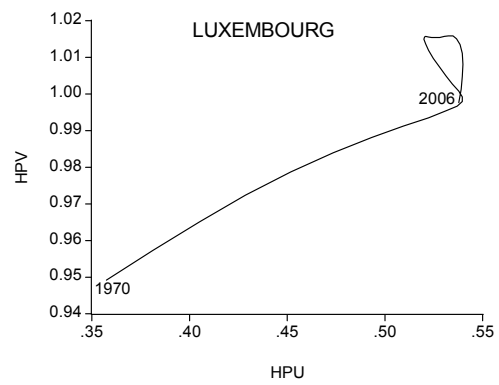
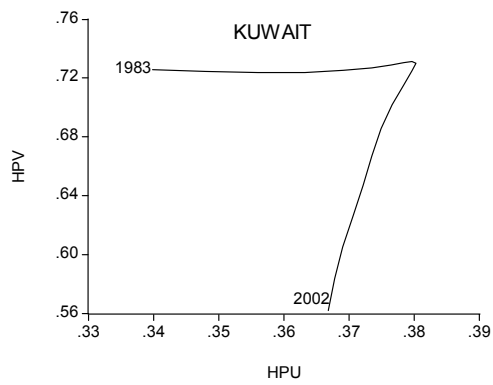
Figure 4: Atypical Behaviour



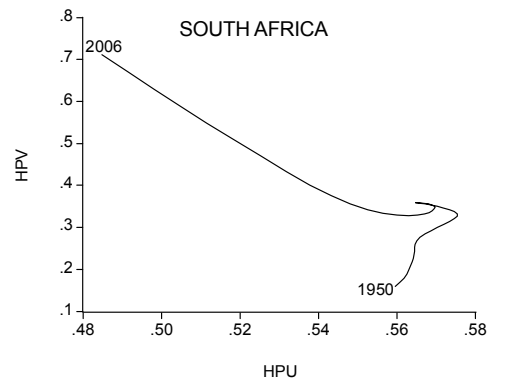
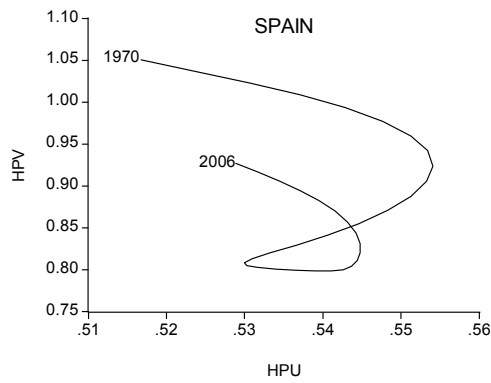
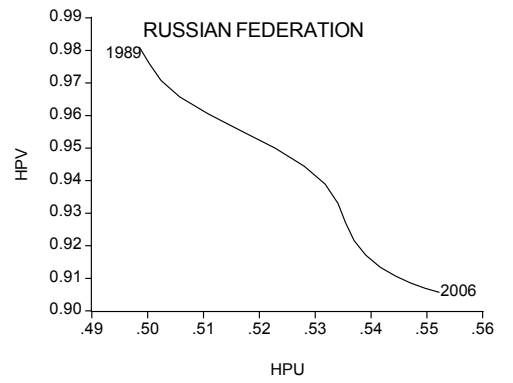
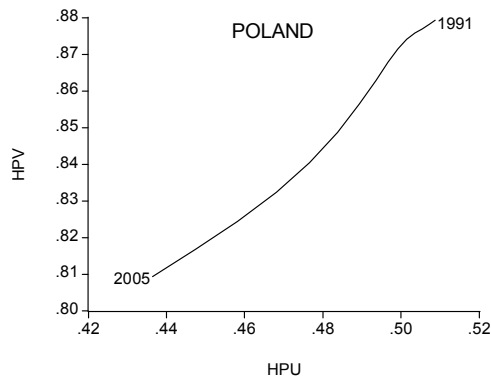
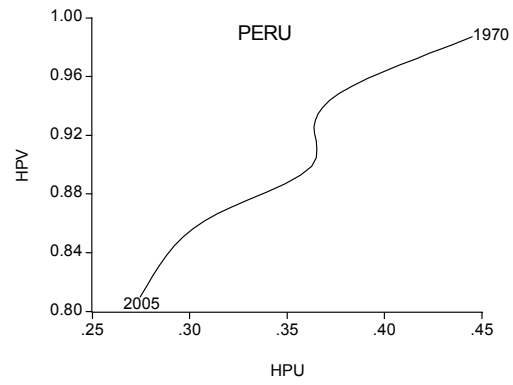
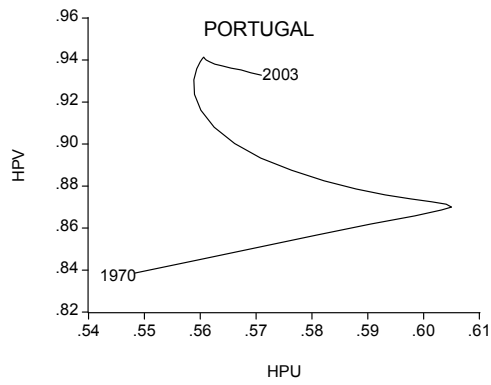


