Departament d'Economia Aplicada
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Miguel-Angel Lopez-Garcia

Departament d'Economia Aplicada
Edifici B
Universitat Autònoma de Barcelona
08193 Bellaterra, Barcelona, Spain.
d.econ.aplicada@uab.cat
www.uab.cat/en/applied-economics
@ecapUAB @ecapuab.bsky.social

UAB
Universitat Autònoma de Barcelona

PENSIONS, HOUSING AND SAVINGS (*)

Miguel-Angel LOPEZ GARCIA (**)

Universidad Autónoma de Barcelona

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Abstract: This paper deals with the interactions between, on the one hand, the provision of public retirement pensions and the episodes of real-estate booms, and, on the other, individual decisions concerning savings. It explores the implications of these interactions in terms of intergenerational transfers of income and wealth, and the ensuing effects on the evolution of the savings rate. Some reforms of social security financing, involving public capital funds, and the effects of savings and investment incentives addressed to owner-occupied housing, are analysed.

Keywords: social security pensions; capital funds; owner-occupied housing; savings and investment incentives; savings motives.

JEL classification: D15; D64; E21; H55; R21; R31.

Resumen: Este trabajo aborda las interacciones entre, por un lado, la provisión de pensiones públicas de jubilación y los episodios de auge inmobiliario, y, por el otro, las decisiones de ahorro de los individuos. Explora las implicaciones de estas interacciones en términos de transferencias intergeneracionales de renta y riqueza, así como sus efectos sobre la evolución de la tasa de ahorro. Se analizan algunas reformas de la financiación de la seguridad social que involucran fondos públicos de capital, y los efectos de los incentivos al ahorro y a la inversión dirigidos a la vivienda habitada por su propietario.

Palabras clave: pensiones de la seguridad social; fondos de capital; vivienda habitada por su propietario; incentivos al ahorro y a la inversión; motivaciones del ahorro.

Clasificación JEL: D15; D64; E21; H55; R21; R31

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(**) ORCID ID: 0000-0002-5012-1869

1. Why "*Pensions, Housing and Savings*"?

Urgent! Urgent! Are you worried about the future of social security retirement pensions? Yes? You are definitely right. No? Quickly check things out! Urgent! Urgent! Are you worried about the so-called "housing problem"? Yes? Indeed, there are many reasons for this. No? Either you are very lucky… or hurry up to change your mind! Do you also agree that the evolution of the savings rate, and along with it that of physical (and human) capital accumulation, are crucial? Absolutely!

Admittedly, this is not the most elegant way to begin a paper. It could be considered as an attempt to capture the attention of the potential reader. But to be honest, this is not necessary. Without any doubt, both pensions and housing are, by themselves, very important issues. They have a great social relevance and entail important effects both in the short and in the long run. They also spur heated debates about the precise policy to be enacted, and important public efforts are devoted to try to solve them. And, of course, the time path of the savings rate is crucial for physical, and also human, capital accumulation.

The purpose of this paper is to deal with the interactions between, on the one hand, the provision of public retirement pensions and the episodes of real-estate booms, and, on the other, the individual decisions concerning savings. It explores the implications of these interactions in terms of intergenerational transfers of income and wealth, and the ensuing effects on the evolution of the savings rate. The ultimate objective is to highlight how a well-designed public policy can help alleviate some of their most undesirable consequences.

2. About Savings Motives: Why Do People Save?

A first and well-known reason for savings is a *life-cycle* motive. Individuals save in their working age to transfer resources for their retirement. If they want to keep a constant or steadily rising consumption profile along their lifetime, they will initially save and ultimately dissave. What matters for consumption (and thus, savings) is the present value of lifetime resources, i.e. the present value of human wealth. The appeal of this theory is indisputable. On the one hand, it is firmly rooted in conventional microeconomic theory of rational behaviour. On the other hand, it allows to relate individual behaviour with the macroeconomics of aggregate savings.

One of the determinants of the savings rate is population and its age structure. Marginal propensities to save [resp. to consume] of older individuals are lower [resp. greater] than those of

younger individuals. Accordingly, income transfers among generations will have effects on the savings rate. In particular, the income effects induced by transfers from younger to older generations will translate in *greater* consumption and *lower* savings.

However, the above description of the life-cycle hypothesis responds to its simplest pattern, since voluntary intergenerational transfers are simply assumed away. In a sense, individuals are assumed to be "intergenerational selfish", who consume the whole present value of their lifetime income. But this is inconsistent with the empirical evidence that, indeed, there are *voluntary* intergenerational transfers. These transfers, however, may well be unintended and unplanned. After all, life duration is uncertain and there may be unexpected events. In these cases, some assets will eventually be received by someone, but many times they cannot be taken to be a voluntary intergenerational transfer.

One reason why individuals can leave voluntary bequests to their children or make gifts to their parents is the satisfaction they derive from so doing. The so-called *joy of giving* or *warm glow giving* provide a rationale why individuals may derive utility from the size of these transfers. These transfers result from a variant of intergenerational selfishness extended or modified to include them, and the real motive for these intergenerational transfers does not seem to be ~~a~~ genuine altruism. Importantly, bequests or gifts are both a target variable and an instrument, and the marginal propensities to save by older generations will be now larger than those predicted by a strict version of the life-cycle model. However, the qualitative effects of non-voluntary transfers from younger to older generations are the same: they will imply *more* consumption and *less* savings.

Of course, voluntary transfers may be the result of *intergenerational altruism*. Now parents [resp. children] take care of the welfare enjoyed by their children [resp. parents], i.e., a positive externality, and bequests [resp. gifts] are the mechanism with which to internalise it. One can envisage individuals as if they were "dynastic" savers, i.e., as if they were undertaking an optimum consumption plan for their whole family. In the presence of altruism from parents to children [resp. from children to parents], individuals behave as if they expected lo live forever [resp. they had been living forever]. Their lifetime horizon is finite, but they behave as if their planning horizon were in fact *infinite*. Individuals now have a powerful tool with which to neutralise any undesired intergenerational transfer: voluntary transfers between them, whether in the form of *bequests* or *gifts*.

This is the basis of the so-called "Ricardian equivalence theorem" of public debt and taxes. Rational individuals, or strictly speaking, extended families, need only modify voluntary transfers among their members and reestablish the intertemporal (by definition, optimal) distribution of consumption prevailing prior to the introduction by the government of compulsory transfers. Therefore, non-desired transfers, whether as a result of public sector actions or for any other reason, would not affect the volume of savings, but only the mechanism through which these savings are made.

Finally, it should not be overlooked that a small but certainly not insignificant percentage of the population may follow what has come to be known as the *short-horizon model*. These individuals do not make systematic savings plans. This may be the case not because their behavior is openly erratic and simply irrational. This behaviour may result from the fact that, despite having preferences that essentially fit to the life-cycle model, individuals "discount" the future so heavily that after a reduced number of periods, that future is simply not relevant. Or, alternatively, they can be liquidity-constrained, thus being prevented from accessing resources in the present that will be obtained in the future.

