



BANK OF GREECE
EUROSYSTEM

Economic Bulletin

Number 30, May 2008



BANK OF GREECE
EUROSYSTEM

Economic Bulletin

Number 30, May 2008



BANK OF GREECE
21, E. Venizelos Avenue
102 50 Athens

www.bankofgreece.gr

Economic Research Department - Secretariat
Tel. +30210 320 2392
Fax +30210 323 3025

Printed in Athens, Greece
at the Bank of Greece Printing Works

ISSN 1105 - 9729

Contents

The efficiency of the Greek banking system and its determinants Ioannis G. Asimakopoulos Sophocles N. Brissimis Manthos D. Delis	7
--	---

Stock market integration: the Athens Exchange in the European financial market Hiona Balfoussia	29
---	----

Child poverty: recent developments and determinants Theodore Mitrakos	57
---	----

Working Papers	87
----------------	----

Monetary policy and financial system supervision measures	97
--	----

Decisions of the Bank of Greece	101
---------------------------------	-----

Statistical section	105
---------------------	-----

Articles published in previous issues of the <i>Economic Bulletin</i>	131
--	-----



The efficiency of the Greek banking system and its determinants*

Ioannis G. Asimakopoulos

Bank of Greece,
Economic Research Department

Sophocles N. Brissimis

Bank of Greece,
Economic Research Department
and
University of Piraeus,
Department of Economics

Manthos D. Delis

Athens University of Economics and Business

1. Introduction

The banking sector is the dominant segment of a country's financial system. In Greece for instance, bank assets represent around 80% of the financial system's total assets. Moreover, it is generally accepted that efficient bank operation, which is linked to financial stability, allows enterprises and households to enjoy higher-quality services at lower costs. Thus, measuring the efficiency of a banking system¹ and analysing the factors that explain it is very important for the supervisory authorities to design the regulatory framework and for bank managements to draw their business plans.

Studying the efficiency of the Greek banking system has become increasingly important over time, especially after the major reforms it has undergone in the last two decades.² These reforms have improved competitive conditions in the banking sector (see Hardy and Simigiannis, 1998, Hondroyiannis *et al.*, 1999, Gibson and Demenagas, 2002, Gibson, 2005), while the structural changes in the late 1990s, mainly through mergers and acquisitions, seem to have helped improve the efficiency of this sector also (see Athanasoglou and Brissimis, 2004).

* The views expressed in the article do not necessarily reflect those of the Bank of Greece. The authors would like to thank Ioannis Papadakis, Heather Gibson, Panayiotis Athanasoglou, Thomas Vlassopoulos, Ioannis Philippakis, Nikolaos Stavrianou, and all participants in a seminar organised at the Bank of Greece, for their helpful comments, as well as to Petroula Karagianni, for her research assistance.

¹ It should be recalled that studies analysing the efficiency of a banking system effectively examine the banks' efficiency relative to that of the best performing bank.

² For developments in the Greek banking system see Bryant *et al.* (2001), Kamberoglou *et al.* (2004), and Mylonidis and Kelnikola (2005).

Moreover, Greek banks have considerably increased the range of products and services they offer to customers, investing heavily in specialised personnel and technology, while they have also been continuously expanding their activities in markets abroad.

Admittedly, differences observed among banks as regards average operating cost have led to a large number of studies that examine economies of scale and scope. Yet, the existence of banks of a similar size with diverging average operating costs has caused a shift of focus towards a more accurate evaluation of the cost efficiency of banks.

This study analyses developments in the cost efficiency of the Greek banking system, and also examines the contribution of its components, i.e. technical and allocative efficiency.³ Compared with earlier studies on the Greek banking system,⁴ the present one differs in the following respects:

First, it reviews a relatively long period, in which the Greek banking system has undergone significant institutional and structural changes, whereas the majority of relevant studies that use Greek data cover periods before 2000.

Second, it examines banking group data,⁵ so as to account for total bank activity in Greece and abroad where Greek banks have been continuously expanding in recent years.

Third, it examines differences in efficiency between acquired and acquiring banks or banks not involved in any merger or acquisition.

Fourth, it estimates efficiency by applying the “Data Envelopment Analysis” (DEA) method,

but with a different approach from the one adopted in previous studies using this methodology on Greek data. In particular, it follows the approach of Drake *et al.* (2006), who employ banks’ profit and loss data rather than balance sheet data as most relevant studies have done.⁶ Moreover, in the context of the DEA method, in addition to total efficiency this study also examines its components, i.e. technical and allocative efficiency.

Fifth, it investigates the determinants of efficiency, including capital adequacy, profitability, liquidity risk, market power, credit risk,⁷ the regulatory framework and the macroeconomic environment.

The study is structured as follows: the second section analyses the notion of efficiency and the alternative methods for its measurement, the third section reviews the relevant literature, the fourth section presents the methodology used, the fifth sec-

3 It should be noted that total efficiency is calculated as the product of these two components (technical and allocative efficiency). The notion of efficiency is discussed in further detail below, in Section 2.

4 A review of these studies can be found in Section 3.

5 All relevant studies on the Greek banking system – except the one by Christopoulos *et al.* (2002) – use bank and not banking group data. For exposition purposes, in the present study the term “banks” is used to signify banking groups.

6 Compared with the two main methodological approaches in the banking literature that use balance sheet data, namely the production approach and the intermediation approach, this approach offers the advantage that profit and loss data record banks’ total activity in terms of expenditure (input) and revenue (output) during a financial year, whereas balance sheet data depict the financial situation at a particular moment in time. Moreover, profit and loss data reflect better not only the cost and the proper pricing of products and services, but also their acceptance by bank customers.

7 This determinant, although particularly important in the banking sector – given that a bank, attempting to maximise profits, may possibly undertake excessive risk by granting loans to borrowers of a relatively low credit rating – has not been thoroughly studied in the relevant literature (see, indicatively, Drake *et al.*, 2006 and, for Greek banks, Pasiouras, 2008).

tion discusses the empirical results, and finally, the sixth section summarises the conclusions.

2. The notion of efficiency and methods for its measurement

2.1 Basic concepts

Efficiency constitutes a basic concept in studies of banking systems and is distinguished into cost and profit efficiency, with the former being most commonly used in the study of efficiency.

