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The Memornada trap and almost fall of the Greek economy

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Abstract: We analyse economic and political developments in Greece for the period 2010-2015, after the introduction of the memoranda agreements between Greece, the European Union (EU), the European central Bank (ECB) and the International Monetary Fund (IMF). We suggest that a vicious cycle took place, whereby austerity measures, badly implemented programs, mistakes of economic policy, unwillingness on the part of the Greek governments to implement structural reforms, and political immaturity from both politicians and citizens led to the failure of the memoranda and furthered political instability. We introduce a game theoretical approach as a model for the "European game" played by Greece and the EU and the complex and confused situation and diverging aims among the major participants: Greece, Germany, the USA, France, the Baltic States, Finland, the IMF, etc. as well as a presentation of the June 5th referendum in Greece. We then present our estimations for the sustainability of the public debt, followed by our conclusions.

Keywords: Memoranda, Greek economic crisis, public debt, debt projection analysis

1. Introduction

Greece joined the European Economic Community (EEC), the then European Union (EU), after the Treaty of Maastricht in 1992, as its tenth member in 1981 and the EMU as one of its original members in 2002.

Before the adoption of the euro, Greece, as the other member states, had its own currency, the drachma, and followed its own monetary policy, which was expansive and accommodating to the needs of the state (public sector). The Bank of Greece functioned as

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the state's source of finance, printing money to cover the difference between expenditure and revenue. This led to high inflation rates (in some years it was over 20%) and high interest rates (18% for long term deposits) which were lower than inflation and led to negative real interest rates.

Expansionary monetary policy led to the drachma's rapid depreciation. For example, in 1970, 1 DEM was equal to 7 drachma, whereas 10 years later, 1 DEM was equal to 175 drachma. Depreciation of the drachma should have led to higher Greek competitiveness in the trade sector. In fact, this did not happen. Depreciation had only temporary and short-lived effects but over the entire period 1974-2002 (and later) Greece had a negative trade balance, which was offset by revenues from services, mainly tourism, shipping and, during the 1970-1990's, remittances of Greek workers working abroad, mainly in Germany (Kyriazis, 1985).

2. The drachmas' adhesion to the EMS

When Greece joined the EMU, the situation changed. Greece could not finance its public deficits through monetary expansion but, being an EMU state, it could do so by issuing public debt (bonds) at relatively low interest rates.

Greek politicians of both main parties which alternated in heading the government between 1975 (after the reestablishment of democracy) and January 2015, tried to satisfy the demands of their political clients by increasing wages and salaries and increasing employment in the public sector, by introducing relatively high minimum wages in the private sector (EUR 840) and keeping taxes relatively low But even more crucial, by not aggressively pushing tax collection or implementing tax reforms, etc. thus permitting the black economy to thrive (estimated at about 30-40% of official GDP). Furthermore, the Greek statistical service "cooked" public deficit and debt statisticsand, surprisingly, the European Statistical Office accepted them as correct.

In 2010, the PASOK socialist government of George Papandreou, which was elected on the promise "*There is money*" (in other words, that financial resources were available to implement policies to satisfy voters) discovered that the actual situation was different. The public deficit, given by the previous government as being about 3-4% of GDP (and

thus within the limits of the EMU fiscal stability criteria) was actually about 14%. The situation was out of control and the government had to ask the EMU for financial help. It was a totally unforeseen situation and the EMU had no instrument to face a debt crisis of one of its members.[1] Invoking also a lack of expertise in facing debt crises, the EMU asked for assistance from the expert, the IMF, to draft a program for the financial bailout of Greece together with the necessary reforms. This was the first memorandum agreement, followed within two years by a second one. In total, the EMU member states and the IMF lent Greece EUR 250 billion, the biggest financial assistance package in history to a country of just 11 million people and with a GDP in 2010 of EUR 220 billion.

In 2012, a "haircut" of the Greek debt that was held by the private sector (Private Sector Involvement, PSI) was implemented of about 55%. Greece was followed by memoranda in other states such as Portugal, (in a situation somewhat similar to that in Greece) Ireland (banking sector induced, following the toxic products crash in the USA in 2008) and Cyprus (banking sector induced, due to the exposure of its banks to Greek bonds). Ireland managed to emerge from its memorandum in 2014 and achieved high growth rates and falling unemployment. Furthermore, the situation in Portugal and Cyprus is improving. After six years under the memoranda, the situation in Greece is deteriorating and verging on collapse.

3. The memoranda trap

Christodoulakis (2014) coined the term "conflict trap" for the Greek Civil War of 1946-1949, during which small and mainly random actions by the two sides (the Greek government and the communist party) led to an unforeseen escalation and increased violence, resulting in great human and economic losses.

