

# Quantifying the Effects of Land Policy on the National Economy of Greece

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**Keywords:** Informal Settlements, Dead Capital, Property Taxation, Valuation, Legalization, Property Formalization, Zoning, Land Policy Efficiency, Human Capital, Linkages, Economic Barriers.

## SUMMARY

This paper, and a more detailed paper series to follow, will focus on methodologies that can be used to economically quantify the effects of land policy on a national economy. In particular, we will look at the Greece, review some specific land policy factors, and estimate their impact on the Greek economy. A greater understanding of these balancing factors will lead to more efficient national policy making, allowing more resources to flow where they can be best utilized, be it in Greece or any other country.

Human Capital and the Real Estate Market sectors represent the vast majority of “value” in the world. The efficiency of the operation of these two sectors is closely related. Land Policies and other regulations affecting the use of real property and the flow of human capital have huge wide ranging effects on GDP and national economic prosperity. This paper explores common regulatory sectors with emphasis on when policies create little or no economic distortion, and when they create roadblocks inhibiting the efficient flow of human, land and real property resources. This thought process will be applied to several key land policy factors in Greece to estimate what impact these policies have on the overall economy.

## THE MODEL

Most understanding of the interconnection of these factors is compartmentalized within specific categories and focuses on limited and short range influences while placing secondary or no consideration of the broader effects of such policies. This analysis looks specifically at these broader secondary effects and begins to quantify their economic impact to foster more efficient governmental policies and minimize negative economic distortion through greater understanding of their underlying connections.

There is a mathematical relationship between the broad market influences and a national economy. Changes in broad factors, say a change in borrowing rates, or a decrease in energy costs, have effects that can reverberate unevenly throughout an economy. Similarly, the core value sectors such as human capital, real estate and the equity markets also have interplay with each other and the broader markets, constantly. Mathematical relationships can be estimated to show how a change in one value sector can reverberate throughout an economy. Growth / contractions in income production and values can be extrapolated from these

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estimates. Individual land policy decisions are one such force that reverberates throughout an economy with large lasting impacts. The effects on GDP (among other effects) can be derived from these mathematical interactions.

The key point to take away is that the value components of a national economy and the broader multi-national effects as well, are a complex multi-dimensional socio-economic math problem. Any policy change (land policy in this instance) should begin by estimating the implications for all of the main value sectors in the economy. This will allow for more efficient decision making and the elimination or minimization of wasteful policies through more transparency. Wasteful policy in an economy the size of Greece's for example, could quickly cost billions in lost GDP, and corresponding tax revenue. Ignoring the wide reaching effects of land policy decisions does nothing to minimize their effects, but it does hamper effective decision making by both governmental authorities and the public at large.

In this paper we will discuss a simple model for estimating the effects of certain land policy factors on the Greek national economy by looking at how they relate to the country's main value sectors. Greater accuracy in estimation, and a better understanding of the broader effects of many other key economic influences can be accomplished through deeper study and more detailed data / analysis. This takes time and resources. This paper's goal is to create awareness and refine these efforts by understanding of the key national economic interactions.

## **EXTERNAL FACTORS INFLUENCING THE NATIONAL ECONOMY**

A national economy, the Greek in our example herein, operates as a national economic organism in the broader international markets. To fully understand the economic impacts of any single policy one must first understand the specific national economic forces at play, and to a somewhat lesser extent, how it operates in the broader sphere of economies outside of their national borders.

- 1) Broad Market Influences
- 2) National Antagonists
- 3) National Protagonists
- 4) Core Trade Markets

This stage of the analysis identifies the Broad Market Influences that affect large national and multi-national areas. These could include state of the overall world economy (such as the World Financial Crisis), the price of energy, typical broad multi-national borrowing rates, general risk perception of the country in question (Greece in this instance), regional stability, and other very broad factors.