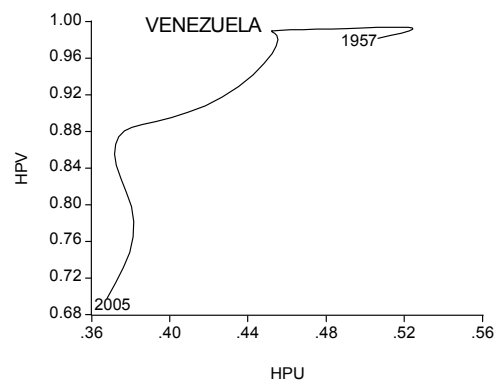
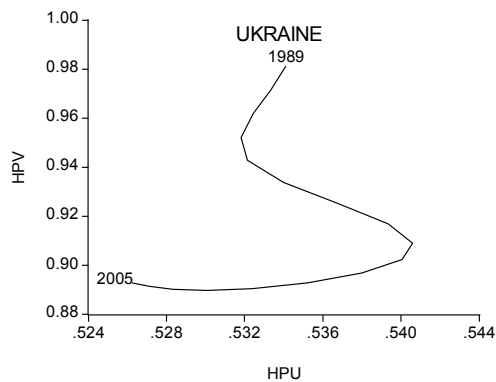
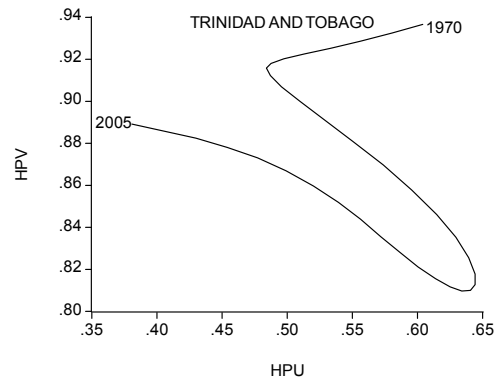
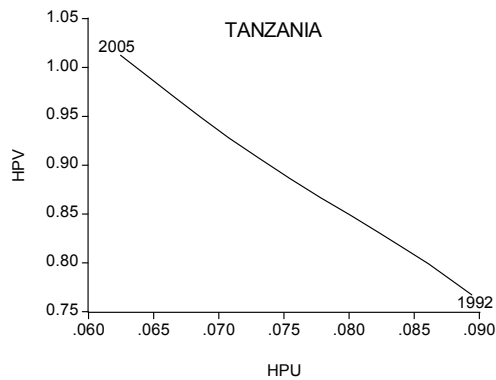
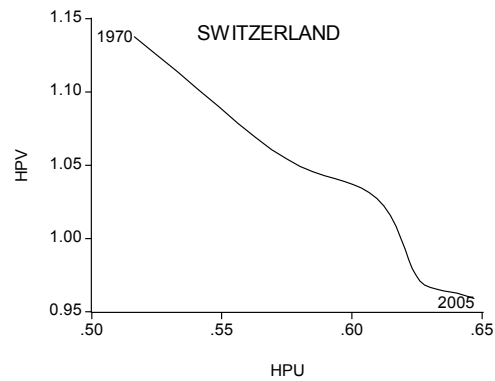
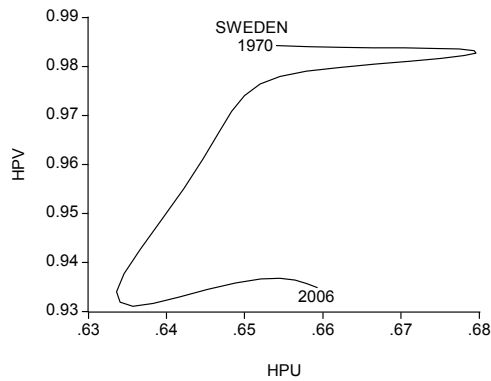
ARE THERE GOODWIN EMPLOYMENT-DISTRIBUTION CYCLES? THEORETICAL AND EMPIRICAL EVIDENCE





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It should be noticed that the results are not clearly related to the degree of development as measured by the income per capita. However, high income countries behave either in the way predicted by Goodwin or in an atypical fashion, not in a demand cycle way; middle income countries show all dynamics, either Goodwin, demand or atypical, although African, European and American countries tend to be atypical; and low income countries tend to show Goodwin cycles. This can be seen in table 1.