[1] This is also astonishing in view of the fact that such mechanisms existed in the EMU's predecessor, the European Monetary System, and some countries, such as Italy, did employ them. It was thought that if countries followed the two financial criteria (public deficit less than 3% of GDP and public debt less than 60%) a debt crisis could never arise, making such mechanisms superfluous.

We suggest that Greece was caught in a "memoranda trap" where many factors contributed to a vicious cycle of economic recession that created political instability and led to further economic recession. Up to the time of writing (August 2015), Greece has lost cumulatively 25% of its GDP (from the level in 2009), unemployment has reached officially 27% and we estimate that GDP losses for 2015 (due to events analysed later on) may reach another 5% and 2% for 2016, bringing the total GDP loss at the end of 2015 to 32%, more than that sustained by major economies after the 1929 crash.

Greece's problem was twofold: excessive public debt and a trade balance deficit, due to the lack of competitiveness of the Greek economy. As stated before, public debt was due to a bloated public sector because of relationships between political parties and governments and their clients.[2] Thus, the memoranda provided for measures to decrease the size of the public sector (one new employee was to be hired for every five retiring) plus additional firing of employees, closure of non-performing and unnecessary public organisations[3], corporations, etc. streamlining the public sector (for example, uniting numerous pension funds into fewer to obtain economies of scale) and reduction of salaries. Parallel to the reduction of expenditures, the program foresaw revenue increases through increases in taxation (VAT, income and corporation tax and from 2012, a tax on property and houses) and an extensive program of privatization of state property.

However, the first problems arose concerning the mix of measures and the government's willingness to implement them. First, the combination of tax increases (two thirds) and expenditure reduction (one third) was wrong because tax increases have higher recessionary effects than expenditure decreases, related to their respective multipliers. The PASOK government preferred an increase in taxation instead of a reduction in expenses in order to safeguard its client basis, which was very strong among public employees,who

[2] The situation was almost surrealistic: when asked by the representatives of the troika (IMF, EU Commission and ECP) how many employees the state had (and paid) the answer was "we don't know"! The state had to implement a census in order to ascertain the number of state employees which, including the wider public sector (state companies etc.), was close to one million.

[3] A notorious case was "Agrogi", a public enterprise that employed 285 employees, had an annual contribution per employee of about EUR 300 (an all-time labour productivity record!) and created an annual deficit of EUR 25 million, covered by the state's budget. It took four years to close it down.

were also better organized and more willing to strike, as, for example the employees of DEH, the public electric power company. Parallel to this, although having agreed in general to reduce public employment, the government found ways to procrastinate and postpone reforms. This was the notorious "political costs" theory. In addition, trying to project as much as possible the public burden on the private sector was a policy that was followed as well by the New Democracy government after 2012 (which was allegedly pro-private enterprise).

The end result of the wrong policy mix was much higher recession and a greater increase in unemployment than had been anticipated. Over the entire period up to 2014, the private sector lost 1,3 million jobs[4]. IMF's experts went along with the wrong estimation of the multiplier, as did the IMF. Director General C. Lagarde had to apologise officially for this error. In order to increase the competiveness of the private sector and ameliorate the trade balance, the memoranda introduced "internal depreciation", an attempt to reduce production costs by decreasing labour cost. This was done by reducing minimum wage to EUR 540 and the deregulation of labour relations by abolishing collective bargaining for private sector employees, as well as reducing by 3, 4% employers' contributions to social security, etc. for their employees.

The main problem was that labour cost, although important, is one element of total cost. Concerning other cost elements, Greek private enterprises had a disadvantage compared to most of their competitors as they faced higher energy (mainly electricity), capital (interest rates for loans or private bonds) and profit taxes (26% normally, 35% for companies listed in the Stock Exchange, as against, for example, 12% in Ireland and Cyprus). These rates were nominal as the actual burden was higher because of other charges as, for example, the pre-payment of up to 55% of taxes for the following year, which influenced liquidity negatively, and an "exceptional" property tax after 2012.

Furthermore, again mainly due to the fear of the political cost, the privatization program did not progress at all during the first two years. The end result was a general dissatisfaction among citizens and voters. Political cost was not avoided. Trying to find an escape route,

[4] Then Finance Minister, Mr. Papakonstantinou, stated in 2010 that the memorandum would lead to a recession of -1% in two years! Many economists estimated deeper GDP losses, as high as -9% to the end of 2011. The actual loss was -10%.