While an in-depth study of these factors as they relate to Greece has not been made at this time, the impacts of expected changes in these factors (Greece's status in the EU, borrowing ability, energy prices, the pace of financial recovery in Europe...etc.) can be mathematically modelled to estimate the effect of specific changes on the economy. For instance, a decrease

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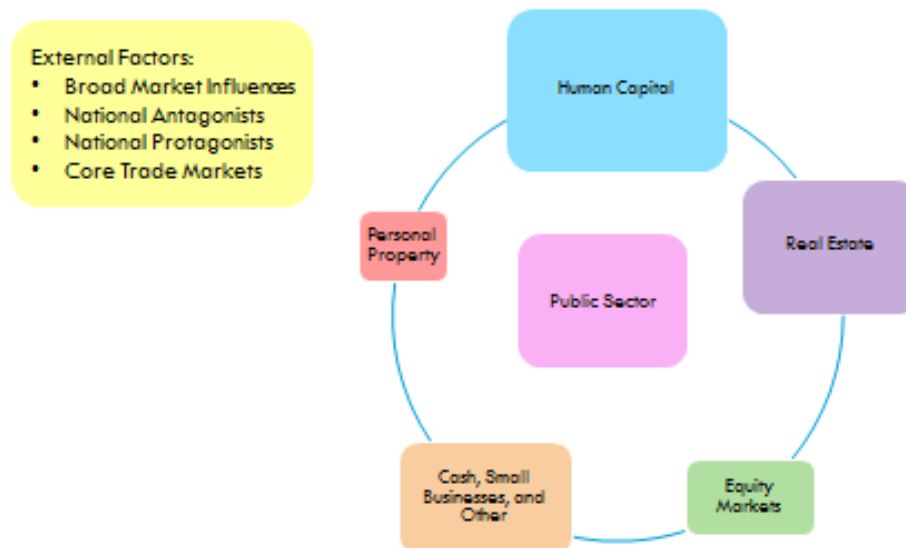
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in energy costs will lower cost of living expenditures for those people relying on cars, and lower energy costs for residential and commercial uses as well. With the right data, an economist can trace which sectors of the economy will exact benefit (or lose) and how much extra resources those sectors will have to expend.

While these broad market factors are not the primary focus of this paper, it is important to note that proper mathematical modelling of the impact of these changes can be accomplished and this will increase the accuracy of the remainder of the mathematical model.

## National Economic Value Components



### NATIONAL ECONOMIC VALUE COMPONENTS

Now that we have identified the broader general market forces, we will go on to describe the core components that make up the vast majority of all “value” on the earth or within a specific nation. While so far we have described the economic setting from the “outside” in towards a specific (land) policy, when we perform our mathematical efficiency or in-utility modelling, we will in fact start from the specific policy and estimate its effects outward.

The primary economic value components are as follows:

- 1) Human Capital (40%)
- 2) Cash, Small Businesses, Intangibles, & Other (24%)
- 3) Real Estate (20%)
- 4) Equity Markets (12%)
- 5) Tangible Personal Property (4%)

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The percentage noted after each category are based our estimates of the sectorial values in the United States. These percentages will clearly be different in differing countries and we have presented a reasonable approximation of the United States value breakdown as a starting basis.

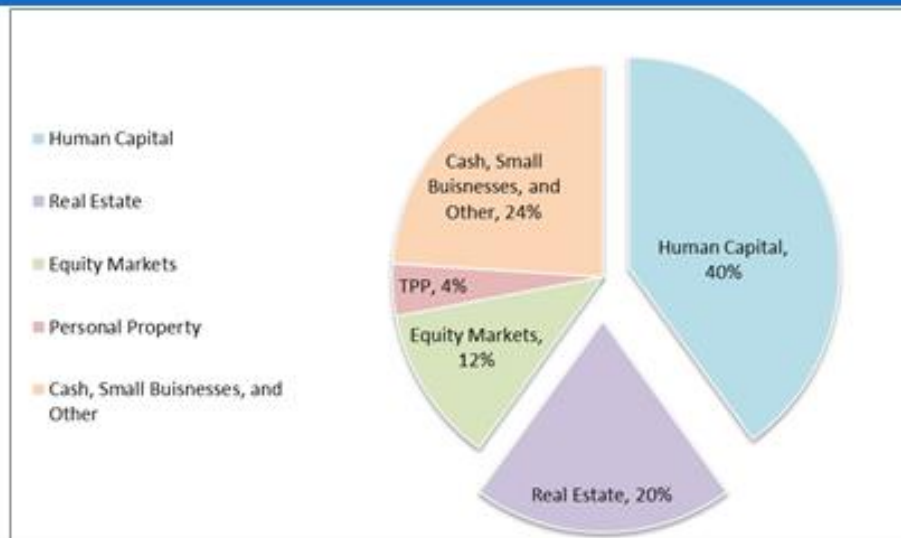
Public sector assets are also an important value component. This is especially large in many countries, like Greece with a public sector that uses approximately half of GDP. This paper is primarily focused on how (land) policy changes can be economically quantified, and our focus is on private markets. However, in some nations, Greece in particular, public sector effects on the rest of the economy are huge and particular attention should be made of how this also affects efficiency / in-utility. The mathematical analysis should be similar to what we will apply herein to policy affects impacting the private value sectors.