Cost efficiency refers to the difference between the minimum production cost a bank may achieve for a given level of output and actual cost. It has two components: technical efficiency and allocative efficiency. Technical efficiency is defined as the highest possible output level that can be produced for a given quantity of inputs, or, alterna-

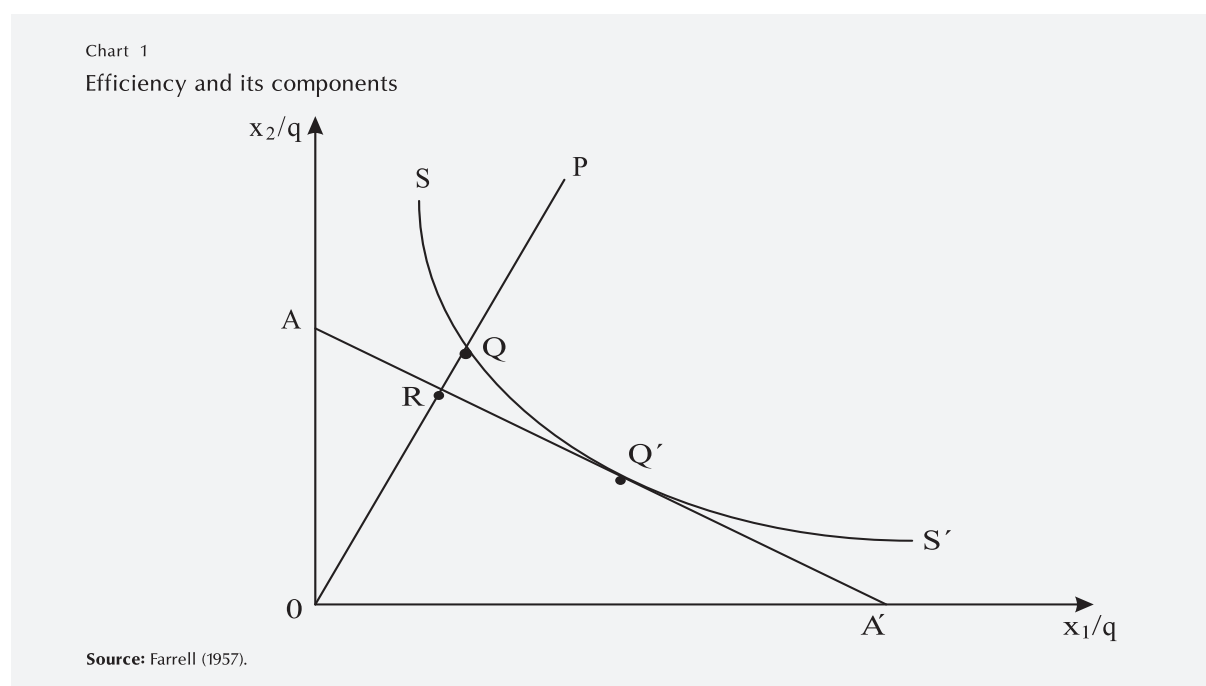
tively, as the minimised use of inputs for the production of a given quantity of outputs.⁸ Allocative efficiency refers to the ability to optimally use inputs, given their user cost as measured by their prices.⁹

The above become clearer using Farrell's (1957) analysis, shown in Chart 1. Let us assume that a bank uses two inputs (x_1 , x_2) for the production of one output (q),¹⁰ while at the same time the

⁸ This concept is not differentiated from that of X-efficiency, as first analysed by Leibenstein (1966).

⁹ From a stricter economic view, allocative efficiency refers to the social welfare gains derived when an output is produced in a perfectly competitive market in which input prices reflect marginal cost in long-run equilibrium. Consequently, allocative inefficiency exists when less quantity of output is produced while at the same time prices are higher than long-run marginal cost.

¹⁰ For the sake of simplicity the present analysis assumes the existence of constant economies of scale and deals with the optimisation of inputs for the production of a given output (input-oriented approach). The reader may extend the discussion to the case of variable scale economies or to output optimisation with a given input quantity (output-oriented approach). An extensive analysis is provided in Farrell (1957) and Cooper *et al.* (2007).





efficiency frontier (SS') – which depicts the input combinations that a perfectly efficient bank would use for the production of one unit of output – is known.¹¹

A perfectly efficient bank that produces at point Q is technically more efficient than another that produces at point P, given that it produces the same quantity of output using the smallest possible quantity of each input. The technical inefficiency of the bank that produces at point P is reflected in the distance QP, which represents the amount by which the two inputs could be proportionately reduced without lowering the output. In percentage terms, this could be expressed as the QP/OP ratio; hence, technical efficiency can be defined as the OQ/OP ratio, which is equal to $1 - (QP/OP)$. This takes values between 0 and 1 and constitutes an index of the bank's inefficiency. A value of the ratio equal to 1 denotes perfect technical efficiency.

At this point, input prices are introduced into the analysis. Let the slope of the line AA' be the ratio of the two inputs' prices. The bank that produces at point Q – although 100% efficient as regards technical efficiency, since it lies on the efficiency frontier SS' – is not perfectly efficient as regards allocative efficiency, since it could be producing at point Q'. The allocative efficiency of the bank that produces at point P is defined as the OR/OQ ratio.

2.2 Efficiency measurement methods

In the international literature, bank efficiency is measured either by using indices (see e.g. Rhoades, 1986, Srinivasan, 1992, Athanasoglou and Brissimis, 2004), or by applying parametric or even nonparametric methods (see e.g. Berger and

Humphrey, 1997, Goddard *et al.*, 2001, Drake and Hall, 2003).

Each of the above methodological approaches has its specific advantages and disadvantages. For instance, the study of simple indices offers the advantage that the necessary calculations are easy, but its main weakness is that it confines analysis to the use of only one input and one output, something particularly restrictive in the banking sector, which is characterised by multiple inputs and outputs that are interrelated.¹² This disadvantage of using indices is overcome by applying parametric and/or nonparametric methods, which can include more than one inputs and/or outputs.

Parametric methods include: (i) the “stochastic frontier approach”, where a bank's cost may diverge from the efficiency frontier due to either random effects or inefficiency; (ii) the “thick frontier approach”, where differences in the estimated cost between banks classified at the lowest cost quartile are due to random effects while respective differences between low-cost and high-cost banks are due to inefficiency; and (iii) the “distribution free approach”, where no hypothesis is required regarding the distribution of the inefficiency term.¹³ A key feature of the above three

¹¹ In reality, this frontier is not known *a priori*, but estimated with the alternative methods discussed in Section 2.2.

¹² It should be noted, however, that some disadvantages of the simple indices are overcome by using composite indices, such as e.g. the Fisher index or the Tornqvist index. For the application of these indices to the Greek banking system see Athanasoglou *et al.* (2008).

¹³ The measurement of efficiency depends on the estimation methodology adopted, given that in the case of fixed effects efficiency is measured by the fixed term in each bank's equation, while in the case of random effects efficiency is measured through the residuals.

approaches is the econometric estimation of the efficiency frontier, and, therefore, as with every econometric model, their main disadvantage is the model's potentially incorrect functional form.

In contrast, nonparametric methods – most known among which is the DEA adopted in this study¹⁴ – are typically used to construct an efficiency frontier with no need of a statistical or econometric approach, and thus are free of the main drawback observed in parametric methods of efficiency estimation. However, it should be stressed that the absence of the random effects factor – present in parametric methods – constitutes the major weakness of the DEA method.

3. Literature review

Measuring the efficiency of banking systems has been the subject of a large number of studies in the last 20 years, originally with an emphasis on the US market, and then gradually, especially in recent years, on other markets of Europe and Asia.¹⁵ Most of these studies investigate the existence of economies of scale and scope, examining Cobb-Douglas production functions (see e.g. Gilligan *et al.*, 1984, Berger *et al.*, 1987) or applying translog functions (see e.g. Molyneux *et al.*, 1996, Altunbas *et al.*, 2000). An alternative approach to the estimation of efficiency is to examine the components of total efficiency, i.e. technical and allocative efficiency (see Vassiloglou and Giokas, 1990, Maudos *et al.*, 2002, Brissimis *et al.*, 2006), while more recent studies examine the potential effect of macroeconomic and institutional factors on the efficiency of banking systems (see e.g. Berger and Mester, 2003, Lozano-Vivas *et al.*, 2002, Drake *et al.*, 2006).