Papandreou put forward the idea of a referendum in 2012. The EU partners insisted that if a referendum were to take place, it should be about Greece's remaining in the EMU. The referendum did not take place but the Papandreou government fell and was succeeded by a "technocratic" one under Professor Loukas Papadimos, which successfully implemented the haircut. It was the first step in the "memoranda trap", when economic recession brought about a change of government and political instability.

In the next elections (June 2012), New Democracy leader Antonis Samaras campaigned under the populist slogan "I will tear the memoranda apart" and his party (after two consecutive elections) was the strongest one, but was unable to form a government, as it did not have an absolute majority in Parliament. It formed a coalition with PASOK (which, from the about 42% of votes it had received in November 2009, had dropped to 12,28%) and the small left pro-European party DHMAR. After forming a government, Samaras forgot his populist declaration and continued with implementing some structural reforms, some privatizations, but at a relatively slow pace, revealing again the unwillingness of political parties to deal with the "political cost". Austerity measures continued, the recessionary decline of GDP and the increase of unemployment continued, coupled with increased taxation and cuts in wages and salaries. Understandably, the credibility of the government among voters sank.[5] Voters considered the government to be acting like tax pirates.[6]

[5] After the retreat of Papandreou, the new leader of PASOK EvangelosVenizelos, took over the post of Finance Minister and introduced the property tax on private property (housing). Willingly, wanting to confuse citizens, he named it a "duty" not a tax (although it was not a duty which finances specific services) and promised that it would be in effect for only for two years, but it became permanent. No wonder his credibility fell and PASOK took just 4.68% of votes in the January 2015 elections, forcing him to retreat.

[6] According to Swedish Professor C.H. Lyttkens (Lund University) who named it "predatory taxation" (http://fractalart.gr/democracy-ellada/), when he was informed that the tax was also levied on 2009 values (before the recession) when real values had fallen by as much as 40% according to the Bank of Greece. Thus, Greece was the only OECD state to tax inexistent values. This tax definitely killed the Greek construction sector, one of the few thriving before the recession. Greece's High Administration Court, in a decision of November 2014, found the tax unconstitutional, ordering the government to implement real values within 6 months.

Not surprisingly, during the European Parliament elections of June 2014, New Democracy lost 3% of its previous voters and came second after the left-wing party, SYRIZA. PASOK and DHMAR also suffered serious losses. It was a second step in the memoranda trap, with economic recession leading to political instability. After the June elections, Prime Minister Samaras practically put an end to reforms, reverting to populist declarations. In spite of this, the economy, after four years of recession, showed some signs of recovering, with a low positive growth (of about 0.8%) for 2014.

But the vicious cycle was to continue because the then Parliament was unable to garner the required 180 votes (out of 300) to elect a new President when the term of the previous president expired. This introduced new instability and economic uncertainty and led to new elections on 15 January 2015. SYRIZA won the elections with the promise that it would unilaterally abolish the memoranda and that, according to its leader, Alexis Tsipras "*we will play the tune and the international markets will dance*". SYRIZA emerged as the first party in number of deputies and formed a coalition government with the small right wing party, "Independent Greeks".

Professor Yianis Varoufakis, an alleged expert in game theory became Finance Minister and undertook the task of convincing EMU partners of the necessity of changing the memoranda and negotiating a new agreement.[7] Negotiations dragged on for five months without result since the Greek side, according to the EU institutions, never presented a credible alternative program, as it was trapped in its pre-election promise of a EUR 11 billion program (the "Thessaloniki Program") of grants, gifts, tax reductions, increase of state employment, increase of minimum wage to the previous levels, reinstatement of collective bargaining, etc.

On June 30 Greece did not pay EUR 1, 5 billion due to the IMF as it was, in fact, essentially bankrupt for the fifth time in its history (Zouboulakis, 2015). In order to break out from the impasse, Tsipras announced a referendum on the agreement of the 8 billion euro program of expenditure acts and tax increases) that had been proposed by the President of the Commission Mr. Jean Claude Juncker. This created a panic among deposit holders,

[7] At the beginning, international and Greek media considered him to be a colorful and interesting personality. By June 2015 he had lost all credibility. According to his own statement, he was hated by everyone in the Eurogroup. Prime Minister Tsipras dismissed him on the 6th of July 2015.

which necessitated the closure of banks (which remained closed for 3 weeks), the imposition of capital controls concerning the export of capital and daily withdrawals from ATMs of EUR 60 (in Cyprus, were capital controls were adopted after March 2013, the limit was EUR 300).