These percentages above represent the total value of human capital, the total value of all real estate, the total value or all equity/stock markets, tangible personal property, and with another category for “other”. The total value of all categories were then added and made into a pie chart showing this breakdown of the components shares.

A fairly accurate breakdown of the scale of each value sector is KEY to estimating the mathematical efficiency / in-utility impact of a specific (land) policy. This is especially important with land policy since there are very direct interactions to both the real estate markets and human capital. In the United States those two sectors account for approximately 60% of all value, and counties with weaker equity markets may see the total of those two sectors to be even higher.

For our model herein, we will apply these percentages for Greece. Greater accuracy could be obtained by analysing the Greek value components on a broad scale and refining these figures for this specific country. The glaringly obvious point to never be forgotten is the huge size of the human Capital factor. Policies that make utilization of human capital more difficult will have large negative impacts on national production. Not estimating the in-utility effects on human capital is one of the major weaknesses in short range or narrow consideration of the economic impacts of (land) policy changes.

## Gross National Private Sectorial Values



### PROPERTY MARKET FOUNDATION

World Citizen Consulting scorecard project performs a Crystal Matrix analysis of the core components of real property markets. They project a 2 dimensional look at the infrastructure utilized in a healthy real property market. Their core components are:

- 1) Appropriate Regulation
- 2) Property Rights
- 3) Access to Credit
- 4) Effective Governance
- 5) Rational Dispute Resolution
- 6) Financial Transparency

Beyond each of these core components are three subcomponents. The next ring of this analysis, Property Rights for example, further expands the Crystal Matrix to show the subcategories of Property Rights, with their own subcategories as well.

- 1) Formal Ownership
- 2) Legal Protection
- 3) Registers

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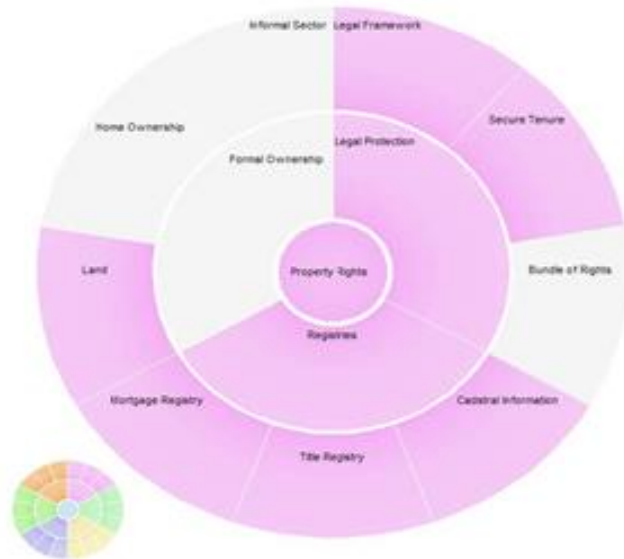
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The Crystal Matrix then has subcategories beneath these. The implications are that these institutional infrastructure components affect the efficient function of the Property Market sector, and by definition the values and risk levels inherent for all property types.

We think this is a fairly good beginning to understand the Property Market components. It is also a good way to frame an understanding of the interconnections that reverberate throughout this one sector with changes in policy or broader market disturbances. It will be a useful exercise to develop similar but possibly simpler Crystal Matrix forms to frame the issues surrounding the other primary value sectors (Human Capital, Equity Markets, Personal Property, Cash/Small Business/Intangible/Other, and possibly the Public Sector too).



# Property Rights



- Goal – Property rights that are legally protected, secure, recorded in a single, accurate, electronically assessable registry and that lead to high levels of formal ownership for all citizens

## OKUN'S LAW

In economics, Okun's Law (more a rule of thumb) describes the relationship between unemployment and a country's loss in total production (GDP). The "gap version" states that for every 1% drop in cyclical employment, there is a corresponding 2% drop in GDP. When using GNP, this figure has been estimated at about a 3% decrease in output for every 1% increase in the unemployment rate.