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TABLE 1: Type of Cycle vs. Income per Country

		INCOME		
		High	Middle	Low
T y p e o f C y c l e	Goodwin	America	America	Africa
		United States	Jamaica	Kenya
		Asia	Panama	Zimbabwe
		Bahrain	Africa	Asia
		Japan	Tunisia	India
		Europe	Asia	Kyrgyz Republic
		Austria	Kazakhstan	Europe
		Belgium	Sri Lanka	Moldova
		France	Thailand	
		Germany	Europe	
		Ireland	Estonia	
		Italy	Slovak Republic	
		Netherlands	Oceania	
		United Kingdom	New Zealand	
		Oceania		
		Australia		
	Europe	America	America	
	Iceland	Costa Rica	Honduras	
		Ecuador	Asia	
		Mexico	Armenia	
		Paraguay		
		Asia		
		Turkey		
		Europe		
		Belarus		
	America	Africa	Africa	
	Canada	Algeria	Tanzania	
	Asia	Botswana		
	Hong Kong, China	Mauritius		
	Kuwait	Namibia		
	Europe	South Africa		
	Denmark	America		
	Finland	Bolivia		
	Greece	Brazil		
	Luxembourg	Chile		
	Norway	Colombia		
Spain	Peru			
Sweden	Trinidad and Tobago			
Switzerland	Venezuela, RB			
	Asia			
	Jordan			
	Korea, Rep.			
	Europe			
	Czech Republic			
	Malta			
	Poland			
	Portugal			
	Russian Federation			
	Ukraine			
Atypical Behaviour				

Source: The information for this table was obtaining base on the estimation on GDP per capita made by the World Bank for 2005.

One possible explanation for this diversity is that capitalism has evolved in several ways in different countries according to different kinds of institutions, particularly labour market institutions. As noted by Arrighi and more recently by Robinson, institutional development may be linked to the pattern of population and migration.

The institutions regulating capital also differ between countries. A few countries (mainly Anglo-Saxon ones) rely on more atomistic shareholders and individual firms. In contrast, most other countries have business groups with controlling shareholders being much more important than the typical textbook would believe (La Porta). In general, institutions might help to classify the different kinds of capitalism and help to understand diversity in the behaviour between distribution and employment.

With regard to quantitative evidence, the theoretical centers of the cycles lied outside of the cycles in all cases, as it happened in Harvie (2000), while the Phillips curve only hold for thirty nine countries.

Note that twenty-one countries had the expected qualitative behaviour despite the Phillips curve not holding. A particular problem of the real Phillips curve is that Goodwin assumes a linear version of it in order to obtain the Predator Prey equations. However, it would be more reasonable to believe that wages would only increase near full employment, not before, which would suggest a non-linear version. However, a more realistic version would make model building far too complicated.

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Table 2: Significance of the Phillips curve

Country	Significance of the Phillips Curve variables	
	γ	ρ
Algeria		
Australia	*	*
Belgium	***	***
Bolivia		
Brazil		
Canada	**	**
Chile	**	**
Colombia		
Costa Rica	*	**
Denmark	**	**
Estonia		
Finland		
France	***	***
Greece		
India		
Ireland		*
Jamaica		
Japan		*
Kazakhstan		
Kyrgyz Republic	***	***
Luxembourg	**	**
Malta	*	**
Mauritius	***	***
Mexico	***	***
Moldova		
Namibia		
Norway		
Poland		
Portugal	*	**
Russian Federation	**	**
South Korea	***	***
Switzerland		
Thailand	**	**
Trinidad & Tobago	***	***
Turkey		
Ukraine	***	***
United Kingdom	*	*
United States		*
Venezuela		

Note: *** (***) (*) indicates parameters test statistics is significance at 1 %,(5%) (10%) 2 tail test

Conclusions

Goodwin's simplified mathematical model is subject to the Cambridge criticism because it assumes the amount of capital to change independently from endogenously determined distribution. This is not to deny its value because it implies that a one commodity world would present endogenous cycles, which is a relevant proposition, given that the mainstream of the profession deals with one commodity exogenous cycles.