Be that as it may, if we disregard the (probably small) percentage of population under the heading of the short-horizon model, it seems appropriate and sensible to say that, on the one hand, the *life-cycle hypothesis* (in its pure version or extended to include a "joy of giving" or a "warm glow giving" motive) and, on the other, a genuine *intergenerational altruism*, with individuals who act as "dynastic" savers, emerge as alternative frameworks within which to contemplate the effects of public policy on savings.

In the remainder, two policies will be considered in their relationship with savings. The first one is the provision of retirement pensions using a pay-as-you-go system, as well as some alternative schemes that partially rely on public capital funds. The second one is the design of tax policies addressed to home-ownership and their interaction with episodes of "real-estate boom", and the intergenerational transfers that are the consequence of them. And, last but not least, it is important to stress that the effect of policy will depend not only on the relative percentages of individuals who behave in one way or another, but also on their relative contribution to the volume of savings. Put another way, altruists may not be as numerous as life-cyclers, but if they are wealthier, they may account for a substantial portion of aggregate savings.

3. Social Security Retirement Pensions and Saving

Consider first the provision of public pensions through an *unfunded* or *pay-as-you-go* system. Under this scheme, the contributions paid by working individuals are not deposited in an actuarial fund, but are immediately used to pay for the benefits received by the current retirees. It is equivalent to an "intergenerational pact or contract" by which workers provide support to retirees in exchange for the (implicit) promise that they will themselves receive a similar treatment when they retire. It can be viewed as a *huge implicit public debt issue,* that can provide, as a rate of return on contributions, the growth rate of the tax base with which the system is financed. This could be termed the *fundamental theorem* of a pay-as-you-go system.

A way to analyse the relationship between savings and the provision of social security on a pay-as-you-go basis entails providing an answer to the question of whether social security generates some kind of perceived wealth to covered individuals. In the same way as with ordinary fungible wealth, the expectation of obtaining a pension can be summarized in the concept of *social security wealth*. *Gross* social security wealth would be the actuarial present discounted value of the future pension benefits of covered workers. *Net* social security wealth would be obtained by subtracting from the former the present value of the contributions to be paid in the future.

If the duration of both the working and retirement periods are taken as (approximately) fixed, the fact that individuals consider contributions to social security as compulsory or forced savings, and/or that pensions are considered as an alternative way to accumulate wealth, will result in a *reduction* of life-cycle private savings addressed to finance retirement. Since under a pay-as-you-go system current contributions are immediately transferred to retirees and, accordingly, there are no offsetting public savings, the net result will be an "asset substitution effect" and a *reduction* of aggregate savings.

When voluntary intergenerational transfers are included into the analysis, the effects of a pay-as-you-go social security on savings are very different according to the reasons underlying them. In the presence of genuine *intergenerational altruism*, future tax liabilities associated with a pay-as-you-go social security will be *fully capitalized in the present*, and there will be *no* adverse (first-order) effects on savings. Through appropriate modifications of voluntary intra-family transfers, i.e., an increase in bequests from parents to children, or a reduction in gifts from children to parents, the behaviour of private agents would cancel out the effects of forced transfers induced by the pension system.

By contrast, if voluntary intergenerational transfers are the consequence of a "joy of giving" or a "warm glow giving" motive, the expectation of receiving a pension benefit will result (assuming a positive lifetime-income elasticity of consumption and of bequests or gifts) in only a portion of the present value of pensions being transferred as a greater inheritance or a smaller gift. Be that as it may, the qualitative effects would in this case be exactly the same as those arising when savings is the consequence of a "pure" life-cycle motive: a pay-as-you-go social security would give rise to a *reduction* in the savings rate.

The question then arises of *how to provide "old-age insurance" to individuals without potential adverse effects on savings*? Of course, this question immediately leads to social security systems with a different institutional design. *Fully-funded* systems, based on strict actuarial criteria, emerge as an obvious alternative. Under this scheme, the contributions paid by working individuals are not paid out as current benefits but invested in a fund that, together with associated interest income, will be used to pay for the future pensions.

In a very real sense, a fully-funded system would be nothing else but a "workers' bank". It is not difficult to understand that, as far as first-order effects are concerned, it would be equivalent to the "laissez faire". This will be the case if social security contributions are lower enough as not to induce corner solutions for private savings, and the rates of return to capital are the same for any agent in the economy.

Of course, if individuals are dynastic savers, there will not be any first-order effect on savings derived from *any* type of social security system, whether it is fully-funded or operated on a pay-as-you-go basis. Only second-order effects would be expected, as those arising from the fact that there will be families without children or with a greater or lesser number of children than average.

However, if the main reason for savings is a life-cycle motive (whether strict or extended to include voluntary intergenerational transfers), relying on *public capital funds* to finance pensions on the same footing as current contributions paid per workers, could contribute to increase the savings rate. If this is the case, social security shows up as *an instrument at the service of the savings promotion policy*.

An obvious (but a little bit subtle) statement seems now in order: *although a fully-funded pension system is based on the return to capital, not every pension system that uses capital funds must necessarily be fully-funded.* Put another way, even if it is true that in an actuarially sound

scheme pensions are "fully funded", in the sense that individuals pay in their working period contributions equal to the present value of their future pensions (and are accumulated as reserves), social security systems can be designed that are either *less-than-fully-funded* or even *more-than-fully-funded.* These pension systems entail capital funds that are, of course, publicly-owned, and provide a fertile avenue for the design of reforms of pay-as-you-go systems. And crudely highlight the consequences of different institutional designs in terms of *transition costs*.

4. Designing Social Security: Beyond Pay-As-You-Go and Fully Funding

To advance in the analysis, it will prove helpful to consider a simple model economy where the working population and the real wage rate grow at constant rates, *n* and *h* respectively. If L_t [resp. L_{t-1}] denotes the number of workers [resp. retirees] in period *t*, and w_t the real wage rate, also in period *t*, we have

$$L_t = (1+n)L_{t-1} \qquad\qquad w_t = (1+h)w_{t-1}\,. \tag{1}$$

With a social security system operated on a *pay-as-you-go* basis, current pensions are paid out of current contributions. Given a tax rate τ, the pension benefit p_t received in period *t* by each retiree and the contribution paid by each worker are related by the budget constraint

$$p_t L_{t-1} = \tau w_t L_t\,, \tag{2}$$

so that the pension benefit received by each retiree will then be

$$p_t = (1+h)(1+n)\tau w_{t-1}\,. \tag{3}$$

As characterized above as the *fundamental theorem* of a pay-as-you-go system, individuals can obtain on their contributions an implicit rate of return equal to the growth rate of the tax base, in this case the wage bill, $h+n+hn$, or disregarding the last term, the sum of the growth rates of real wages and working population.