Findings regarding the Greek banking market are rather limited, and refer either to the efficiency of bank branches in the period before full liberalisation of the Greek banking system (see Vassiloglou and Giokas, 1990, Giokas, 1991, Donatos and Giokas, 1995, Athanassopoulos, 1997, Athanassopoulos and Giokas, 2000, Donatos *et al.*, 2002), or to the efficiency of banks, based however on data that mostly cover the period up to 2000 (see Karafolas and Mandakas, 1996, Noulas, 1997, Christopoulos and Tsionas, 2001, Christopoulos *et al.*, 2002, Tsionas *et al.*, 2003, Halkos and Salamouris, 2004, Apergis and Rezitis, 2004, Rezitis, 2006).¹⁶ Thus, the recent period – marked by significant changes in the structure and operation of the Greek banking system, the country's entry into EMU, the expansion of the Greek banks' activities abroad, and changes in the regulatory framework that governs their operation – is not examined.

The above studies focus on the Greek banks' cost efficiency and in very few cases also on total productivity, while their methodological approaches involve mainly the use of translog cost functions, Malmquist productivity indices, and DEA. Overall, their empirical findings indicate the existence of scale economies, mostly after 1990, and of cost inefficiency, which

¹⁴ The methodology of the envelopment analysis was developed by Charnes *et al.* (1978).

¹⁵ For a comprehensive summary of a considerable number of studies on the measurement of efficiency in various banking systems, see Berger and Humphrey (1997) and Goddard *et al.* (2001).

¹⁶ For instance, Karafolas and Mantakas (1996) use a sample of 11 banks for the period 1980-1989, Noulas (1997) a sample of 20 banks for the years 1991 and 1992, Christopoulos and Tsionas (2001), Christopoulos *et al.* (2002) and Tsionas *et al.* (2003) the total of Greek commercial banks for the period 1992-1998, Halkos and Salamouris (2004) a sample of 15 to 18 banks for the period 1997-1999, and finally Apergis and Rezitis (2004) and Rezitis (2006) a sample of 6 banks for the period 1982-1997.

depends on the banks' size – but not unambiguously, as size and efficiency appear to be positively related in some cases (see e.g. Rezitis, 2006) and negatively in others (see e.g. Tsionas *et al.*, 2003). Also limited are the findings on the components of efficiency. The only two studies looking into this subject (Christopoulos and Tsionas, 2001, and Tsionas *et al.*, 2003) conclude that allocative efficiency has a larger weight than technical efficiency.

Empirical findings related to Greek banks' efficiency in the period after 1999 can only be found in the studies by Athanasoglou and Brissimis (2004) on the relationship between efficiency and mergers/acquisitions, and by Pasiouras (2008) on the cost efficiency of Greek commercial banks.

The former authors analyse eight cases of mergers and acquisitions and the effect these had on bank efficiency in the period 1997-2002, and conclude that mostly profit efficiency and to a lesser extent cost efficiency seem to improve in the period after the mergers and acquisitions.¹⁷

The study by Pasiouras (2008) – the one most directly comparable to the present one – uses the DEA method to examine technical efficiency and scale efficiency in the period 2000-2004. Besides traditional variables used in similar studies, it also analyses the effects on efficiency of banks' exposure to credit risk and to off-balance sheet items risk. According to its findings, taking account of credit risk increases Greek banks' efficiency, while banks with activities abroad record higher efficiency. Moreover, technical efficiency appears to be more important than scale efficiency, although only slightly more so. Finally, Greek banks' efficiency seems to depend posi-

tively on each bank's capitalisation, the level of loans and market share.

4. Methodological approach and data

4.1 Data Envelopment Analysis¹⁸

The present study applies the DEA technique, a nonparametric method based on the use of linear programming,¹⁹ which calculates a bank's efficiency relative to that of the best performing bank. More specifically, as regards technical efficiency, it calculates for each year and for each bank the distance from the efficiency frontier that reflects the optimum combination of inputs with which a given level of output can be produced. Efficiency is equal to 1 for banks operating on the efficiency frontier, and less than 1 for all other banks. The formulation of the linear programming problem is based on the hypothesis that variable economies of scale prevail – the commonest hypothesis in bank efficiency studies.²⁰ When input price data are also available, as in this study, the above optimisation problem can be extended so as to minimise the objective cost function that also includes input prices. The ratio of this minimum cost to the observed actual cost gives total cost efficiency, while allocative efficiency is derived as the ratio of total efficiency to technical efficiency.

¹⁷ It should be noted that one of the methods of this study involves comparing the efficiency of individual banks with that of the best performing bank, and consequently has some similarity with the DEA method.

¹⁸ For a detailed presentation of Data Envelopment Analysis see Cooper *et al.* (2007) and Zhu (2003).

¹⁹ The relevant calculations have been carried out using Zhu's (2003) specialised software.

²⁰ Particularly for the Greek banking system, the findings by Athanasoglou and Brissimis (2004) support the hypothesis of variable economies of scale.

4.2 Inputs and outputs

The analysis in the previous section shows that a basic requirement for the calculation of efficiency is the selection of the inputs/outputs combination. The relevant literature has extensively dealt with this issue, as banks constitute a special type of enterprise that uses multiple inputs and at the same time produces multiple outputs, not always having a physical form as for example the products of an industrial enterprise. Moreover, the activities banks undertake are more complex than those described in their traditional definition, according to which they mainly engage in intermediation, i.e. collecting savings and granting loans. For this reason, several views have been expressed in banking theory with respect to a bank's core functions, which include e.g. provision of payment services, transformation of assets, and processing of borrowers' credit rating data (see Freixas and Rochet, 1997, Allen and Santomero, 1998, Bhattacharya and Thakor, 1993).

Overall, the literature reveals that the two most prevalent approaches to proxying the inputs and outputs of a banking enterprise are the production approach and the intermediation approach. According to the former, banks use labour and capital to produce loan and deposit accounts, while the latter holds that they operate as intermediaries between depositors and borrowers, and thus use labour, capital and deposits to produce mainly loans and investments, usually in financial assets. Therefore, according to the former approach, output is best measured on the basis of the number of transactions and accounts a bank creates, while according to the latter, output is measured in value terms, i.e. as the total amount of loans granted or investments made.²¹

Despite their conceptual dissimilarities, the above two approaches converge on some common conclusions. For instance, both loans and investments in other financial assets, regardless of how they are measured (i.e. in volume or value terms), are considered as bank outputs. By contrast, some problems arise with the classification of deposits, given that these may clearly appear as an input for a bank, since they are used e.g. for the "production" of loans, but in essence they create a relationship between the customer and the bank, by way of which the bank offers the customer additional services, other than a simple deposit facility.

In fact, both approaches fail to accurately measure a bank's multifaceted activity, which includes both an intermediating role between depositors and borrowers, and services related to custody, data processing, fund management, consulting, etc.²² An alternative approach, adopted in this study, is the one by Drake *et al.* (2006), which considers all cost factors of a bank – i.e. all expenses incurred due to its operation – as

²¹ The literature also mentions the value-added approach (see Berger and Humphrey, 1990) and the user cost approach (see Hancock, 1985) as – less widely used – alternative approaches to proxying bank inputs and outputs. The former considers a bank asset (liability) as an input (output) depending on its impairment (creation) of value added, while the latter records as outputs assets (liabilities) with a yield (cost) higher (lower) than the opportunity cost of using the funds.