The authors consider this to be a reasonable approximation of the general trends regarding these rates. However, the stability and usefulness of "the law" has been disputed, it will surely vary from nation to nation, the majority of this change is capacity utilization and hours worked per employee, and the magnitude of these changes seem to be declining over time in the United States. The primary reasoning cited for this effect (why GDP may increase or decrease more rapidly than unemployment changes) is as follows:

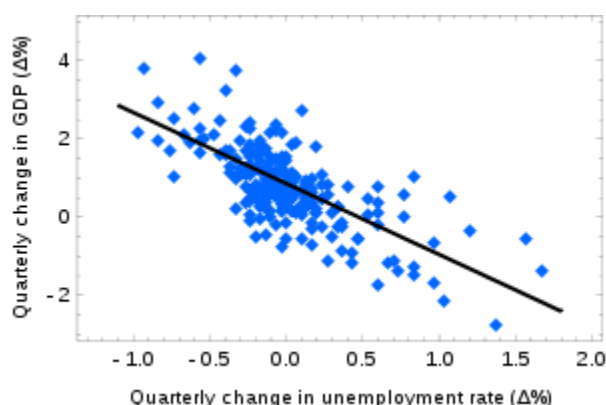
- 1) A reduction in the multiplier effect of money
- 2) Unemployed persons dropping out of the work force
- 3) Employed person working shorter hours
- 4) Labor productivity change

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The final caveats are that this relationship was tested in the United States and over a fairly narrow range of employment levels, and tends to be better for short run rather than long range forecasts.



Graph of US quarterly data (not annualized) from 1947 through 2002 estimates a form of the difference version of Okun's law: %Change GNP = .856 - 1.827\*(Change Unemployment Rate). R<sup>2</sup> of .504. Differences from other results are partly due to the use of quarterly data.

The gap version of Okun's law may be written (Abel & Bernanke 2005) as:

$$(Y - \bar{Y})/\bar{Y} = c(u - \bar{u}), \text{ where}$$

- $\bar{Y}$  is potential GDP
- $Y$  is actual output
- $\bar{u}$  is the natural rate of unemployment
- $u$  is actual unemployment rate
- $c$  is the factor relating changes in unemployment to changes in output
- 

In the United States since 1955 or so, the value of  $c$  has typically been around 2 or 3, as explained above.

The gap version of Okun's law, as shown above, is difficult to use in practice because  $\bar{Y}$  and  $\bar{u}$  can only be estimated, not measured. A more commonly used form of Okun's law, known as the difference or growth rate form of Okun's law, relates changes in output to changes in unemployment:

$$\Delta Y/Y = k - c\Delta u, \text{ where:}$$

- $Y$  and  $c$  are as defined above
- $\Delta Y$  is the change in actual output from one year to the next
- $\Delta u$  is the change in actual unemployment from one year to the next
- $k$  is the average annual growth rate of full-employment output
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At the present time in the United States,  $k$  is about 3% and  $c$  is about 2, so the equation may be written

$$\Delta Y/Y = 0.03 - 2\Delta u.$$

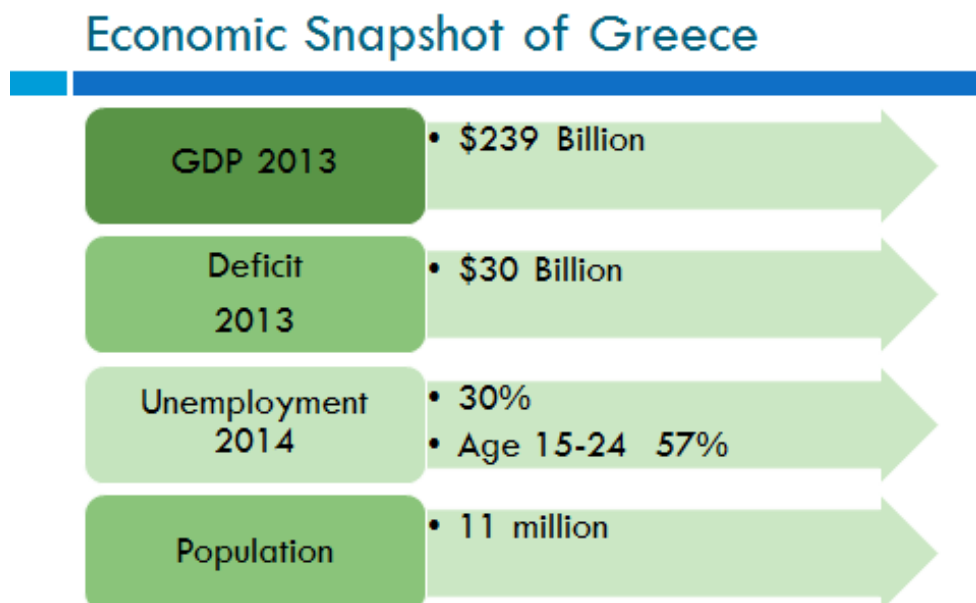
The graph at the top of this article illustrates the growth rate form of Okun's law, measured quarterly rather than annually.