This again brought the economy practically to a standstill with the danger of a "Grexit" (meaning leaving the euro and returning to the drachma) and the economic decline became imminent. Greece had to return to negotiations under these near disaster conditions. The referendum took place on July 5, 2015 and gave a 61.3% vote in favour of "No", mainly because a "Yes" vote was accompanied by harsh austerity measures. The next day, the Prime Minister fired Mr. Varoufakis and gave his position to Euclid Tsakalotos, an Oxford educated Professor of European Politics. Mr. Tsipras, understanding the seriousness of the situation and being aware that Greece stood on the brink of a "Grexit", asked for the support of the opposition parties in Parliament to renegotiate, which he achieved with 251 votes (out of a total of 300 MP's) on the explicit condition that Greece would remain in the EMU.

Hectic meetings of Eurogroups, summits, etc. followed, culminating in the longest Summit meeting in history, lasting 17 hours (!). An agreement was reached which included a EUR 12 billion program of expenditure reduction and tax increases, for a three year period, the refinancing of Greece and a promise to discuss the alleviation of public debt.

Thus, for the time being and very narrowly, the fall of Greece was avoided.

4. Memoranda and referenda

We have always been supporters of direct democracy of which referenda are the major expression. Here, we will address briefly some issues.

Direct democracy was invented and practiced in ancient Greek city-states (Ober, 1999) and federations such as the Achaean and the Aetolian (Mackil, 2013; Economou and Kyriazis, 2013, 2015a,b; Economou, Kyriazis and Metaxas, 2015). Modern Greece on the other hand, has no established tradition of referenda and direct democracy in contrast to countries such as Switzerland, Uruguay, New Zealand, the USA and Germany (the last two on the states and cities level).

Although the Greek constitution (established after the fall of the dictatorship on July 24, 1974) provides for the possibility of top down (e.g., decided by the government)

referenda, only one had taken place before 2015, which was in 1974 and concerned the institutional foundation of Greece. The decision at that time was in favour of the abolishment of the monarchy and the introduction of a Presidential Democracy.

The second time that a referendum was discussed as an option led to the fall of the Papandreou government. Mr. Tsipras called for the second referendum since 1974 which led to furious debates during the preceding week. The referendum had numerous real and technical issues: those in favour of voting "No" (the government parties, the communist party and the far right-wing party "Golden Dawn" supported "no" for different reasons, but the two parties of the government explicitly maintained that "no" would provide them with a clear negotiating advantage, and by no means did it imply a "Grexit". Opposition parties, which supported a "yes" vote, argued that the true issues were a "Grexit" (in case of "no") or remaining in the EMU, in case of "yes".

On a technical level, it was not clear on which program the vote was taken (since the Juncker proposal had been already withdrawn). Furthermore, the time available for discussion was extremely short, just one week. The way the issues were stated (there were two issues, program acceptance-rejection and debt solution), were absolutely confusing for voters (and were even written on the ballot in a mix of Greek and English). So voters voted not on the particular issues, but on their interpretations of them. Lastly, the presentation of the vote was considered by many as biased, since there were not two separate votes (one for "yes", one for "no") but one single ballot, with the "no" option written above the "yes" option (a clear alphabetical misuse, since in Greek, the letter "N" for yes (Greek: "ναι" precedes the letter "O" for "no" (Greek: "όχι").

Even the debate leading to the vote was mainly emotional and in some cases irrational, invoking "bad Germans", "Nazi collaborators" (an accusation directed at "yes" supporters), national independence, pride and sacrifice (the "no" vote invoking a strong emotional parallel to the "no" of Greece against the Italian invasion of October 1940, which lead to the humiliating defeat of Italy by the Greeks in Albania, October 1940 – April 1941). Even heroes of the Greek war of independence were invoked by the supporters of "no".

What the results showed, once again, was that a segment of Greek citizens was unable to learn and face reality: they voted "no", hoping that "no" would lead to a better outcome

in the negotiations. In fact, the outcome was worse. Instead of the EUR 8 billion Juncker package, which was rejected, the Greek government accepted a new package of EUR 12 billion. Once again, the vicious political economic cycle continues. As a result of the referendum, apart from Finance Minister Varoufakis' departure, the leader of New Democracy, Mr. Samaras, resigned. In Parliament, 17 government MP's voted against, or abstained from voting in favour of the new program, which in fact meant that the government no longer had a majority (before then, it had 161 MPs). Some members of the party of the government, even two ministers, took very strong positions against the program. In conclusion, the referendum of the 5th of July was a case of "much ado about nothing", and created instability in political terms.

5. The European economic game

In this section we formulated the negotiations that took place between February and July 2015 between the new Greek government and the EU as a simple game.[8] The game has two players, the new Greek government and the EU, and each has two strategies, agreement and conflict. The aim of the Greek government is postulated as "political survival", while the aim of the EU's political elites, which set EU strategy, is to force the Greek government to reach an agreement according to the prevailing EU's "rules of the game" and political and economic orthodoxy eg., to force the Greek government to abandon its pre-election program and populist declarations (as, for example, the unilateral declaration of the memoranda as void, the Thessaloniki program, etc.).