Under a *fully-funded system*, contributions of workers in period *t* are accumulated in a capital fund A_{t+1} that will generate returns in period *t*+1,

$$A_{t+1} = \tau w_t L_t\,. \tag{4}$$

This fund, plus accrued interest income at the (probably endogenous) rate of return to capital prevailing in period *t*+1, r_{t+1}, will be used to pay for the benefits received by retirees,

$$p_{t+1}L_t = (1+r_{t+1})A_{t+1}. \tag{5}$$

The rate of return on contributions is thus the rate of return to capital,

$$p_{t+1} = (1+r_{t+1})\tau w_t. \tag{6}$$

Notice that, with fully funding, the social security capital fund in absolute terms grows at the same rate as population, i.e., $A_{t+1} = (1+h)(1+n)A_t$. Accordingly, the stock of public capital in *per worker* terms, $a_t = A_t / L_t$, grows at the same rate as the wage rate, $a_{t+1} = (1+h)a_t$.

Now consider a social security system that can be *as general as possible*, in the sense that *any institutional design* may be feasible. On the sources side, it taxes young individuals, and obtains interest income from the capital fund. On the uses side, it pays a pension benefit to each retiree and sets aside resources that are deposited in the capital fund. Its budget constraint in period *t* is therefore

$$p_t L_{t-1} + (A_{t+1} - A_t) = \tau w_t L_t + r_t A_t, \tag{7}$$

or, equivalently,

$$p_t L_{t-1} + A_{t+1} = \tau w_t L_t + (1+r_t)A_t. \tag{8}$$

It is routine to check that (7) and (8) include, as particular cases, both pay-as-you-go (i.e., $A_{t+1} = A_t = 0$) and fully-funded systems (i.e., $A_{t+1} = \tau w_t L_t$).

Notice that in the period-by-period budget constraint (7), the term $(A_{t+1} - A_t)$, i.e., the amount invested in the capital fund in period *t*, incorporates a recurrence rule for the social security capital fund. This interrelation among period-by-period budget constraints (i.e., that in period *t*-1, involving A_{t-1} and A_t, that in period *t* comprising A_t and A_{t+1}, and so on) implies that, under certain conditions, an intertemporal budget constraint can be found. However, a simpler approach will lead us to essentially the same result.

In particular, assume that, even if the social security system is not fully funded, its capital fund grows at the *same* rate as the wage bill, i.e., that it verifies $A_{t+1} = (1+h)(1+n)A_t$, just as if it were a fully-funded scheme. Consequently, the stock of public capital per worker, $a_t = A_t / L_t$, will grow at the same rate as the wage rate, $a_{t+1} = (1+h)a_t$. Substituting into (7),

$$p_t = (1+n)\left[\tau w_t + \left(r_t - (h+n+hn)\right)a_t\right]. \tag{9}$$

When $a_t = 0$ and no capital fund is being accumulated, this expression becomes that under a pay-as-you-go system. Under fully-funding, taxes are placed in a capital fund, i.e., $A_{t+1} = \tau w_t L_t$, which translates into (an important expression, to be used below),

$$\tau w_t = (1+n)a_{t+1}. \tag{10}$$

Obviously, when the return to capital r_t is greater [resp. less] than the growth rate of the wage bill, $(h+n+hn)$, the pension benefit under fully-funding will exceed [resp. fall short of] that to be obtained under pay-as-you-go financing. In other words, if the starting point were the *laissez faire*, the choice between these two systems would be clear: just choose the one with the greatest rate of return to be obtained over contributions.

The important point, however, is *not* that of comparing pay-as-you-go and fully funded systems, but observing in (9) that, if $r_t > h+n+hn$, i.e., if the return from investing in capital exceeds that of "investing in future generations", the pension benefit afforded by the *general* social security system implicit in (9) will be greater, other things being the same, than that provided by a pay-as-you-go system.

Clearly, from the point of view of the design of policy reforms, the starting point is the existence of a pay-as-you go system, and the potential alternatives are those systems that rely, at least partially, on the return provided by capital funds. In this regard, it is crucial to stress that, as advanced above, a fully-funded social security system is based on the returns obtained from investing in capital*, but this does not entail that a social security system that hinges on the returns obtained from investing in capital must necessarily be operated on a fully-funded basis*.

This point can be illustrated with the help of Figure 1, whose axes are the two parameters available to the social security system, τw_t and a_{t+1}, i.e., the social security contribution paid by each worker today and the amount of social security capital (in per-worker terms) that will be available next period. Figure 1 allows to verify that, in fact, one can identify not only the two schemes associated with pay-as-you-go financing and fully-funding, but *infinitely many others*, represented by the infinitely many points on the non-negative quadrant.

The *absence* of social security, i.e., the laissez faire, is given by the origin of coordinates, point *O*. Points *P* and *P'* are associated with two *pay-as-you-go* systems, where $\tau w_t > 0$ and

$a_{t+1} = 0$. Clearly *P'* is more generous than *P,* as it provides greater pension benefits, but both lie along the vertical axis. Points *F* and *F'* along the line passing through the origin with slope $(1+n)$ represent two *fully funded* systems, and as stated above, the expression $\tau w_t = (1+n)a_{t+1}$ is verified. Interestingly, points *L* and *L'* [resp. points *M* and *M'*] located to the *left* [resp. *right*] of the line through the origin with slope $(1+n)$ denote social security systems characterized by

$$\tau w_t > (1+n)a_{t+1} \qquad [\text{resp. } \tau w_t < (1+n)a_{t+1}]. \tag{11}$$

Accordingly, the pension systems described by *L* and *L'* [resp. *M* and *M'*] can be characterized as *less-than-fully-funded* [resp. *more-than-fully-funded*] since the total amount of resources that are set aside today in the social security capital fund, A_{t+1}, is *lower* [resp. *greater*] than the amount of contributions raised today, $\tau w_t L_t$. Or formally,

$$A_{t+1} < \tau w_t L_t \qquad [\text{resp. } A_{t+1} > \tau w_t L_t]. \tag{12}$$

Summarizing, the above discussion shows that, as argued above, a myriad of social security systems can be devised that *rely on capital funds* and are *not* fully-funded ones.

[FIGURE 1 AROUND HERE]

One can also check in Figure 1 that points *L* and *L'* are located along the same straight line with slope $(1+n)$ as *P*. This property is also shared by fully-funded systems *F* and *F'* with respect to *O*, and all of them are equivalent in terms of physical (and human) capital accumulation and social welfare. In fact, *P*, *L*, *L'* are all equivalent to each other, and the underlying intuition is also the same: starting from the pay-as-you-go scheme *P*, the systems represented by *L* and *L'* all imply that a fully-funded (sub)system is enacted along with the pre-existing pay-as-you-go (sub)system. But nothing else has changed, as individuals will reduce their private savings in exactly the increased forced contributions. Needless to say, this result is general and immediately applies to the equivalence of the systems associated with *M* and *M'*.