²² Nevertheless, depending on its nature and aim, each study opts for one of these two approaches. For example, the production approach is considered to be more suitable for measuring efficiency at bank branch level, since this is where the primary processing and recording of the customers' transaction data is carried out, while the policy related to the cost of money is decided and managed at a central level and each branch has little contribution to such decisions. By contrast, a study aimed at evaluating a bank's efficiency as regards all its activities usually adopts the intermediation approach, so as to also take into account factors such as the cost of money, which represents a significant part of total cost. In addition, the data required for applying each of these approaches are more readily available in the second case.



inputs, and all its net income from its various activities as outputs.

In this study, input and output data are drawn from the banks' profit and loss accounts, using personnel outlays and fixed capital expenditure as inputs, and net interest income, net commission income, and other income as outputs. Moreover, as the study also looks at allocative efficiency, input prices are calculated as well. For this purpose, labour costs are proxied by the ratio of personnel wages to the total number of employees, and the user cost of capital by the ratio of depreciation to the value of fixed assets net of depreciation.

4.3 The determinants of efficiency

In addition to estimating efficiency itself, the present study also examines its determinants, through the estimation of model (1):²³

$$Z_{it}^* = \beta'X_{it} + \varepsilon_{it} \quad (1)$$

where Z_{it}^* is the efficiency (total, technical or allocative, as per case) of bank i at time t , β' is the vector of coefficients, X_{it} is the matrix of the explanatory variables, and ε_{it} the disturbance term. The model is estimated using Khan and Lewbel's (2007) two-stage least squares method, so as to take into account not only the limited range of values of the dependent variable and some explanatory variables (e.g. market share), but also the potential endogeneity of specific determinants (e.g. profitability).

As regards the determinants of efficiency, the study examines the effects of factors related both to specific characteristics of banking groups and to

the economic environment in which such groups operate. Specifically, it examines the following:

- *Capital adequacy*: The equity to assets ratio is used, and a positive relation between capital adequacy and efficiency is expected, as banks with a strong capital base are more able to expand their activities safely, avoiding excessive risks, and to face potential adverse developments. In addition, high equity levels can also be seen (Mester, 1996) as a way for a bank's shareholders to control its management by reducing moral hazard.
- *Profitability*: This variable, proxied by the ratio of pre-tax profits to assets (ROA), is expected to be positively related to efficiency, as high profitability allows banks to invest in skilled personnel with higher wages, and in improved technology, expecting that this increased cost will bring in much higher output gains.
- *Liquidity risk*: This is an important risk for banks, as those with high liquidity are able to expand and/or face potential adverse developments in the economic environment better than those that need to resort to stock markets to raise funds, especially at times of bad conditions in money markets. Although liquidity risk can be measured in different ways, this study uses the loans to assets ratio following the approach by Altunbas *et al.* (2000), since the higher this ratio the greater the banks' need to raise finance. Therefore, a negative relation is expected between efficiency and liquidity risk.

²³ Estimating this model in order to examine the effect of certain determinants of bank efficiency constitutes usual practice in the relevant literature (see e.g. Simar and Wilson, 2007, Girardone *et al.*, 2004, Sathye, 2001).

- *Market power and concentration:* The relationship between market power, concentration and efficiency can be indirectly examined through the structure-conduct-performance (SCP) hypothesis and the efficient structure hypothesis.²⁴ In fact, banks may operate more efficiently either because they take advantage of synergies made available due to market concentration, or because they develop their own market power through their operation, regardless of market concentration. Thus, if the variable that measures market power has a statistically significant effect on efficiency while market concentration does not, evidence is provided in support of the efficient structure hypothesis. Here, market power is proxied by the ratio of each bank's assets to the total assets of all banks, while market concentration is measured by the Herfindahl-Hirshman index.

- *Credit risk:* As this is the major risk banks face, its sound management is expected to be positively related to bank efficiency. A bank's flow of provisions to total loans ratio provides a proxy of the credit risk it assumes,²⁵ as well as an indication of the quality of its credit risk management, given that high values of this ratio are associated with a less efficient functioning of lending procedures (Berger and De Young, 1997). However, such a high value may sometimes be the result of a bank's intended assumption of increased risk in expectation of higher yields, or of adverse economic conditions that affect the borrowers' ability to meet their obligations, and not attributable to poor management and/or application of less rigorous credit standards. Moreover, it is possible that a bank may choose not to increase the costs of granting, monitoring and managing its loans, and thus may appear relatively cost efficient at least in the short run, whereas in the long run its

credit risk may be increasing. The credit risk variable is expected to be negatively related to efficiency.

- *Personnel:* Overall, personnel outlays constitute a bank's major category of expenses. Excessive personnel increases expenses without creating the required outputs, while conversely, personnel shortages increase the probability of errors during the production process, and thus a bank's risk, while the optimum level of offered products and services is not achieved. For this variable the present study uses the number of bank employees to assets ratio.²⁶

- *Macroeconomic conditions:* In addition to purely banking variables, the overall macroeconomic conditions may also affect the efficiency of a banking system. As a proxy of these conditions this study uses the rate of change in GDP per capita.

4.4 Data

The sample in this study includes all banks operating in Greece in the years 1994 to 2006. This period covers the years after the full liberalisation of the Greek banking market, while its early part

²⁴ For an extensive analysis of the empirical results associated with these hypotheses internationally see Goddard *et al.* (2001), while in relation to the Greek banking system see Athanasoglou *et al.* (2008) and Gibson (2005).

²⁵ It should be noted that this ratio is also affected by the composition of the banks' loan portfolio. For instance, a bank with a loan portfolio consisting mainly of consumer loans makes higher provisions than a bank with a loan portfolio consisting mainly of housing loans.

²⁶ The present study uses the number of employees – and not personnel outlays, as other studies usually do – for two reasons: because it uses personnel outlays as an input in estimating efficiency and because, unlike other respective studies, it has these data available.



coincides with the onset of Stage II of EMU and a significant improvement in accounting standards through the adoption of consolidated balance sheets. Moreover, as already mentioned, the sample's time coverage is much greater than that of earlier studies on the Greek banking industry. A total of 34 banks are examined, but the number of banks varies across years as this period has seen a considerable number of mergers and acquisitions.

All relevant data are drawn from the annual financial statements of Greek banking groups, whereas bank data are only used in very few cases, where banking group data were not available. In addition, the study uses certain macroeconomic variables of the Greek economy to examine possible effects of the economic environment on the banking system's efficiency.

Table 1 presents some key descriptive statistics of our sample where, except for the number of

banks which slightly declined between 1994 and 2006, all other variables had an upward trend. Worth noting is also the increase in the standard deviation of the variables, which is due to the considerable rise in the activity of relatively larger banks and the entry of new small-sized banks into the Greek market.

5. Empirical results

5.1 Efficiency

Chart 2 displays developments in the average values of total efficiency and its components in the period 1994-2006.²⁷ In general, the first sub-period (1994-1999) is characterised by moderate changes in efficiency, while the second sub-period

²⁷ It should be recalled that efficiency constitutes a relative variable; see sections 2.1 and 4.1.