This would serve as a warning to other countries, such as Spain's "Podemos", that whatever government is in power, European rules have to be followed (*Pacta sunt servanda*). This again would maximize the probability of existing governmental political parties in European countries remaining in power and not being ousted by dissenters and anti-European parties such as Podemos, Bepe Grillo or Marine Lepen. By accepting the European terms and a new memorandum, as it did in July 2015, the Greek government could no longer be considered to be a leftist government, this being a strong signal to other

[8] Presented first in May 10, 2015 in the newspaper "Tachydromos". The prediction of the game that an agreement would be reached proved to be correct.

political parties and European voters. Had it not accepted it, then Greece would have been forced to leave the EU. In fact, the German Economics Minister Schäuble had apparently prepared a "Grexit" plan to cover this possibility.

Table 1 presents a game theoretical choice set regarding the strategies and outcomes that both the Greek government and the EU had to face. By [c] we refer to the cost of conflict for Greece in the case of non-agreement. Since if one of the two players chooses a conflict strategy, the outcome is non agreement (independently of which one does so) in the three of the four cases of Table 1. The cost of a non-agreement-conflict for Greece would be further GDP loss (up to more than 30% cumulative from 2010), further increase of unemployment, reduction of available income, etc. resulting in disaster or further economic downturn.

The outcome of conflict for EU is negative [d] but not so great. It would mean destabilization of the EMU, fall of the euro exchange rate, some GDP losses for its members, but within manageable limits[9]. In the case of an agreement, the outcome is [a] for Greece and [b] for the EU, both positive, for Greece in the long run, due to stability, transfer of EU funds, etc. In the short run, the negative effects of the agreement due to austerity measures would predominate, but would be less severe than in the conflict outcome, e.g., in all cases a > c.

We refine the game by introducing a probability given by the EU that Greek governments would be willing and able to realise the agreement in view of the EU's mistrust of previous and current Greek governments to implement the previous agreements. If p is high, e.g., the probability of implementation is estimated so by the EU, then the positive outcome [p • b] is relatively high for the EU, and the cost of non-implementation [p • d] in case of conflict also higher. If p is low, then both the positive and the negative outcomes, b and d are smaller for the EU, thus favoring a conflict strategy for the EU. In

[9] If such an eventuality could be approximated by stock exchanges as mechanisms that discount future events, such losses would be small. When Greece's referendum was announced and interpreted as a signal of possible "Grexit", stock exchanges in the USA and the EU had a daily loss of between 3-4%, as against the -25% of the New York Stock Exchange after the fall of Lehman. This also showed that the negotiating threat made by Mr. Varoufakis, that in the case of non-agreement (on Greece's terms) the consequences for the EU would be disastrous, was totally unrealistic.

simple terms, if the EU believes that the Greek government would not be willing or able to implement an agreement (making thus the agreement void in fact) then the option of the conflict strategy becomes stronger for the EU.

Table 1. The Greek and the EU strategies in favour of or against a new memorandum agreement

	EU strategies	
Greece, Strategies	**Agreement**	**Conflict**
Agreement	[a], [p • b]	[c], [p • d]
Conflict	[c], [p • d]	[c], [p • d]

The prediction of the game outcome would thus be that, since the agreement strategy gives better outcomes for both players, e.g., a > c for Greece, and p • b > p • d for the EU, an agreement will be reached, as it did. Crucial here is [p], a fact that became clear during negotiations, when Chancellor Merkel and many others on the European side made clear their lack of trust in a credible commitment by the Greek government up to then in the negotiations.

The dismissal of Finance Minister Varoufakis and his replacement by Mr. Tsakalotos, of lower profile and more of a technocrat, may be interpreted as a signal by the Greek government of building up trust and credible commitment. In fact, actual negotiations were much more complex than a simple model can illustrate because the EU was not a single player, but many. There was a game with many players, each pursuing divergent and sometimes conflicting strategies. We address only a few of them: the IMF, not being an EU member but a player (together with the US) in the negotiations, favoured an agreement linked to a further austerity memorandum but insisted on a haircut of Greece's public debt, which Germany and other EU countries rejected out of hand.