## THE MULTIPLIER EFFECT IN ECONOMICS

The multiplier effects include the money multiplier, fiscal multipliers, Keynesian and Hansen-Samuelson multipliers. This article will not go into depth on the various multipliers but the general method for the calculation of short run multipliers is comparative statistics or comparative dynamics.

The aspect of the multiplier effects we would like to highlight herein relates to the injection of new demand/income into a circular economic flow. The injection of this extra income leads to more spending, which creates more income over a specified time period, creating more demand and so forth. The multiplier effect we refer to herein is the increase in increase in gross income (GDP) arising from a new injection of spending, over a given time period (a year typically).

## 2013 / 2014 GREEK ECONOMIC SNAPSHOT



These were statistics gathered over the 2013 and 2014 period. The specific figures vary over time, and will also vary based on differing data sources. The point of this analysis is not to create an argument over the exact figures at a certain point in time (although the greater the accuracy the greater reliability of the final conclusions), but to show a starting point for GDP in our analyses, to show that there has been a significant historical deficit (individual years can vary greatly), and to highlight the continued high unemployment levels.

The positive aspects of high unemployment is an understanding of the pent up GDP growth potential in the economy tied into this underutilization of this greatest valued resource in the Greek economy (and all economies). A primary (if not main) goal of the public sector should be to find ways to achieve an efficient utilization of this human capital, and (land) policies should be designed to further boost efficiency. Poor policies can easily exacerbate the problems increasing unemployment and lowering GDP.

## CHANGES IN UNEMPLOYMENT

### Effects of Lower Unemployment on GDP & the Deficit

- Assumptions: Pro employment and private market growth land policies, regulations, and possibly a privatization of some of the currently public held industries/markets.
- Applying an Okun's Law level multiplier effect of 2x to 3x equates to;
- **As a result of market improvements, if Greek Unemployment were to drop to 7%-10%;**
- **GDP would increase to \$334 Billion to \$382 Billion.**

The elimination of inefficient (land) policy regulation can have a huge impact on GDP and employment levels. If we were to assume that only the low end of the range were truly achievable via Okun's Law, and even applied an inefficiency factor (-35%) to account for new in-utility created by imperfectly redesigning the existing inefficient regulations, we are still left with a minimum of over \$200 billion dollars of increase in GDP with improvement in employment levels.

The huge scale of these numbers makes it obvious that a very close and careful look at the (land) policies in question, so that inefficiencies / in-utility can be removed, is clearly

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warranted. There are many ways the understanding of the interrelationships can be expanded and refined for better accuracy, but the overall direction and general magnitude of the factors is undeniable.

## **INEFFICIENT REGULATION OR POLICY IN GREECE**

The following pages will show a list of potentially inefficient (land) policies in Greece that contribute to the current high unemployment levels, and lower than optimal GDP production. These items will be discussed herein briefly, but that is not to say that a much more in-depth analysis and understanding of the issue is not warranted. This brief estimation of the effect of improving these policies is shown here to indicate “how much is at stake” by continuing with the current policy group in question. With an understanding of the potential cost of the policy, better decision making (cost benefit analysis) can be employed and it is more likely that policies with less inefficiency will be utilized wherever possible. Greater transparency regarding cost will help highlight where the largest problems are, and minimize the potential effects of governmental inertia or special influence group influence.