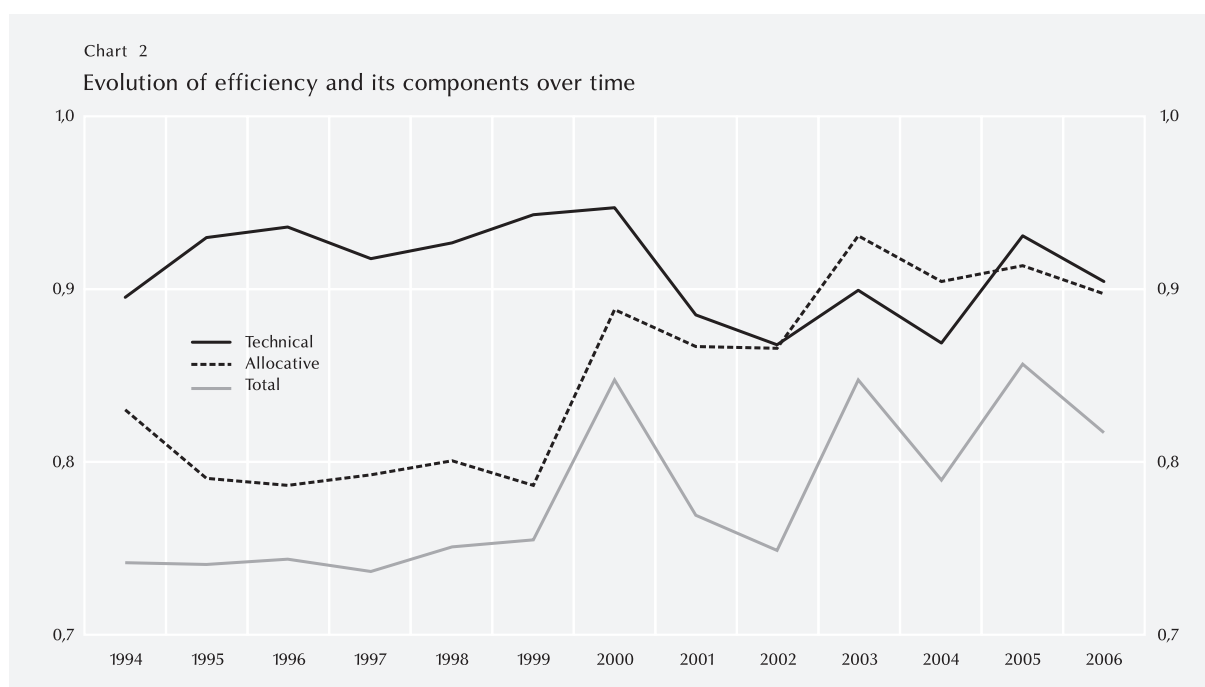


Table 1
Descriptive statistics
(In million euro, unless otherwise indicated)

Variable	Statistic	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total assets	Average Standard deviation	3,165 6,170	4,029 7,179	4,378 7,374	5,134 8,656	5,575 9,183	7,353 10,730	10,150 13,331	10,292 14,044	9,044 13,896	9,393 14,198	9,906 14,727	12,454 17,874	15,456 22,066
Loans	Average Standard deviation	1,158 2,009	1,419 2,258	1,592 2,493	1,886 2,770	2,222 3,190	3,011 4,081	4,304 5,427	4,714 6,039	4,649 6,559	5,413 7,544	6,124 8,775	7,332 10,091	9,515 12,914
Other earning assets	Average Standard deviation	664 1,769	937 2,114	928 2,200	1,283 3,011	1,185 3,260	1,588 3,632	2,485 4,153	2,589 4,527	2,291 4,612	2,065 4,410	1,832 3,509	2,502 4,555	2,832 4,916
Deposits	Average Standard deviation	2,335 4,861	2,977 5,478	3,286 5,960	3,966 6,839	4,502 7,915	5,628 8,824	7,676 10,929	8,206 11,955	7,131 11,277	6,955 10,192	7,021 10,341	7,871 11,048	9,626 13,424
Net interest income	Average Standard deviation	42 82	71 117	89 127	112 159	128 201	167 238	238 320	265 332	233 334	271 376	279 412	341 500	428 630
Net commissions income	Average Standard deviation	36 78	37 64	45 76	52 83	56 83	106 121	100 121	74 102	67 104	74 118	73 117	87 132	112 167
Other income	Average Standard deviation	12 23	17 29	17 30	19 36	24 40	43 66	50 72	36 70	20 39	15 15	44 74	44 76	41 60
Personnel expenses	Average Standard deviation	48 89	60 104	70 119	81 129	89 143	119 160	141 192	141 199	125 189	131 193	158 250	161 233	196 278
Other non-interest expenses	Average Standard deviation	25 41	36 49	42 59	50 69	61 81	85 104	111 138	116 148	103 142	100 129	108 148	116 149	138 173
Provisions	Average Standard deviation	16 28	11 19	27 60	44 92	31 51	34 52	38 46	39 55	36 53	48 68	55 78	64 95	93 149
Number of employees (in thousands)	Average Standard deviation	2,080 3,313	2,090 3,397	2,138 3,388	2,362 3,667	2,775 3,810	3,606 4,758	4,054 5,697	3,838 5,563	3,382 5,131	3,621 5,498	3,472 5,226	4,182 5,952	4,793 6,826
Number of banks		23	24	24	23	20	19	16	17	20	20	21	20	19



(2000-2006) features stronger fluctuations. These fluctuations are attributable to the mergers and acquisitions that took place in the Greek banking system and the different extent of banks' adjustment to the economic and institutional changes in this period, such as the country's entry into EMU, stock market developments, full liberalisation of consumer credit, and the adoption of the international accounting standards.

As can be seen in Chart 2, the average value of efficiency shows an improvement over time, and rises to 0.82 in 2006 from 0.74 in 1994. Thus, between the start and the end of the period examined, banks improved their efficiency by 8% on average, while on the basis of 2006 data they could improve it further by as much as 18%. The gradual improvement in total efficiency is attributable to the considerable rise in allocative efficiency, especially between 2000 and 2006, a period in which its average value rose to 0.90 (1994-1999: 0.80), more than offsetting the slight decrease in technical efficiency (2000-2006: 0.90, 1994-1999: 0.92). In fact, from 2001 onwards, allocative and technical efficiency stand roughly at the same levels.

The improvement in allocative efficiency, which demonstrates the importance of relative input prices, is in line with the economic and institutional changes that took place in this period, such as the adoption of the euro, the reduction of the Greek government's participation in the banking system's total share capital, the liberalisation of consumer credit, and the narrowing of the interest rate spread. These developments, combined with the gradual expansion of the banks' activities in the domestic market and markets abroad, led to intensified competition and as a result banks

placed emphasis on better managing the user cost of their inputs. At the same time, the conditions of relative price stability that prevailed, particularly after the country's entry into EMU, contributed to lower uncertainty and the more efficient selection of input prices. Moreover, the overall improvement in the efficiency of the Greek banking system was accompanied by a reduction in its distribution, as measured by the standard deviation of efficiency in each year.

As the data of Table 1 reveal, the banks' size differential widened in the period under study. To examine the relationship between efficiency and size, banks are classified in four quartiles based on their assets each year. The first quartile comprises the banks with the highest assets, the fourth those with the lowest, and the other two quartiles include banks of medium size.