Within the EU, and in view of internal political considerations and coalition governments, strategies were also divergent, exacerbated by national considerations. Thus, for example, the Baltic States, even though all are poorer in GDP per capita than Greece, found it difficult to pass measures in their parliaments to grant additional loans to Greece. The USA, having in mind the wider geopolitical situation, was concerned about political instability in Greece in the case of a "Grexit" and intervened openly (through President Barack Obama and Finance Minister Jack Lew) in favour of Greece. Other countries, like

France, Austria and Italy came out strongly in favour of Greece, perhaps also as a show of independence against Germany. Secondary to the main issue of negotiations between Greece and the EU, an important split and decision of interests and perceptions manifested itself within the EMU, showing also that EMU has no integrated mechanisms and rules for facing new, challenging and unforeseen situations, a situation similar to that after the 2008 crisis. Negotiations involved three EMU levels, the technocratic EMU working group, the Finance Minister's Eurogroup and Summits, but without a perfectly clear structure for decision making, not unlike a tennis game, with one level referring responsibility to another, only to be given back the ball! This was a further cause of the lengthy duration and confusion of negotiations.

Lastly, even in the German coalition government, and within the CDU party itself, there were apparently substantial differences with SPD being more in favour of Greece's remaining in the EMU, Chancellor Merkel in favour but under severe conditions, and Finance Minister. Schäuble clearly in favour of "Grexit", having apparently prepared plans for this eventuality. Is Greece's public debt viable? According to the first two memoranda, Greece's public debt was viable, and was expected to reach 120% of GDP in 2020, compared to the level in 2014 of 176%. This was later revised to 124% for 2020.

In a study by a research group of the Faculty of Economics of the University of Thessaly[10] first released in November 2014, the basic scenario (with the highest probability of realization) had the public debt reaching 147.3% of GDP in 2020. In June 2015, IMF vindicated our forecast in its latest update, stating that the target of 124% for 2020 was unrealistic. Here we present our new revised estimate of the basic scenario for the development of the public debt, taking into account the new, third memorandum.

We estimate that the three weeks' closure of the banks, the imposition of capital controls and the austerity measures and tax increases of the third memorandum will result in a GDP decline of 5% in 2015 and 2% in 2016, about EUR 12 to 13 billion, so that GDP will be in the range of EUR 165 billion by the end of 2016, compared to EUR 250 billion

[10] Members included Associate Professors Stephanos Papadamou and George Iatridis, Assistant Professors Theodore Metaxas, Paschalis Arvanitidis, Iakovos Psarianos, Angeliki Anagnostou, lecturer Lukas Zachilas and Miltiades N. Georgiou, Ph.D, under the coordination of Prof Nicholas Kyriazis and Emmanouil M.L. Economou, Ph.D.

in 2007. This represents a cumulative fall of about 32% or a third of GDP since the beginning of the crisis in 2009, the biggest ever for a country in a peaceful period, higher than the GDP loss of the USA after the crash of 1929.

We start with a basic provisional estimate of Greece's GDP for 2015. Greece's GDP for 2014 was EUR 180 billion.[11] However, after the imposition of capital controls, according to estimations[12], this will lead to a further economic decline, as high as 5% of GDP at the end of 2015 and 2% for 2016 (negative growth rates). Thus, we estimate that GDP will shrink to 180 – 180 • 5% = EUR 171 billion for 2015 and 171 – 171 • 2% = 167, 58 for 2016 (see table 1, row 2).

Taking it for granted that it is absolutely necessary for political stability to be achieved in the forthcoming years, this will affect crucially and positively the prospects of the Greek economy and providing that the current Greek government will begin reforms at once, based on the OECD toolkit, such as privatizations of inefficient and economically damaging public organizations and companies, privatization of public land property as a way of attracting potential investors in areas such as tourism, drastically confronting the issues of bureaucracy and tax evasion[13], etc. We argue that the possibility of achieving growth rates of 1% for 2017, 2% for 2018, 2019 and even 3% for 2020 should not be considered unlikely. Table 2 provides an estimation of Greece's GDP evolution for the 2015-2020 period as a whole. These are rough estimates according to today's situation.

As far as the debt is concerned, it was EUR 325 billion in 2014. We add an estimate of EUR 20 billion additional debt as total increase for 2015 and then, we argue that the economy will gradually achieve an annual public surplus of 1% of GDP for 2016, 2% for 2017 and 2018 and 3% for 2019 and 2020, due to the positive effects of the structural reforms (rows 5, 8). Achieving public surplus will give the opportunity to lessen public debt.