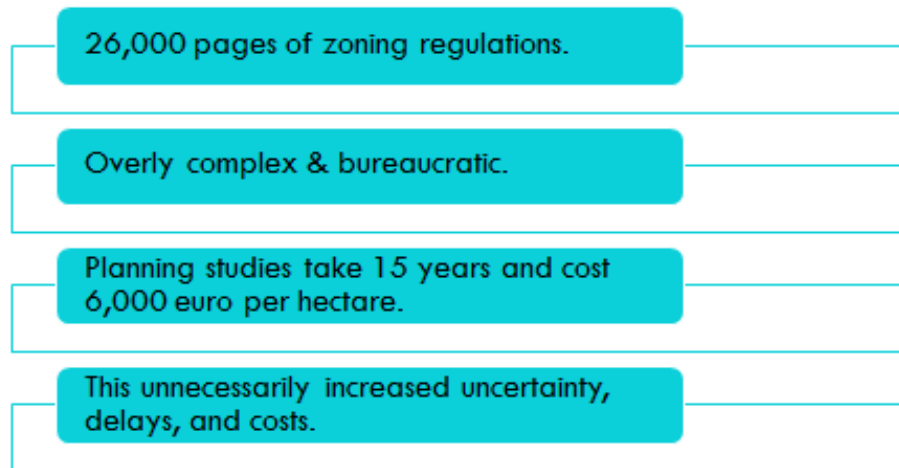
## **INEFFICIENCY MODEL STEPS**

The first step in this simplified model is to estimate what percentage of the population will be affected by the policy in question. From this stage we then estimate what percentage of the value sector(s) (human capital, real estate, equity markets, personal property, etc.) is likely to be affected. At that point, a range of “loss in productivity” is estimated based on the likely impacts on decision making due to the specific policy. This arrives at an annual productivity loss estimate, which is then compared to how often this policy impact will apply, relative to a generally unconstrained market. This is then multiplied by the % of total “value” the sector has in relation to the overall national value total (40% for human capital and 20% for real estate is our base line but in actuality each country should be carefully analysed to refine these figures for the location in question). This then concludes to an annual efficiency loss due to the policy in question.

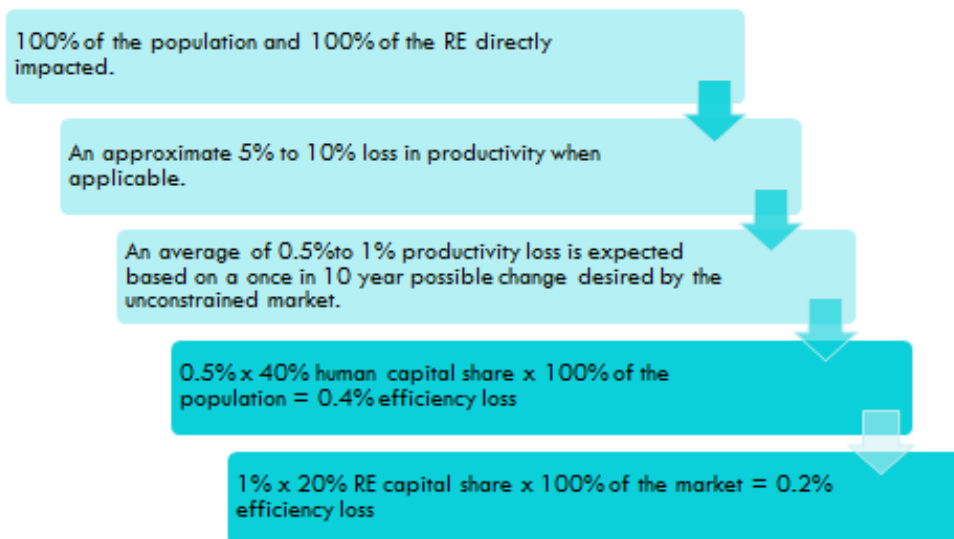
Clearly there are a great deal of estimates and ranges involved. There is also a much deeper set of interconnections between policy, public sector, social, financial, and broad market influence. They should be understood and analysed in great detail to refine and perfect the conclusions shown by the broader trends discussed herein, but the first step is the realization of how deep the hole really is, and how important to a national (the Greek) economy the efficiency maximization can be.

The following pages will show a set of policies and a simple inefficiency math calculation conclusion.

## Overly Complex Zoning Regulation



## Overly Complex Zoning Regulation



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## Dead Capital and Informal Development

- Can't sell (at more than 50% value?)
- Mortgage
- Difficulty inheriting
- Can't legally expand
- Human capital is much less mobile
- Corporate assets are much less mobile
- Can't tax
- Uncertainty increased
- Can't register with cadaster
- Formalization has a high cost (7-20% of property value)
- Formalization permits are for 30 years only
- Formalization increased uncertainty
- 1 million constructions are deemed illegal (and this excludes the 1.5 million with minor informalities); totaling about 72 billion euro in value.