Put another way, if a reform entails changes $\Delta\tau w_t$ and Δa_{t+1} in the parameters of social security that verify

$$\Delta\tau w_t = (1+n)\Delta a_{t+1}, \tag{13}$$

it will have no effects in terms of social welfare. This is so because the straight lines with slope $(1+n)$ in Figure 1 can be interpreted as the contours of an *indirect utility function relating social welfare to the values of social security parameters*, τw_t and a_{t+1}, i.e., $U(\tau w_t, a_{t+1})$. In fact, it can be shown that, when $r_t > h+n+hn$, the partial derivatives $U_{\tau w_t} = \partial U(\tau w_t, a_{t+1}) / \partial \tau w_t$ and $U_{a_{t+1}} = \partial U(\tau w_t, a_{t+1}) / \partial a_{t+1}$ are, respectively, negative and positive. As a consequence, the marginal rate of substitution along any of the level curves of the indirect utility function in Figure 1 is $(d\tau w_t / da_{t+1})_U = -U_{a_{t+1}} / U_{\tau w_t} = (1+n)$.

The next step concerns of course the characterization of those changes in $\Delta \tau w_t$ and Δa_{t+1} that translate into a social welfare gain. In order to do so, we have to be sure that it is worth building public capital funds, i.e., that the rate of return from investing in capital exceeds that of "investing in future generations". In other words, in terms of expression (9) above, that pension benefits will be greater than those to be obtained under pure pay-as-you-go financing. In the light of (13), it is not difficult to understand that, if $r_t > h+n+hn$, a reform of social security will increase social welfare whenever

$$\Delta \tau w_t < (1+n)\Delta a_{t+1}. \tag{14}$$

In words, when *the increase in social security contributions is less than the new amount of resources that are set aside in the capital fund*, i.e., $\Delta \tau w_t L_t < \Delta A_{t+1}$. Clearly, the difference between these two magnitudes is something that has to be filled. And this immediately raises the question of the *transition* between the existing pay-as-you-go system and the new one towards which policy points to.

Figure 2 and the ensuing discussion, illustrates a variety of reforms of social security, with quite different effects, all of them starting from a pay-as-you-go system *P*. These reforms range from superimposing a fully-funded (sub)system that essentially keeps the results of the pre-existing pay-as-you-go one to shifting to a less-than-fully funded system and even radical changes entailing more-than fully-funded schemes. Needless to say, the associated transition costs emerge as quite different too.

(i) Invoking (13), superimposing a fully-funded system besides a pre-existing pay-as-you-go one, as the shift from *P* to *L*, would have no (first-order) effects. One can safely say that such a reform has in fact little sense if the objective is to achieve social welfare gains.

(ii) Consider now a radical reform dismantling the pay-as-you-go system and immediately building a fully-funded one, keeping the same contributions paid by workers and leaving retirees with their hands outstretched. The burden of the change from *P* to *F* would of course fall on those retirees that previously paid their contributions and now are receiving nothing. *There would be a welfare gain in the long-run, but at the cost of an unbearable sacrifice of some generations in the short-run*.

(iii) *A similar short-run sacrifice in exchange for a long-run gain* would arise if the radical reform involved that younger generations should pay *twice*, one to pay for the pension benefits that retirees expected from the prevailing pay-as-you-go system, and another one for their own fully-funded pensions. Such a change from *P* to *F'* would imply a small pension for those workers during the transition period relative to the great effort that society forces them to bear.

(iv) A reform from *P* to the *more-than-fully-funded* system represented by *M'* would of course *exacerbate the welfare losses during the transitional periods*, since the amount of capital that should be accumulated in the social security fund would simply be humongous. Again, this reform deserves no further comments, especially when it would be unfeasible in a democratic setting.

(v) A modest reform like the one involving the shift from *P* to the *less-than-fully-funded* system given by *L''* could represent *a reasonable compromise*. After all, the long-run gains to be enjoyed by future generations are modest and the short-run losses borne by current ones are also small and bearable. These reforms are probably the only ones that can pass the test of a democratic political process.

[FIGURE 2 AROUND HERE]

In plain English, the farther we want to go, the more people will be left behind. A sense of prudence should lead us to suggest reforms that entail a fair distribution of gains and losses. And if this is true for any respect in life, it is probably even more so when we talk about retirement pensions. With our feet firmly on our beloved Earth, we would surely be delighted to colonize Venus, and even more so to visit Mars. But we will have to settle for landing on our neighbouring Moon.

5. Owner-Occupied Housing and Savings

When reviewing above the life-cycle hypothesis, it was stressed that one of the determinants of the savings rate is population and its age structure. When talking about owner-occupied housing this is a particularly relevant aspect, since older generations are those who own the greatest share of wealth, and, in particular, real-estate assets and housing wealth. And, according to the above-mentioned hypothesis, the members of the older generations will have lower marginal propensities to save than younger generations.

The effects of "real-estate boom" episodes and the ensuing huge increases in real housing prices are then clear: *younger and future generations will end up acquiring their housing units at higher prices than otherwise*. From this perspective, these processes will entail a considerable transfer of income and wealth *from younger to older generations.* If savings are mainly the result of a strict life-cycle motive, these income and wealth effects will generate greater consumption and lower savings. Adding voluntary intergenerational transfers that are not the consequence of genuine altruism does not modify these qualitative results. If individuals are "extended" life-cycle savers, there will again be a transfer of income and wealth (although probably not as high as before) from younger to older generations, who own housing assets, giving rise to more consumption and less savings.

If individuals are dynastic savers, however, the results change dramatically. A process of rising housing prices *should* imply an increase [resp. reduction] of bequests from parents to children [resp. gifts from children to parents], by exactly the same reason discussed with social security pensions operated on a pay-as-you-go basis. Now, again, the process of rising housing prices associated with a real-estate boom does not modify the intertemporal budget constraint of the "extended family" in a relevant sense. Clearly, the above-mentioned reactions would offset the effects of any net intergenerational transfer, and would prevent any burden to be shifted from older to younger and future generations.

Therefore, the analysis has to return to the case where individuals are (either strict or extended) life-cycle savers and the question can be stated as follows. Can public policy, in particular *tax policy*, contribute to keep any positive effects of real-estate booms while at the same time alleviating their less desirable side effects? Or, equivalently, can a *higher (owner-occupied) housing stock* be achieved with *lower housing prices*, thus preventing the massive intergenerational transfer described above?