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[11] http://www.investingreece.gov.gr/default.asp?pid=16, https:// forexcorporate.com/ news-popup2.php?id=8571

[12] http://money.cnn.com/2015/07/17/news/economy/greece-bailout-recession/index.html?category=economy

[13] Tax evasion in Greece is as high as 25%-30% of GDP % of the annual GDP (!) http://www.theguardian.com/ world/2015/feb/24/greece-collecting-revenue-tax-evasion

We also hypothesize that Greece will have to pay about EUR 3 billion a year for interest rate payments (we accept interest rates as high as 1%) for its loans and also that the government will manage to pay annual interests rates, through annual public surpluses (rows 4, 6, 7). Thus not only is there no extra burdening of the public debt as a whole[14] but also the government will manage finally to slightly reduce the public debt (from EUR 345 billion in 2015 to EUR 340,77 billion in 2020). When it comes to the level of inflation (row 9), we don't include it at this stage. We will include the inflation scenario in an update, when more macroeconomic data will become available.

Having taken all of the above into account, in Table 1 (row 10), we represent the basic estimate, to which we give the highest probability of being realized. The main result is that the public debt to GDP ratio (PDt/GDP) in 2020 amounts to 340, 77 / 181,28 = 187.9 ~ 188,0 which will be much higher than the present figure of debt to GDP ratio, 177% for 2014.[15] The estimation of row 10 shows the rapid deterioration of the PDt/GDP ratio for the 2015-2017 period. It will exceed 200% of the GDP. But taking for granted that structural reforms based on the OECD toolkit and credible commitment by the Greek governments to adopt them will be an important prerequisite for the situation to change gradually after 2017, for the forthcoming 2018-2020 period.

There is also an additional scenario which may prove to be beneficial for the Greek economy. If we take further into account revenues from privatisations which are used for the reduction of the public debt of at least EUR 10 billion (e.g., EUR 2 billion per year, a realistic scenario) till 2020, debt will be further diminished to EUR 330, 77 billion. In this case public debt will be 330, 77 / 181, 28 = 182, 5% of GDP.

So is Greece's debt viable? In order to answer this question a definition of the term "viable" is necessary. A debt is viable if interest payments (plus a low payment of capital) are possible, so that the public debt is reduced in the long run. This is again possible, if the rate of GDP is higher than the interest rate, because this also means that higher tax revenues are generated, so that public debt does not increase, higher GDP growth means that the ratio of debt to GDP is being reduced.

[14] Interest rates (being variable) fell to 1% on average for 2014, due to the ECB's quantitative easing. If this trend continues, interest payments for Greece will be lower, at about 3 billion per year.

[15] http://www.tradingeconomics.com/greece/government-debt-to-gdp

Table 2. Basic macroeconomic data estimations of the Greek economy for the period 2015-2020

Year	2015	2016	2017	2018	2019	2020
GDP (in billion euros)	171	167,6	169,3	172,6	176	181,28
Economic Growth Rate (%)	-5	-2	1	2	2	3
Interest rates (%)	1	1	1	1	1	1
Public Surplus (A)	0	1,67	3,38	3,45	5,28	5,43
Interests payments (in billion euros) (B)	-	3	3	3	3	3
(A) - (B)[16]	-	1,33	0,38	0,45	2,28	2,43
Public Debt[17]	345	346,33	345,9	345,45	343,2	340,77
Inflation (%)	2	2	2	2	2	2
PDt / GDP (%)	345/17= 201,7	346,33/167,6 = 206,6	345,9/169,3 = 204,31	345.45/172,6 = 200,15	343,2/176 = 195	340,77/181,28 = 188

An additional issue depends on the willingness of markets to finance it, a matter of trust towards the country issuing the debt, and its government. Japan has a higher public debt ratio than Greece (226% in 2014) but up to now the question of it being viable has not been raised, mainly because the Japanese themselves are willing to buy Japanese bonds, trusting

[16] When (A) – (B) < 0 the sum is added to each year's public debt. By contrast, when (A) – (B) > 0, the sum reduces the annual public debt.

[17] We hypothesise here that paying the interests payments can be feasible without any extra burden to the public debt.

their government, and because they have high saving rates. Neither of these conditions apply to Greece, where saving rates have become negative, capital outflows were substantial before the imposition of capital controls and deposits in the national banking system were falling to about EUR 120 billion in June 2014 compared to a GDP of EUR 180 billion in 2014, a low percentage of 66%. Trust in their government both by Greek nationals and markets reached a nadir.

So, in the long run, the viability of Greece's debt depends on low interest rates (which again, depends on a decision by the EMU, since 250 billion EUR of debt is held by the public sector) and positive growth rates, which is the most important issue. As we propose above, Greece will have negative rates for 2015 and 2016, possibly achieving positive growth after 2017, but this again depends on Greece's escaping the memoranda trap.

6. Conclusion

Measures agreed under the third memorandum of July 2015 led first to an insane and surrealistic political situation. Out of 162 MPs in the government coalition, 39 voted against during the second vote, on the prerequisites for signing the agreement, including three Ministers and the President of the Parliament. But the memorandum laws were passed with 222 votes in favour, because the MPs of the three main and pro-European opposition parties (New Democracy, "To Potami" and PASOK) voted in favour!