## Dead Capital and Informal Development

20% of the population and 20% of the RE directly impacted.

An approximate 10% to 20% loss in productivity when applicable.

A weighted average of 1% to 2% productivity loss is expected based on a once in 10 year possible change desired by the unconstrained market.

$1\% \times 40\% \text{ human capital share} \times 20\% \text{ of the population} = 0.1\% \text{ efficiency loss}$

$2\% \times 20\% \text{ RE capital share} \times 20\% \text{ of the market} = 0.1\% \text{ efficiency loss}$

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## Forest Land Policy Inefficiencies

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- 48% of all land registered in the cadaster is informal since it has recently been claimed to be in new or historic forest lands.
- State claims ownership rights.
- No construction can commence.
- There are no completed forest or coastal zone maps
- owners must prove chain of title back to 1884.
- There has been a history of significant corruption in this process.

## Forest Land Policy Inefficiencies

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- Title chain research is a long costly process tending to rule out small and medium investors from the market.
- The state has often claimed land in suburbs, even land registered with services available, taxes being paid, and a resident in place for over 20 years.
- The presence of a forest (25% canopy) at any time in the past based on ortho photos from as far back as 1945 allow the government to make these claims to ownership.

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## Forest Land Policy Inefficiencies

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- Rural land that is not cultivated may also “become” forest land and then the state can make claim. In informal & unplanned areas it can take 2-3 years for “possible” approvals for any construction, and denial is very possible.
- Constructions are commonly built informally because of this.
- To build in unplanned areas requires up to 25 agencies, may take several years, often court decisions ruling out small players.
- The process is slow and the lack of spatial data (forest maps & coastal zone maps) makes it even longer when there is existing formal & informal development already in place.

## Forest Land Policy Inefficiencies

12% of the population and 12% of the RE directly impacted (we used 1/4 of the land area as our guide assuming lower values and population in these areas).

An approximate 10% loss in productivity when applicable.

A weighted average of 2% productivity loss is expected based on a once in 20 year possible change desired by the unconstrained market.

$2\% \times 40\% \text{ human capital share} \times 12\% \text{ of the population} = 0.1\% \text{ efficiency loss}$

$2\% \times 20\% \text{ RE capital share} \times 12\% \text{ of the market} = 0.05\% \text{ efficiency loss}$



## Human Capital and Cost Inefficiencies

- Real estate values are inflated due to mortgages only available in the planned areas, pushing the populations into the urban areas where they might not go were their mortgage options expanded.
- Engineering inspections for informalities are required for each transfer (increasing costs).

## Human Capital and Cost Inefficiencies

100% of the population and 100% of the RE directly impacted.

An approximate 1% loss in productivity.

A weighted average of 1% productivity loss is expected relative to an unconstrained market.

$1\% \times 40\% \text{ human capital share} \times 100\% \text{ of the population} = 0.4\% \text{ efficiency loss}$

$1\% \times 20\% \text{ RE capital share} \times 100\% \text{ of the market} = 0.2\% \text{ efficiency loss}$

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## Tax on New Construction

There is a 23% tax due on all new constructions forcing up real estate values by raising the feasibility level for new constructions well above what is efficiently demanded by the market.

## Tax on New Construction

100% of the population and 100% of the RE directly impacted.

An approximate 4% loss in productivity.

A weighted average of 5% productivity loss is expected based on higher rent and ownership costs of building improvements (+13% housing costs, +13% higher feasibility level & 30% housing share of personal gross income).

$4\% \times 40\% \text{ human capital share} \times 100\% \text{ of the population} = 1.6\% \text{ efficiency loss}$

$4\% \times 20\% \text{ RE capital share} \times 100\% \text{ of the market} = 0.8\% \text{ efficiency loss}$

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## **MULTIPLICITIVE INEFFECIENCY FACTORS**

The effect of lost efficiency on GDP is a multiplicative function. Essentially, all of these factors are interrelated thus the inverse of each in-utility factor is multiplied to determine the composite in-utility or composite inefficiency factor (adding them would overstate the total).

We are also considering the likely short term effects of a portion of the GDP change as well as considering that the likely policy corrections to account for these inefficiencies will also be imperfect. To account for this, a downward pressure or dampening adjustment will be made to the final composite factor. This dampening factor is to account for the imperfect nature of the system in general, even when efficiency is realistically maximized (corruption, other related weak institutions, increased tax revenues gathered, costs to implement, etc.).