6. Real-Estate Booms and Intergenerational Transfers: The Role of Tax Policy

Many tax systems around the world provide a favourable tax treatment to owner-occupied housing. For a long time, until 2013, Spain was not an exception, and generous tax provisions in the personal income tax were available to homeowners: exclusion of net imputed income from the tax base; deduction of mortgage interest payments (with maximum amounts and, for a time, also of property taxes); exclusion, under some circumstances, of capital gains from the sale of a principal residence; and a tax credit associated with payments of mortgage principal during the tax year.

A crucial distinction in the present context is that between *savings incentives* and *investment incentives*, in this case referring to housing. Saving incentives keep the relative price of newly-produced and pre-existing units unchanged, and can be applied regardless of this fact. Investment incentives, however, modify their relative prices and can only be invoked in the case of a new housing unit. Of course, both can be either negative (i.e., a tax) or positive (i.e., a subsidy). The former are *universal*, whereas the latter are *selective* (or, if one wants to stress the argument, openly discriminatory)

The consequences of these policies, both in the long run and along time trajectories, are subtly different. Certainly, their *allocative* effects are the same: both can be characterized as successful in their attempt of achieving a *greater* owner-occupied housing stock. However, their *distributional* effects are completely different. Savings incentives translate into *increases* of the producer price of pre-existing housing units, whereas investment incentives imply *reductions* of the producer price of pre-existing homes.

That is all well and good, but why is the emphasis in the previous paragraph placed on the producer price of *existing units* instead of that of *new units*? Or, why not just asking about "housing prices" without any further adjective? The reason is twofold. On the one hand, it is obvious that existing houses are the lion share of the real-estate wealth of families. On the other, it is important to emphasize that the producer prices of new and pre-existing units may *differ.* As it will shortly be shown, this is certainly the case if they are perfect substitutes. But, introducing an appropriate "premium to novelty", this statement will continue to hold even if they are only close substitutes.

Prior to 2013 (and with a small exception in the period 1985-87 to be discussed below), the situation in Spain was characterized as a *positive* savings incentive coupled with a *negative* investment incentive: tax subsidies associated with payments of interest and principal (the so-

called *Desgravaciones por Vivienda*) at an effective rate *c*, were the same for new and pre-existing units; taxes on transactions of new homes (*Impuesto sobre el Valor Añadido* plus *Impuesto sobre Actos Juridicos Documentos*), summarized in the tax rate τ_{IVAJD}, were greater than those for pre-existing ones (*Impuesto sobre Transmisiones Patrimoniales*), at rate τ_{ITP}; and the effective tax subsidy rate *c* (expressing the present discounted value of tax subsidies) was greater than any of the tax rates on housing transactions, i.e., $c > \tau_{IVAJD} > \tau_{ITP}$.

To advance in the analysis, assume that new housing units and pre-existing ones are perfect substitutes. As noted above, a "premium to novelty" of new homes can be introduced without any essential change, but at the cost of increasing technical complexity. Let P_H and P_H^N respectively denote the (real) *producer prices* (i.e., those relevant for an agent who sells them) of a pre-existing and a newly-produced unit. With housing units being perfect substitutes, any notion of equilibrium requires that *consumer prices* (i.e., those relevant for the agent who buys them) of both types be exactly *the same*. This requirement, which is nothing else but a *no-arbitrage condition*, entails

$$P_H(1+\tau_{ITP})(1-c) = P_H^N(1+\tau_{IVAJD})(1-c), \tag{15}$$

which, cancelling out the terms involving *c*, reduces to

$$P_H(1+\tau_{ITP}) = P_H^N(1+\tau_{IVAJD}). \tag{16}$$

Clearly, if $\tau_{ITP} \neq \tau_{IVAJD}$, the consequence is that $P_H \neq P_H^N$, which means that *producer prices* are simply *different*. Indeed, $\tau_{IVAJD} > \tau_{ITP}$ implies a negative investment incentive, and $P_H > P_H^N$. The price of pre-existing housing units *exceeds* that of new ones.

Noting that (16) follows from (15) for any value of *c*, it will hold, in particular, for $c = 0$, i.e., in the absence of any tax subsidy to purchases of either pre-existing or newly-produced homes. But this is exactly the situation *after* the abrogation of housing subsidies in 2013. Thus, the current tax provisions referred to owner-occupied housing units entail a *negative* savings incentive (since $c = 0$ but $\tau_{ITP} > 0$) in conjunction with keeping a *negative* investment incentive (as a consequence of $\tau_{IVAJD} > \tau_{ITP}$).

In general, allowing for different tax and subsidy rates, with *s* denoting the subsidy rate addressed to the purchase of new housing units, the no-arbitrage condition will become

$$P_H(1+\tau_{ITP})(1-c) = P_H^N(1+\tau_{IVAJD})(1-s). \tag{17}$$

Incidentally, notice that (17) allows to illustrate two episodes with a strictly *positive* investment incentive due to the existence of a more favourable tax treatment of newly-produced housing units relative to pre-existing ones. These were the period between1985-1987, with $s > c > \tau_{IVAJD} > \tau_{ITP}$, and the very short-lived (six months) reform in 2011, where $s = c > \tau_{ITP} > \tau_{IVAJD}$.

Be that as it may, the message is that *if taxes and/or subsidies on pre-existing and newly-produced homes differ, so will their respective producer prices*, i.e., $P_H \neq P_H^N$, despite their being perfect substitutes. And, of course, this proposition will continue to hold in the real world, where pre-existing and new homes are close substitutes. The corollary of this proposition is simple and, at the same time, overwhelming: the introduction of a *positive investment incentive* will translate into an *increase of residential investment* (and, accordingly, of the owner-occupied housing stock) in conjunction with a *reduction* of the *producer prices of existing homes.* A quick intuition of these effects can be obtained with the help of the market for new and second-hand cars, which share with housing the feature of being close substitutes. What would be the effect on the price of used cars of reducing or eliminating the tax on new car purchases? Or, equivalently, of introducing a subsidy exclusively addressed to the purchase of new cars? Without any doubt, a reduction in used car prices! And, importantly, all this while the production of new cars would be fostered!

A discussion and a diagrammatic representation of the consequences of this proposition will be helpful when discussing the different outcomes arising from savings and investment incentives. Figures 3 and 4 illustrate the effects of introducing a savings incentive. The axes of the former are the amount of owner-occupied residential capital, *H*, and the associated notional rent, *R*. The (derived) demand for housing stock is obtained from the (basic) demand for housing services, *HS*, and captures the marginal willingness to pay for *H*. The demand for housing services will depend on the rent that the owner, as a tenant, pays to herself, her lifetime or permanent income and a number of socio-demographic variables (i.e., population structure, creation of new homes, migration, etc.) than can be taken as exogenous to the housing market. Disregarding the role of these exogenous variables this demand can be written as $HS^d = f(R)$. The supply of housing services depends, written as a production function, on the amount of housing stock, $HS^s = g(H)$. Equilibrium in the market for housing services entails $f(R) = g(H)$, which implicitly characterizes the demand for housing stock, $H = H(R)$. This function can now be inverted, giving rise to the notional rent or marginal valuation $R = R(H)$. Formally, this marginal

valuation can be considered as the counterpart here of marginal product in the models with physical capital.