However, when trying to understand real-world problems the evidence is mixed. For the sample of 67 countries, evidence of cycles similar to those predicted by Goodwin was found for twenty six countries. Evidence of demand led cycles was found for nine countries. And no clear evidence of cyclic behaviour was found for the remaining (32 countries). The diversity is not readily related to the degree of development and it was suggested that explaining it would require a better understanding of the different ways of capitalism evolved around the world.

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Appendix

Table 3: Average growth rate for productivity and population

Country	GROWTH RATES (50 years)	
	Productivity α	Population β
Algeria	1,6%	3,4%
Australia	2,2%	2,0%
Belgium	2,6%	0,4%
Bolivia	0,8%	2,8%
Brazil	2,4%	3,0%
Canada	2,2%	1,9%
Chile	1,8%	2,4%
Colombia	1,9%	3,2%
Costa Rica	2,1%	3,6%
Denmark	2,3%	0,6%
Estonia*	-0,3%	-1,5%
Finland	2,9%	0,3%
France	2,6%	0,7%
Greece	3,4%	1,3%
India	2,3%	1,7%
Ireland	3,7%	1,5%
Jamaica	1,3%	1,4%
Japan	4,3%	0,9%
Kazakhstan*	1,0%	-0,1%
Kyrgyz Republic*	-1,9%	1,3%
Luxembourg	2,8%	2,1%
Malta	1,0%	1,2%
Mauritius	7,9%	2,1%
Mexico	2,1%	3,5%
Moldova*	-5,8%	-2,7%
Namibia	3,0%	-2,4%
Norway	3,0%	1,1%
Poland	1,9%	-0,2%
Portugal	4,1%	0,8%
Russian Federation*	-0,7%	-0,2%
South Korea	6,0%	2,5%
Switzerland	1,5%	1,3%
Thailand	4,5%	1,5%
Trinidad & Tobago	2,3%	1,6%
Turkey	2,6%	1,5%
Ukraine*	-3,2%	-1,2%
United Kingdom	2,1%	0,4%
United States	2,1%	1,8%
Venezuela	-0,1%	3,8%

* The data for this countries is only available since 1989

Econometric estimation

For the econometric estimation we follow Harvie's methodology for all variables of the model, in addition the state variables, i.e. u , v were pass through the Hodrick – Prescott Filter in order to release the tendency. For the productivity growth, labor force growth and the Phillips curve estimation the parameters were estimate using ordinary least square (OLS) regressions. For countries with more than 17 data observation, we run a unit root test and a cointegration test

Parameter estimation

Productivity growth σ

It assume like an exponential productivity growth function $a = a_0 e^{\alpha t}$, where α is the constant growth rate. This is the parameter estimate for each country using (OLS), by the following equation

$$\ln a_t = \ln \hat{a}_0 + \hat{a}_t + \varepsilon_{1t} \quad (11)$$

Labour force growth β

Using a similar exponential function for the labour force growth $n = n_0 e^{\beta t}$, where β is the constant growth rate and using the same estimation methodology with (OLS) by the following equation

$$\ln n_t = \ln \hat{n}_0 + \hat{n}_t + \varepsilon_{2t} \quad (12)$$

Capital-output ratio σ

In the model, Goodwin assumes a constant capital-output ratio $\sigma = k/q$ so a simple estimation of the mean for the variable was calculate for each country.

Phillips curve γ and ρ

For the mayor purpose of the model, we calculated a long run Phillips curve by the following equation

$$w_t = -\gamma + \rho v_t + \phi w_{t-1} \quad (13)$$

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Greece

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Hong Kong

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Slovakia

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South Africa

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Spain

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Results

The rest of the countries cant not be analyzed because the variables of the Phillips curve was positive which means that the model can not be run under this circumstance.

There are two capital/output ratio parameter estimated $\hat{\sigma}$ was calculated from a different database including The International Institute for Applied Systems Analysis, Christophe Kamps, Kiel Institute for World Economics and Marcos Souza y Aumara Feu (2005). The other capital/output ratio σ^* was taken from Nehru - Dhareshwar (1993) for some countries, the aim of this methodology was compare this different way of estimation and its impact on the results. Note that there is no a big difference between the two estimations despite of the change on the capital/output ratio.