According to the findings presented in Table 2, larger banks (1st quartile) show higher efficiency, followed by smaller banks (4th quartile). However, after 2002 the latter perform better than the former in allocative efficiency. As regards the other two categories, medium-sized banks in the 2nd quartile, although ranking in third place overall for the entire period, were outperformed in the last years by banks in the 3rd quartile.

The above differences in the efficiency of banks of unequal size are also confirmed by the findings of the Kruskal-Wallis nonparametric statistical test that appear in Table 3. The results of the Z statistic that measures the statistical significance of the distance of bank efficiency in each quartile from total efficiency reveal a positive deviation for the 1st and the 4th quartiles and a negative deviation for the other two quartiles, while statistically sig-

Table 2
Evolution of total efficiency and its components by bank size

Efficiency	Size	Years												
		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total	1st quartile	0.83	0.88	0.89	0.89	0.70	0.76	0.94	0.95	0.81	0.93	0.82	0.99	0.91
	2nd quartile	0.63	0.70	0.65	0.66	0.79	0.82	0.93	0.81	0.79	0.90	0.79	0.67	0.68
	3rd quartile	0.80	0.57	0.78	0.62	0.64	0.68	0.68	0.61	0.59	0.65	0.77	0.82	0.82
	4th quartile	0.71	0.82	0.66	0.78	0.87	0.77	0.84	0.74	0.80	0.97	0.79	0.95	0.86
Technical	1st quartile	0.94	0.98	0.98	0.99	0.89	0.89	0.97	1.00	0.96	0.96	0.94	1.00	0.96
	2nd quartile	0.82	0.93	0.95	0.86	0.92	0.96	1.00	0.90	0.86	0.95	0.85	0.83	0.86
	3rd quartile	0.96	0.84	0.88	0.93	0.90	0.95	0.84	0.76	0.72	0.75	0.89	0.92	0.91
	4th quartile	0.88	0.98	0.93	0.89	0.99	0.97	0.97	0.90	0.93	0.97	0.81	0.97	0.88
Allocative	1st quartile	0.87	0.90	0.90	0.90	0.79	0.82	0.96	0.95	0.84	0.96	0.86	0.99	0.94
	2nd quartile	0.79	0.74	0.68	0.75	0.84	0.83	0.93	0.91	0.93	0.94	0.93	0.80	0.79
	3rd quartile	0.83	0.69	0.87	0.68	0.70	0.71	0.80	0.81	0.82	0.85	0.87	0.88	0.89
	4th quartile	0.82	0.83	0.70	0.85	0.88	0.78	0.87	0.81	0.87	1.00	0.95	0.98	0.98



Table 3
Kruskal-Wallis test

Z statistic									
Size quartile	Total efficiency			Technical efficiency			Allocative efficiency		
1	3.8*			2.8*			2.73*		
2	-1.4			-1.2			-1.06		
3	-3.5*			-2.9*			-2.67*		
4	1.2			1.3			1.00		
H statistic	23.1*			15.4*			12.48*		
H statistic by size pairs									
Size quartile	Total efficiency			Technical efficiency			Allocative efficiency		
	2	3	4	2	3	4	2	3	4
1	9.8*	20.7*	2.7**	6.3*	13.3*	1.1	5.5*	10.8*	0.9
2		1.5	2.7**		1.0	2.9**		0.9	1.4
3			8.7*			6.7*			5.3*

* Denotes statistical significance at the 5% level.
** Denotes statistical significance at the 10% level.

nificant are the deviations in the 1st and 3rd quartiles. Furthermore, the H statistic that tests the sample's overall homogeneity suggests the existence of at least one statistically significant difference between the individual quartiles, both for total efficiency and for its components.

For this purpose, the same statistical test is applied to each size pair and results at a statistical significance level of 5% show significant differences in most cases. An exception is the comparison between the 1st and the 4th quartiles, where the difference is marginally significant at the 10% level, and only as regards total efficiency.²⁸ Statistically non significant differences are detected between the 2nd and the 3rd quartiles in all cases, and between the 2nd and the 4th quartiles in the case of allocative efficiency.

The above results can partly be explained by the fact that large-sized banks have the infrastructure and ability to manage their inputs better, taking advantage of scale economies as well, while banks of a very small size are able to achieve relatively good performance due to specialisation and better control of their inputs as a result of size. In contrast, as Drake *et al.* (2006) also observe, an environment characterised by intense competition influences more banks of a relatively medium size, since these lack the appropriate size to fully take advantage of scale and scope economies, while at the same time are not flexible enough to specialise in specific markets or products.

²⁸ Using the t statistic there is no statistical significance even at the 10% level. In all other cases, the results are identical with those of the Kruskal-Wallis statistic.

As can be observed in Table 2, which depicts developments in efficiency over time, in the two-year period 1998-1999 efficiency edged down for banks in the 1st quartile and improved for those in all other quartiles. This is associated with the fact that several mergers and acquisitions took place during that time, and acquiring banks were larger and more efficient than the acquired. However, in the period immediately afterwards, the efficiency of larger banks improved again – an observation that confirms the conclusion reached with a different methodology by Athanasoglou and Brissimis (2004), namely that the efficiency of Greek banks involved in mergers and acquisitions improved.

More generally, as regards total mergers and acquisitions in the whole period under study, as Chart 3 shows, the average efficiency of acquired banks has been lower than that of other banks, a finding also in line with the literature (see e.g. De

Young, 1997). In fact, based on the Kruskal-Wallis test, the relevant differences were statistically significant.²⁹

5.2 Explaining efficiency

Table 4 presents the results of the estimation of model (1), which point to three basic conclusions: first, they confirm the importance of allocative efficiency in the Greek banking system;³⁰ second, they provide evidence that credit risk and the relevant supervisory interventions play a major role in determining efficiency; and third, they show that the macroeconomic environment appears to

²⁹ The value of the relevant statistical criterion was 23.9 for total efficiency, and 19.3 and 16.7 for technical and allocative efficiency, respectively.

³⁰ The greater importance of allocative efficiency compared with technical efficiency is implied by comparing the magnitude of estimated coefficients, as well as by the non-significance of the fixed term and the higher value of the Wald statistic in the case of allocative efficiency.