From a range of 0% to 50%, the Greek example is likely to face a 35% loss of efficiency factor implementing the policy corrections. This will be used to dampen the forecast benefits of the policy changes. This factor will also tend to dampen our estimated results, making them somewhat more conservative.

## **COMPOSITE INEFFECIENCY FACTOR AND CONCLUSION**

The composite inefficiency factor from the above policy weaknesses is a 1.1% loss in efficiency. We applied a 65% efficiency factor to this estimated (or a loss of 35% as described in the previous paragraph) showing the final composite factor to be 0.74%. This excludes the construction sector which may account for an additional 1.55% inefficiency all by itself.

We will apply an Okun's Law multiplier effect of 2X to 3X to these core composite factors to arrive at the annual GDP loss of 1.5% to 2.2%, plus an additional 3.1% to 4.6% for construction VAT alone.

The annual loss of GDP, based on the inefficiency factors as estimated herein, is \$3.6 to \$5.3 billion US dollars, and an additional \$7.4 to \$11 billion (based on a decrease from 23% to 3% in the Construction VAT).

## **EXTENDED ANALYSIS AND CORE LESSONS TO BE LEARNED**

We have performed a rather simple analysis to estimate the inefficiency factors inherent in several very specific policy issues. These were related to the effected percentage of the total value of the specific sector in the local economy and this was then applied to the scale of the economy via GDP. The result of this analysis is the GDP cost of the economic distortion effects. Minimizing the economic distortion will lower the unemployment levels while also increasing GDP and corresponding tax revenue.

The individual inefficiency estimates can be analysed and estimated more accurately with better and more detailed information. Additional policy factors also have in-utility issues, and possible solutions will have inefficiencies of their own. They should be estimated and understood to determine their relative merit. The basic parameters of the economy in question change over time, which alters the conclusions as well. Lastly, the predictive ability of the multiplier effect in this situation should be explored in greater detail.

The core lesson of this analysis should be:

- 1) These inefficiency effects are incredibly important
- 2) The magnitude of the effect on GDP can be estimated
- 3) Inefficiency impacting Human Capital can be huge
- 4) Value sectors are interrelated
- 5) Land policy has very broad effect

Discussion and refinement of all of the factors in this paper will be a very productive exercise. A very narrow and short range public disclosure / consideration of policy effects, costs, and benefits are fairly typical in the world given the national political realities. This is very likely to understate and distort the true impact of a given policy. It also routinely achieves suboptimal results.

The interconnection of value sectors, policy impact, logistical considerations, societal concerns, and institutional realities create a spider web of interrelationships. Much of this spider web of interrelationships can and should be mapped out mathematically with an eye to economic efficiency, minimizing economic distortion and political reality. A fairly good analysis of this spider web of mathematical economic interrelationships could result in the creation of a predictive model, relative to GDP and employment (and other market parameters), that any new or existing policy or broad market influence can be tested against. The value of a reasonably predictive model based on these connections could eclipse the benefits of even the billions of dollars of efficiency that can be added to an economy by effectively refining the existing policies in force. Thousands of man hours of time may be required to build this predictive model but with the billions of dollars at stake annually in even a fairly small economy, can we afford not to do so?

## **BIOGRAPHICAL NOTES**

### **Steven NYSTROM**

Current Positions: NewStream Companies (Principal), National Society of Professional Surveyors (International Delegate to the FIG), Peace by Prosperity (President, NGO), UNECE WPLA (Working Representative to). Past Positions: Appraisal Institute International Relations Committee, Appraisal Institute Delegate to the FIG.

### **Chryssy POTSIOU**

Dr Surveyor Engineer, Ass. Professor, School of Rural & Surveying Engineering, National Technical University of Athens, in the field of Cadastre and Spatial Information Management. FIG Commission 3 chair (2007-2010). FIG Vice President (2011-2014). FIG President 2015. Elected bureau member of the UN ECE Working Party for Land Administration (2001-2013), member of the management board of KTIMATOLOGIO SA; elected bureau member of HellasGIs and the Hellenic Photogrammetric and Remote Sensing Society.

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Quantifying the Effects of Land Policy on a National Economy (7757)  
Steven Nystrom (USA) and Chryssy Potsiou (Greece)

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