It is, indeed, a unique situation, where the opposition comes from within the government from the so called "Left Platform" and support comes from the opposition! This compelled Prime Minister Tsipras to make changes on July 17 by firing eight of his ministers and deputy ministers and replacing them with eight new and more pro-European ones. On the 20th of September 2015 new elections took place in Greece. A new government coalition was formed, by the same parties that negotiated the 3rd memorandum. SYRIZA, having now accepted the new memorandum, was approved by the 35, 46% of the voters and AN.EL were voted by the 3,69% of the voters (10 seats). Thus both political parties took 155 seats out of 300 and formed the new government.

Still, important doubts remain both within Greece and the EU as to the willingness and possibility of the government to implement the measures, especially since the Prime Minister expressed openly the view that he does not believe in the program. Chancellor

Merkel and other European personalities on their part face the matter of mistrust. It takes a long time to build up trust, but it is easy to destroy it, as Greece's recent events again have demonstrated.

This again brings into the foreground the issue of political instability, with new elections within 2015 being almost certain and the outcome doubtful[18]. A split within SYRIZA is highly probable. Will new parties appear? How much will SYRIZA loose, and how much will the opposition parties gain? Will new political personalities appear to replace the old ones? During this period, Greece did not lack politicians but did not have a single leader.

The new memorandum includes measures of about EUR 12 billion. "Tax piracy" continues and increases, by raising profit tax from 26% to 28%, VAT on restaurants from 13% to 23%, for hotels from 6,5% to 13%, for many alimentation items, etc. from 13% to 23% and for energy bills, etc. from 13% to 23%. Property tax (the so-called ENFIA tax) will be retained for two years in its present form. In addition, new pension and social security cuts and wage reductions will follow. In this, the new memorandum follows the old ones and will bring about a severe recession.

Concerning structural measures, privatizations agreed in the old memoranda (airports, ports, train, land, etc.) are reconfigured, and a new Fund of EUR 50 billion will be introduced, which will include various state properties as a kind of collateral for the official loans given to Greece. The so-called "toolkit" of OECD will be implemented in order to strengthen competitiveness providing (yet again) for the opening up of the so-called "closed professions" (ranging from hairdressers and pharmacists to lawyers and notaries). The new memorandum measures represent a total reversal of SYRIZA's election program of EUR 12 billion benefits. Instead, there is a EUR 12 billion austerity measure program, plus a EUR 12 billion loss of GDP up to 2016, a total difference of EUR 36 billion between promises and realization. We expect that this will bring about further political instability after the new elections and that the vicious cycle of the memoranda trap will continue.

[18] Nicholas Kyriazis, among others, in a series of newspaper articles in the Greek press estimated that the new government would not remain in office for the whole four-year duration. He was being optimistic, because apparently it will remain in office for less than a year.

In conclusion, Greece suffered from three badly conceived and badly implemented programs, that placed emphasis on tax increases, less on expenditure cuts and even less on structural measures. The alleged experts of the IMF were notoriously unable to correctly calculate even simple price demand elasticities. For example, the increase of VAT on restaurants from 13% to 23% bought about a reduction of demand, a fall of revenue and an increase of unemployment in the sector. The reduction from 23% to 13% before the summer of 2014 reversed the trend in clear proof of the validity of the Laffer relation. The equalization of fuel tax for heating (which previously, was lower) to that of motoring, brought about a dramatic decline in demand, because people switched to substitutes such as pellets, coal, wood for fireplaces, etc. with a corresponding fall of revenue. Still, the IMF and the troika seem unable to learn from experience and once again raised VAT on restaurants to 23%! Also, the raising of VAT for hotels will make the sector, one of the few remaining competitive ones, less competitive.

Thus, for the time being, the vicious cycle of the memoranda remains. We see two ways of breaking out of the trap. In order to restore political stability, confidence, trust and credibility, pro-European political parties must come to a general agreement on future policy that will be implemented in broad lines independently of government changes, as has happened in the other memoranda countries. Recent events seem encouraging in this respect. In order to restore economic growth, a change of policy is necessary. We hope that the troika will understand this, and once political stability is established, that they will be willing to correct mistakes. The new policy should aim at tax reduction in order to make companies and the economy more competitive, a review of expenditure in areas where waste, duplication, etc. still exist, and most importantly, a strong emphasis on structural measures that will enhance competitiveness.

If this happens, then Greece will find again its way toward growth. If not, then Greece will be transformed for decades into the Argentina of the Mediterranean.

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