In the market of housing as an asset, homeowners will select the amount *H* for which their marginal valuation equals the marginal cost they face. Given the real price of (existing) residential capital stock, P_H, and a measure of the per unit user cost, ω, which accounts for any source of cost associated with holding housing as an asset (i.e., mortgage interest rate, opportunity cost of equity, depreciation, maintenance, expected nominal capital gains, and, of course, any kind of related taxes), the equilibrium condition is $R(H) = \omega P_H$. In the absence of any tax or subsidy, and with a user cost written as $\omega_0 P_{H0}$, homeowners will choose H_0 at point 0 in Figure 3, where $R_0 = R(H_0) = \omega_0 P_{H0}$.

The introduction of a savings incentive will reduce the per unit user cost of residential capital from ω_0 to ω_1. If the price of housing as an asset were to remain at its initial level P_{H0}, the new (long-run) equilibrium would be associated with point $0'$, where $R_0' = R(H_0') = \omega_1 P_{H0}$. This would be the case in the unlikely situation where the supply curve of new homes is infinitely elastic (i.e., a straight line in terms of Figure 4, discussed below). If, instead, it is upward sloping, the new price of existing units will go up to P_{H1}, and the new (long-run) equilibrium will entail a lower *increase* in the housing stock to H_1 at point 1, where $R_1 = R(H_1) = \omega_1 P_{H1}$.

Therefore, a savings incentive will be successful in its presumed purpose of achieving a greater amount of owner-occupied housing. However, as a probably undesired effect, the real price of housing as an asset has also *increased*, from P_{H0} to P_{H1}. The effectiveness of this policy will of course depend on the elasticity of the $R(H)$ function. The greater this elasticity, other things being the same, the greater the impact in terms of residential capital.

Figure 4 shows the effect of a savings incentive on the level of activity in the construction industry. Its axes are gross residential investment, *I*, and its relevant producer price, i.e., that of newly-produced homes, P_H^N. It is important to emphasize once again that, strictly speaking, the price of pre-existing homes, P_H, is irrelevant as far as the decisions of the building industry are concerned. Unless, as discussed above, we are in a situation without any taxes or subsidies or the tax treatment of both types is the same, in which case $P_H^N = P_H$.

The production function of new homes depends on the amounts of land, labour and materials used when building them. Accordingly, the supply curve of newly-produced housing units will depend on their real producer price, P_H^N, as well as those of the above-mentioned production factors. If the latter are taken as exogenous (although the price of land, in particular, can easily be endogenised without essential changes), the supply curve will be $I = I(P_H^N)$ in Figure 4. In general, it will be expected to be upward-sloping, reflecting the existence of investment adjustment costs, either internal or external to the construction industry. In the absence of any tax or subsidy. and given the initial price P_{H0}^N (equal to P_{H0} by definition), the amount of residential investment will be I_0 at point 0. The introduction of a savings incentive will spur a greater level of gross residential investment, I_1, which can only be achieved at point 1 with an increased (long-run) price of new homes, P_{H1}^N $(= P_{H1})$.

[FIGURES 3 AND 4 AROUND HERE]

Figures 5 and 6 represent the consequences of introducing a genuine investment incentive. Consider again, as a starting point, a situation without any kind of taxes or subsidies, i.e., point 0 in Figure 5, where the producer prices of new homes and existing ones are the same, $P_{H0}^N = P_{H0}$, and gross residential investment is $I_0 = I(P_{H0}^N)$. Now assume that the government introduces a genuine investment incentive, so that it subsidizes αP_H^N of any new housing unit and the private purchaser pays $(1-\alpha)P_H^N$ only. In terms of (17), the no-arbitrage condition between the consumer prices of pre-existing and new homes will now be $P_H = P_H^N(1-\alpha)$, so that

$$P_H^N = \frac{P_H}{(1-\alpha)} > P_H, \tag{18}$$

and the producer price of new homes will be *greater* than that of pre-existing ones. Accordingly, the supply curve of new homes can simply be rewritten as $I = I\left(P_H / (1-\alpha)\right)$.

The next step is to depict in Figure 5 the supply curve of the construction industry as a function of the producer price of *pre-existing homes*, i.e., $I = I\left(P_H\right)$, when the investment incentive is in force. For the sake of illustration, if $\alpha = 1/3$, the vertical distance from the

horizontal axis to any point on the $I\left(P_H/(1-\alpha)\right)$ function can be divided into three parts. The associated point on the $I\left(P_H\right)$ function will then account for two out of these three parts. Hence, the $I\left(P_H\right)$ function will be located below its counterpart $I\left(P_H/(1-\alpha)\right)$.

The introduction of the subsidy will induce an increased residential investment, I_1, at point 1, which will be associated with a *greater* producer price of *new* homes, P_{H1}^N. But the crucial point is that the producer price of *existing* homes, P_{H1}, has *gone down*, as shown by point 1'. *The investment incentive has thus resulted in both a greater activity in the construction industry and a reduction in the real producer price or pre-existing housing units*. Needless to say, the effectiveness of this policy will depend on the elasticity of the $I(P_H^N)$ function. Other things being the same, the greater this elasticity, the greater the impact in terms of spurring gross residential investment.

Finally, Figure 6 shows the effect in the market for pre-existing homes of introducing a genuine investment incentive. The initial equilibrium is at point 0, with $R_0 = R(H_0) = \omega_0 P_{H0}$, and the new (long-run) one at point 1, with $R_1 = R(H_1) = \omega_0 P_{H1}$ and $H_1 > H_0$. Ignoring the dashed line (which is inconsistent with an upward-sloping supply of new homes), the situations depicted in Figures 3 and 6 appear as similar. However, this apparent similarity hides a fundamental difference. Indeed, in the former the final per unit cost of residential capital, ω_1, is lower than its counterpart before the introduction of the savings incentive, ω_0 This reduction eases the increase in the amount of residential capital in spite of P_{H1} being *greater* than P_{H0}. However, in the latter, the per unit cost is exactly the same in both cases, i.e., ω_0 has not changed. It is precisely the *fall* in the producer price of existing houses, from P_{H0} to P_{H1}, the one that has allowed home-owners to increase their amount of residential capital.