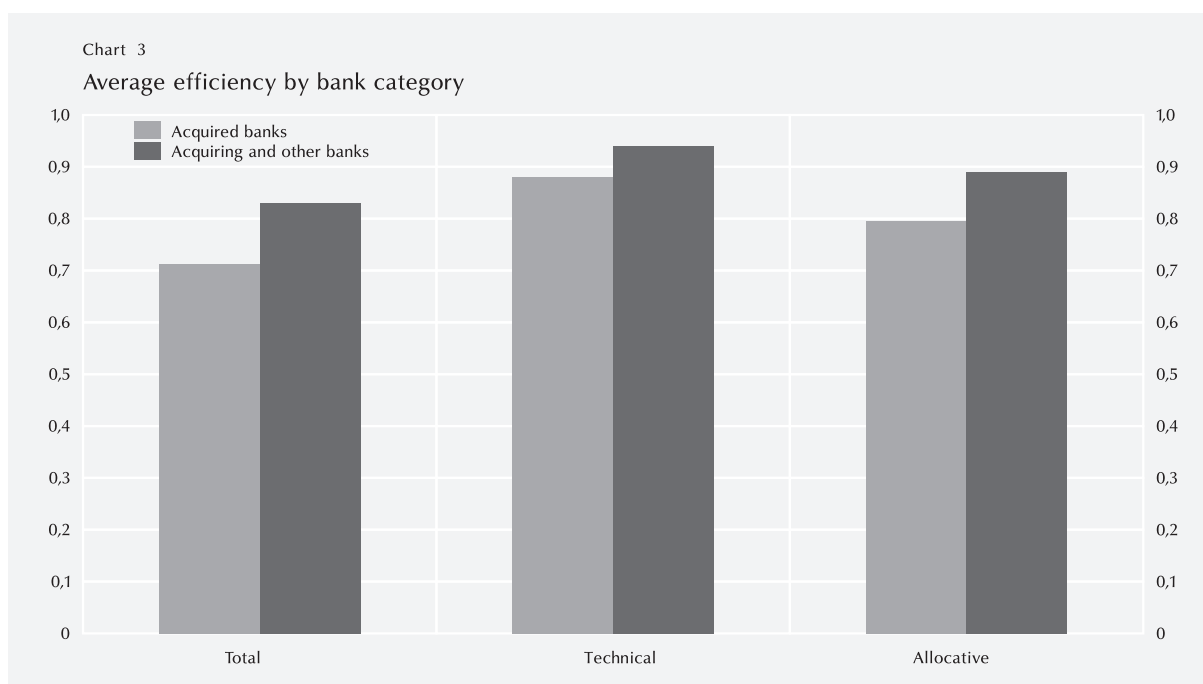




Table 4
Determinants of efficiency

	Efficiency		
	Total	Technical	Allocative
Constant term	0.3888	1.3479*	0.0247
Capital adequacy	0.4947*	0.3493*	0.2101*
Profitability	2.1031*	0.9629*	1.3171*
Liquidity risk	-0.2524*	-0.1234*	-0.1328*
Market power	0.0081*	0.0039*	0.0048*
Market concentration	0.0003	-0.0002	0.0005
Credit risk	-1.0443*	-1.7335*	0.4347
Regulatory framework	0.1025*	-0.0354	0.1376*
Personnel	-0.8324*	-0.2197*	-0.7318*
Macroeconomic conditions	0.0050	0.0017	0.0042
Wald statistic	198.35*	86.51*	139.69*

* Denotes statistical significance at the 5% level. The Wald statistic tests the overall significance of the regression.

Note: Capital adequacy: equity to assets ratio. Profitability: ratio of pre-tax profits to assets (ROA). Liquidity risk: loans to assets ratio. Market power: ratio of each bank's assets to total assets of all banks. Market concentration: Herfindahl-Hirshman index. Credit risk: flow of provisions to total loans ratio. Personnel: number of bank employees to assets ratio. Macroeconomic conditions: rate of change in GDP per capita. Institutional framework dummy variable: 0 for the years up to and including 2002 and 1 for the years from 2003 onwards.

have no significant effect on the efficiency of the Greek banking system, at least not in the period of this study.³¹

In particular, capital adequacy, as previous studies have shown (Casu and Girardone, 2004, Mester, 1996), has a positive effect on efficiency, and thus banks with high adequacy of equity capital are more efficient. A positive effect on efficiency is also attributable to profitability – a finding in line with those by Christopoulos *et al.* (2002) and Altunbas *et al.* (2000) – while the effect of liquidity risk is negative.

Moreover, each bank's market share has a positive effect on efficiency. Similar findings are presented in this respect by Pasiouras (2008) and

Rezitis (2006), but not by Christopoulos *et al.* (2002) and Girardone *et al.* (2004). The effect of market share becomes even more significant when combined with the insignificant effect of market concentration, as measured by the Herfindahl-Hirshman index, since it provides an indirect indication in support of the efficient structure hypothesis. Therefore, banks with a considerable market share are more efficient, thanks to their better management of inputs, exploitation of scale economies, offer of differentiated outputs, and technological superiority – and not due to

³¹ It should be noted that, in addition to the rate of change in GDP per resident, the study also examines a number of other macroeconomic variables, such as inflation, public and private consumption, and the balance of payments, none of which was found to have a statistically significant effect on efficiency.

market concentration. Thus, the efficiency of Greek banks does not appear to stem from any collusion strategies, a finding in agreement with that of Athanasoglou *et al.* (2008).

The provisions to loans ratio has a negative effect on efficiency, a finding in agreement with those of Altunbas *et al.* (2000), Casu and Giradone (2004) and Giradone *et al.* (2004). Consequently, banks with a loan portfolio of relatively higher risk seem to be less efficient, a fact that underscores the importance of better provisioning. In addition, to better estimate the effect of credit risk on efficiency, this study uses a dummy variable that takes the value of 0 for the period up to 2002 and the value of 1 from 2003 onwards, due to the full liberalisation of consumer credit and the strengthening of the regulatory framework related to the measurement of credit risk.³² This variable is significant, providing evidence of the banks' sounder credit risk management in these last years. The effect of the ratio of the number of employees to assets appears to be negative (i.e. the decrease of this ratio has a positive effect on efficiency) – a finding in line with the voluntary retirement schemes implemented by some banks in recent years. Finally, macroeconomic conditions appear to have no effect on the efficiency of Greek banks, a fact possibly associated with the sample's relatively short time span, including only one cyclical upturn.

6. Conclusions

By applying the DEA method the present study examined developments in the efficiency of the Greek banking system in the period 1994-2006. Overall, efficiency – a relative variable – shows an improvement over time, attributable mainly to the rise in allocative efficiency. Larger and smaller banks appear to be more efficient than medium-sized banks, and also, on average, banks targeted for acquisition exhibit lower efficiency than the rest. In general, the improvement of Greek banks' efficiency seems to be explained by their better management of inputs, due also to the stability conditions that prevailed in the period under study, and not by the exploitation of collusion strategies. Moreover, a positive relation with efficiency was found for determinants such as the banks' capital adequacy, profitability, and loan portfolio quality. Also positive appears to be the role of the supervisory interventions related to banks' sounder credit risk management, especially in the period after the full liberalisation of consumer credit. Finally, a negative relation was found for the ratio of the number of bank employees to the bank's size, while the macroeconomic environment appears to have no statistically significant effect.

³² Besides the improvement in the regulatory framework (see Bank of Greece Governor's Act 2513/15 January 2003), these last years banks have started making the necessary adjustments in view of the implementation of the new framework "Basel II".