The variables U and V are the central points of the closed cycle and T are the period, σ Productivity growth, β Labour force growth, σ Capital-output ratio and γ, ρ are the Phillips curve parameters, where

$$u^* = 1 - (\alpha + \beta)\sigma \quad (14)$$

$$v^* = (\alpha + \beta) / \rho \quad (15)$$

$$T = \frac{2\pi}{\left[(\alpha + \gamma) \left(\frac{1}{\sigma} - (\alpha + \beta) \right) \right]^{1/2}} \quad (16)$$

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Table 4: Estimation of cycle's centers and periods

PARAMETER	Capital/output ratio		Center and period estimate with capital/output ratio σ^*			Center and period estimate with capital/output ratio $\hat{\sigma}$		
	σ^*	$\hat{\sigma}$	U^*	V^*	T^*	\hat{U}	\hat{V}	\hat{T}
COUNTRY								
ALGERIA	2,4	2,4	0,883	4,324	4,018	0,883	4,324	4,018
AUSTRALIA	3,5	4,5	0,855	1,056	36,349	0,812	1,051	42,492
BELGIUM	2,8	3,2	0,913	1,035	35,759	0,902	1,035	38,329
BOLIVIA	4,3	1,6	0,846	0,736	0,120	0,944	0,736	0,068
BRAZIL	1,9	2,6	0,896	0,789	1,183	0,861	0,789	1,398
CANADÁ	2,6	3,4	0,894	0,783	30,690	0,863	0,783	35,535
CHILE	2,3	2,1	0,902	0,873	0,072	0,911	0,873	0,069
COLOMBIA	1,7	1,6	0,914	0,661	4,556	0,918	0,661	4,436
COSTARICA	1,8	1,5	0,897	0,817	3,668	0,913	0,817	3,332
DENMARK	2,9	3,3	0,914	0,962	20,034	0,904	0,962	21,206
ESTONIA	4,5	4,6	1,081	1,001	22,910	1,083	1,001	23,166
FINLAND	3,8	4,3	0,878	1,564	51,404	0,860	1,564	55,687
FRANCE	3,2	3,2	0,897	1,247	41,352	0,895	1,247	41,643
GREECE	2,7	2,9	0,874	9,267	58,762	0,865	9,267	60,991
INDIA	2,6	2,6	0,898	0,769	5,096	0,898	0,769	5,096
UNITED KINGDOM	2,7	1,7	0,931	1,927	50,995	0,956	1,930	40,212
IRELAND	2,9	2,3	0,850	2,052	48,211	0,880	2,052	42,360
JAMAICA	5,3	5,3	0,856	0,484	45,965	0,856	0,484	45,965
JAPAN	3,3	5,8	0,829	0,861	2,938	0,696	0,861	4,278
KAZAKHSTAN	5,5	5,6	0,950	0,872	0,756	0,949	0,872	0,766
KOREA	2,3	2,3	0,807	0,951	0,793	0,807	0,951	0,793
KYRGYZSTAN	4,4	4,5	1,024	0,851	2,354	1,025	0,852	2,390
LUXEMBURGO	3,3	3,3	0,841	1,055	31,124	0,841	1,056	31,124
MALTA	3,0	3,0	0,933	0,923	2,480	0,933	0,923	2,480
MAURITIUS	2,6	2,6	0,737	0,982	19,617	0,737	0,986	19,617
MÉXICO	2,0	2,1	0,888	0,957	8,543	0,886	0,957	8,638
MOLDOVA	4,1	4,4	1,348	0,752	1,481	1,379	0,752	1,528
NAMIBIA	3,9	3,9	0,975	2,530	47,100	0,975	2,530	47,100
NORWAY	4,3	3,8	0,825	1,229	24,300	0,846	1,229	22,547
POLAND	2,1	2,2	0,963	0,809	4,247	0,963	0,809	4,286
PORTUGAL	3,5	1,7	0,828	1,532	47,744	0,917	1,535	31,532
RUSSIAN FEDERATION	4,6	4,8	1,044	0,897	2,385	1,046	0,897	2,439
SWITZERLAND	3,6	0,8	0,897	0,976	49,405	0,978	1,013	21,673
THAILAND	2,4	2,4	0,857	0,996	15,260	0,857	0,995	15,260
TRINIDAD Y T.	1,7	1,7	0,935	0,845	11,589	0,935	0,845	11,589
TURKEY	2,3	2,3	0,906	2,067	47,506	0,906	2,067	47,506
UKRAINE	4,5	4,9	1,199	0,893	0,309	1,215	0,893	0,319
UNITED STATES	2,7	2,9	0,895	1,057	36,678	0,889	1,057	37,724
VENEZUELA	2,5	1,8	0,908	0,713	3,713	0,934	0,713	3,105