[FIGURES 5 AND 6 AROUND HERE]

In the light of the discussion above, the question that inevitably emerges is surprisingly simple. Let us take for granted that the purpose of housing policy is to ease access to housing, perhaps increasing (or even in spite of increasing) home-ownership, but that transfers from

younger to older generations are deemed undesirable. Let us also assume that we want to leave in the hands of younger generations more resources to consume, to save and to have children (the latter with an obvious positive effect in terms of social security financing!). In the current situation where housing subsidies are no longer available, can *tax policy* be an instrument of housing policy? Or, to put it more explicitly, can *taxes* be used to achieve *increases in the housing stock* and, at the same time, *reductions in the producer price of existing housing*?

The answer is in the affirmative and requires appropriate changes in the taxes associated with transactions of newly-produced and pre-existing homes. The following summarizes some results that can be obtained concerning the effects of a variety of tax reforms, all of them involving changes in the tax rates τ_{IVAJD} and τ_{ITP}. These reforms range from variations in τ_{ITP} to eliminating the current negative investment incentive (following two different paths) or introducing an explicitly positive one.

(i) The mere reduction or elimination of τ_{ITP} would be capitalized in increases in the producer prices of pre-existing housing units, without (first-order) effects on either the stock of residential capital or on the consumer prices of housing (new or second-hand).

(ii) Eliminating the current negative investment incentive by reducing τ_{IVAJD} until being equal to τ_{ITP}, would lead to increases in the stock of residential capital and reductions in the producer price of pre-existing housing and the consumer price of both new and second-hand units.

(iii) Eliminating the current negative investment incentive by increasing τ_{ITP} until being equal to τ_{IVAJD}, would lead to reductions in the producer price of pre-existing housing and ambiguous effects on the residential capital stock and on consumer prices of new and second-hand housing units.

(iv) The introduction of a positive investment incentive through setting a rate τ_{IVAJD} lower than that of τ_{ITP} (without, of course, modifying the latter), would result in increases in the residential capital stock and in reductions in both the producer price of second-hand housing and consumer prices (of new and second-hand housing).

(v) A zero rate on transactions of new homes or even a subsidy targeted exclusively at newly-produced homes, would provide a positive investment incentive and result in the increases and decreases described in the previous reform being progressively larger.

The propositions above range from an apparently simple but useless change (reduction of τ_{ITP}) to the abrogation of the current negative investment incentive through two different routes (either reducing τ_{IVAJD} or increasing τ_{ITP}, leading to different results), or even the introduction of genuine investment incentives. If one thing becomes clear is that some of the previous results are not those that one could expect. This is just a reminder that the working of the housing market is very different from that of the peanuts market or the toy trains market. Or that, in housing policy too, the road to hell is paved with good intentions.

7. Final Comments

The purpose of this paper has been to provide two examples, focusing on the provision of public pensions and on easing access to owner-occupied housing, that illustrate how helpful economic analysis can be in the formulation of public policy. The interactions between the effects of policy and the motives underlying individual savings behaviour have been the main driving force. In the light of the issues that have been dealt with, and, above all, for the huge social relevance of both pensions and housing, it is difficult to deny that they constitute two of the fields where the "social marginal productivity of economic analysis" may be the greatest.

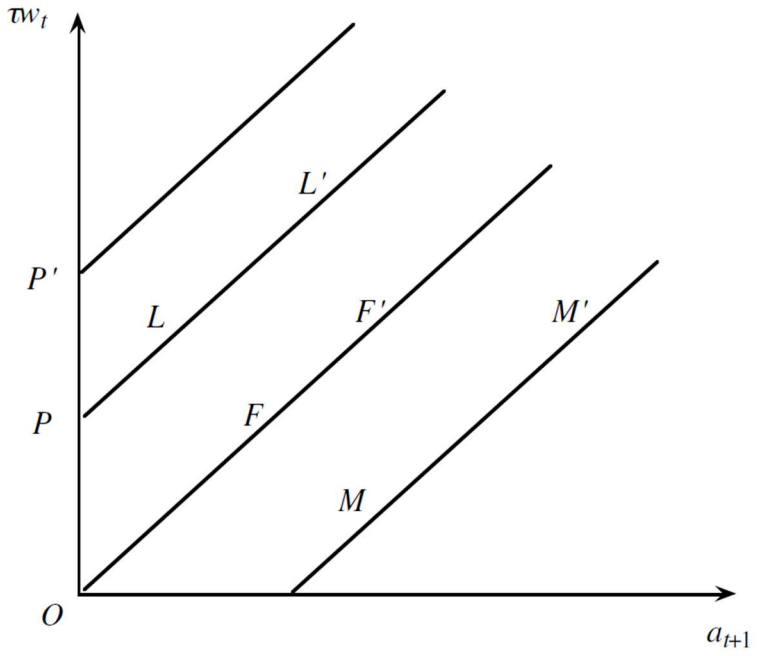
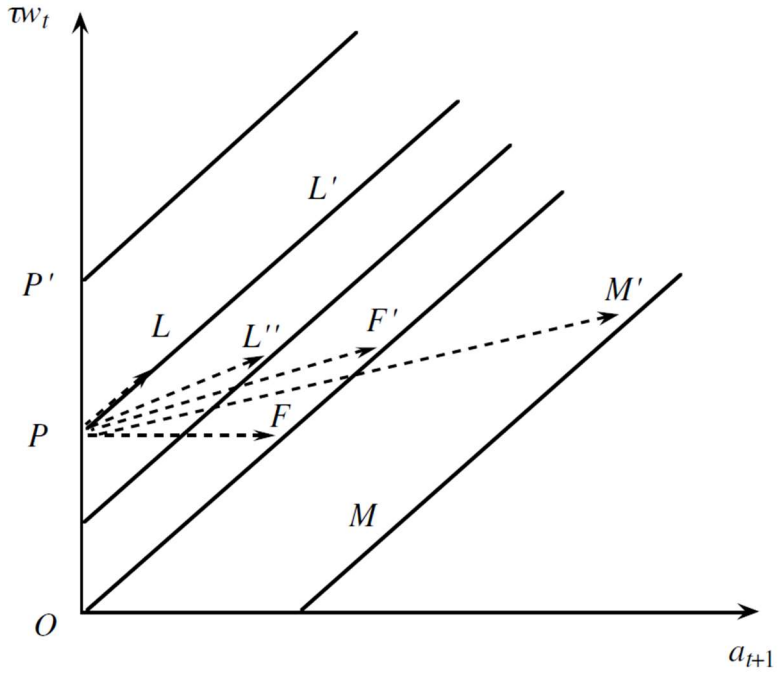


FIGURE 1



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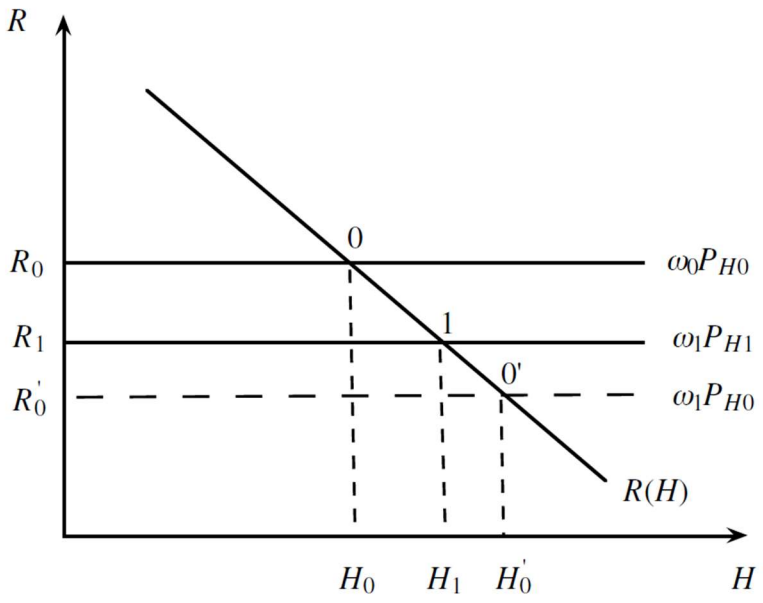

FIGURE 3

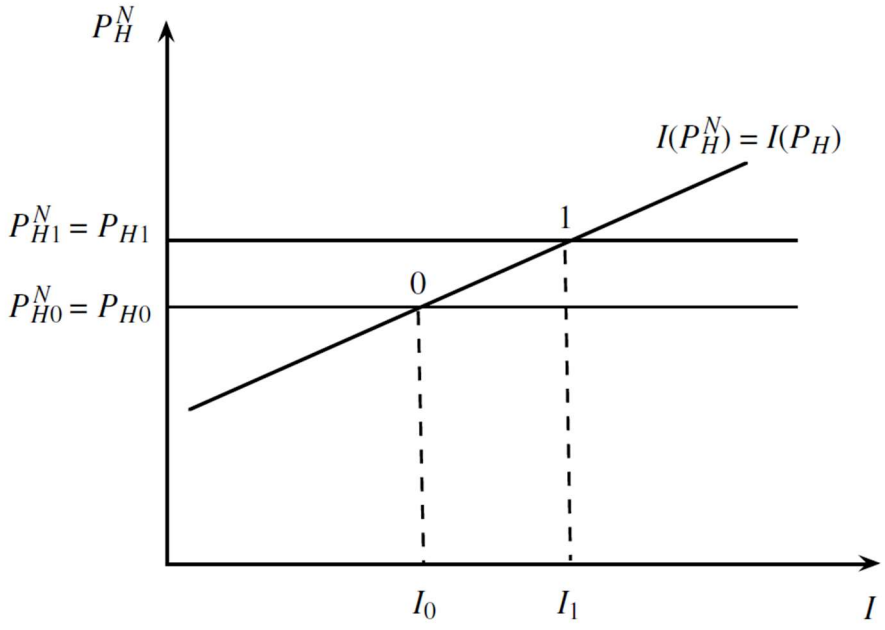

FIGURE 4

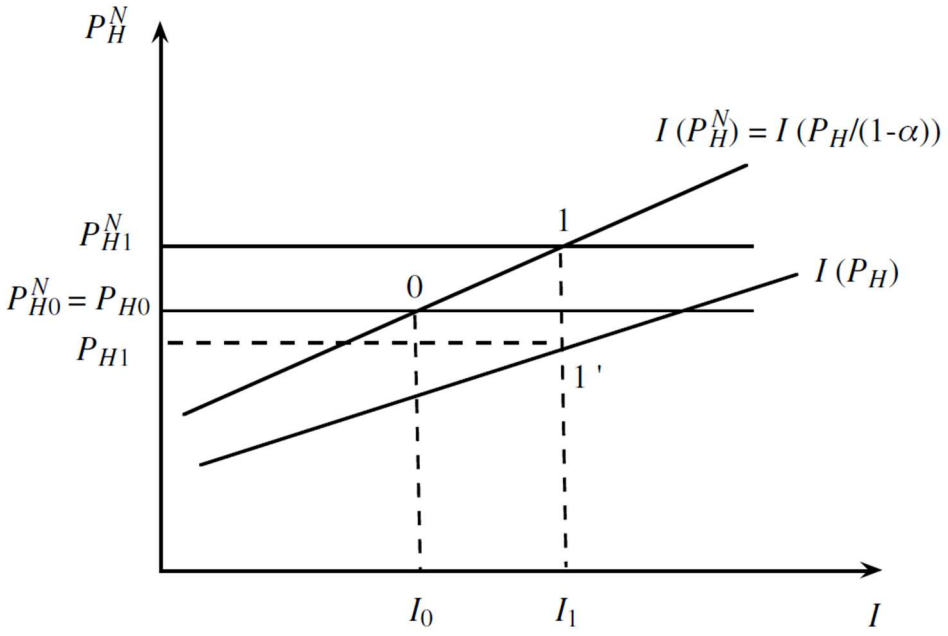

FIGURE 5

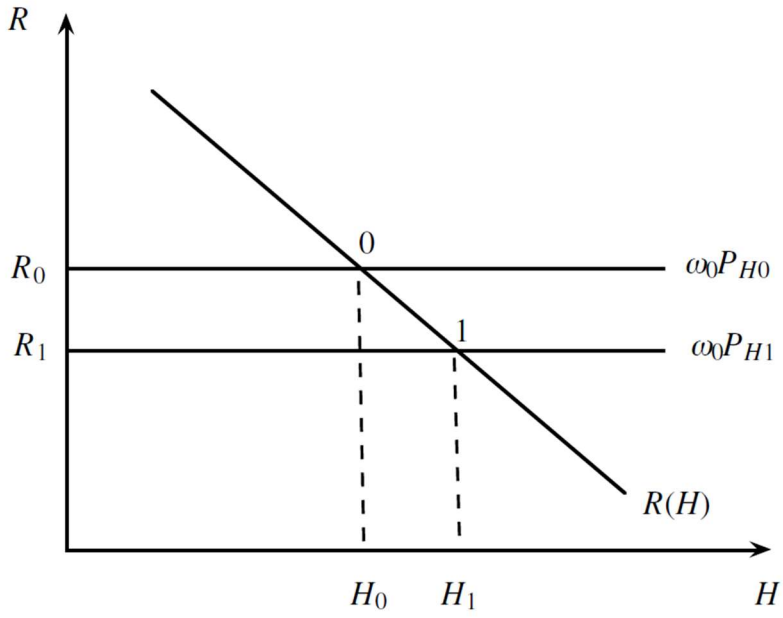

FIGURE 6