References

- Allen, F. and A.M. Santomero (1998), "The theory of financial intermediation", *Journal of Banking and Finance*, 21, 1461-85.
- Altunbas, Y., M-H Liu, P. Molyneux and R. Seth (2000), "Efficiency and risk in Japanese banking", *Journal of Banking and Finance*, 24, 1605-28.
- Apergis, N. and A. Rezitis (2004), "Cost structure, technological change and productivity growth in the Greek banking sector", *International Advances in Economic Research*, 10, 1-15.
- Athanasoglou, P.P., E.A. Georgiou and C.K. Staikouras (2008), "Output and productivity of Greek banks", Bank of Greece, Working Paper No. 92.
- Athanasoglou, P.P. and S.N. Brissimis (2004), "The effect of mergers and acquisitions on bank efficiency in Greece", Bank of Greece, *Economic Bulletin* 22, pp. 7-34.
- Athanasoglou, P.P., S.N. Brissimis and M.D. Delis (2008), "Bank-specific, industry-specific and macroeconomic determinants of bank profitability", *Journal of International Financial Markets, Institutions & Money*, 18, 121-36.
- Athanassopoulos, A.D. (1997), "Service quality and operating efficiency synergies for management control in the provision of financial services: evidence from Greek bank branches", *European Journal of Operational Research*, 98, 300-13.
- Athanassopoulos, A.D. and D. Giokas (2000), "The use of data envelopment analysis in banking institutions: evidence from the Commercial Bank of Greece", *Interfaces*, 30, 81-95.
- Berger, A.N. and R. De Young (1997), "Problem loans and cost efficiency in commercial banks", *Journal of Banking and Finance*, 21, 849-70.
- Berger, A.N., G.A. Hanweck and D.B. Humphrey (1987), "Competitive viability in banking: scale, scope and product mix economies", *Journal of Monetary Economics*, 20, 501-20.
- Berger, A.N. and D.B. Humphrey (1990), "Measurement and efficiency issues in commercial banking", *Finance and Economics Discussion Series*, No. 151, Federal Reserve Board.
- Berger, A.N. and D.B. Humphrey (1997), "Efficiency of financial institutions: international survey and directions for future research", *European Journal of Operational Research*, 98, 175-212.
- Berger, A.N. and L.J. Mester (2003), "Explaining the dramatic changes in performance of US banks: technological change, deregulation, and dynamic changes in competition", *Journal of Financial Intermediation*, 12, 57-95.
- Bhattacharya, S. and A.V. Thakor (1993), "Contemporary banking theory", *Journal of Financial Intermediation*, 3, pp. 2-50.
- Brissimis, S.N., M.D. Delis and E.G. Tsionas (2006), "Technical and allocative efficiency in European banking", Bank of Greece, Working Paper No. 46.
- Bryant, R.C., N.C. Garganas and G.S. Tavlak (eds.) (2001), *Greece's Economic Performance and Prospects*, Bank of Greece and the Brookings Institution.
- Casu, B. and C. Girardone (2004), "Financial conglomeration: efficiency, productivity and strategic drive", *Applied Financial Economics*, 14, 687-96.

- Charnes, A., W.W Cooper and E. Rhodes (1978). "Measuring the efficiency of decision making units" *European Journal of Operational Research*, 2, 429-44.
- Christopoulos, D.K. and E.G. Tsionas (2001), "Banking economic efficiency in the deregulation period: results from heteroscedastic stochastic frontier models", *Manchester School*, 69, 656-76.
- Christopoulos, D.K., S.E.G. Lolos and E.G. Tsionas (2002), "Efficiency of the Greek banking system in view of the EMU: a heteroscedastic stochastic frontier approach", *Journal of Policy Modeling*, 24, 813-29.
- Cooper, W.W., L.M. Seiford and K. Tone (2007), *Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References and DEA-Solver Software*, Second Edition, Springer, New York.
- De Young, R. (1997), "Bank mergers, X-efficiency, and the market for corporate control", *Managerial Finance*, 23, 32-47.
- Donatos, G. and D. Giokas (1995), "An empirical study of the relative performance of a Greek bank's branches using DEA and OLS", Proceedings of the 7th Panhellenic Conference on Statistics, Cyprus, pp. 39-46, (in Greek).
- Donatos, G., D. Giokas and A. Athanassopoulos (2002), "Alternative input-output models for the evaluation of relative efficiency of a Greek bank's network of branches", *Spoudai* 52, pp. 136-159, (in Greek).
- Drake, L. and M.J.B. Hall (2003), "Efficiency in Japanese banking: an empirical analysis", *Journal of Banking and Finance*, 27, 891-917.
- Drake, L., M.J.B. Hall and R. Simper (2006), "The impact of macroeconomic and regulatory factors on bank efficiency: a non-parametric analysis of Hong-Kong's banking system", *Journal of Banking and Finance*, 30, 1443-66.
- Farrell, M.J. (1957), "The measurement of productive efficiency", *Journal of the Royal Statistical Society*, 120, Ser. A, 253-81.
- Freixas, X. and J.C. Rochet (1997), *Microeconomics of Banking*, MIT Press, Cambridge.
- Gibson, H.D. (2005), "Greek banking profitability: recent developments", Bank of Greece, *Economic Bulletin* 24, pp. 7-25.
- Gibson, H.D. and N.A. Demenagas (2002), "Competition in the Greek banking system: an empirical study for the period 1993-1997", Bank of Greece, *Economic Bulletin* 19, pp. 7-21.
- Gilligan, T., M. Smirlock and W. Marshall (1984), "Scale and scope economies in the multiproduct banking firm", *Journal of Monetary Economics*, 13, 393-405.
- Giokas, D. (1991), "Bank branch operating efficiency: a comparative application of DEA and the loglinear model", *Omega International Journal of Management Science*, 19, 549-57.
- Girardone, C., P. Molyneux and E.P.M. Gardener (2004), "Analysing the determinants of bank efficiency: the case of Italian banks", *Applied Economics*, 36, 215-27.
- Goddard, J.A., P. Molyneux and J.O.S. Wilson (2001), *European Banking: Efficiency, Technology and Growth*, John Wiley & Sons, London.



- Halkos, G.E. and D.S. Salamouris (2004), "Efficiency measurement of the Greek commercial banks with the use of financial ratios: a data envelopment analysis approach", *Management Accounting Research*, 15, 201-24.
- Hancock, D. (1985), "The financial firm: production with monetary and non-monetary goods", *Journal of Political Economy*, 93, 859-80.
- Hardy, D.C. and G.T. Simigiannis (1998), "Competition and efficiency of the Greek banking system", Bank of Greece, *Economic Bulletin* 11, pp. 7-26.
- Hondroyiannis, G., S. Lolos and E. Papapetrou (1999), "Assessing competitive conditions in the Greek banking system", *Journal of International Financial Markets, Institutions & Money*, 9, 377-91.
- Kamberoglou, N.C., E. Liapis, G.T. Simigiannis and P. Tzamourani (2004), "Cost efficiency in Greek banking", Bank of Greece, Working Paper No. 9.
- Karafolas, S. and G. Mantakas (1996), "A note on cost structure and economies of scale in Greek banking", *Journal of Banking and Finance*, 20, 377-87.
- Khan, S. and A. Lewbel (2007), "Weighted and two stage least squares estimation of semiparametric truncated regression models", *Econometric Theory*, 23, 309-47.
- Leibenstein, H. (1966), "Allocative efficiency vs X-efficiency", *American Economic Review*, 56, 392-415.
- Lozano-Vivas, A., J.T. Pastor and J.M. Pastor (2002), "An efficiency comparison of European banking systems operating under different environmental conditions", *Journal of Productivity Analysis*, 18, 59-77.
- Maudos, J., J.M. Pastor, F. Perez and J. Quesada (2002), "Cost and profit efficiency in European banks", *Journal of International Financial Markets, Institutions & Money*, 12, 33-58.
- Mester, L.J. (1996), "A study of bank efficiency taking into account risk-preferences", *Journal of Banking and Finance*, 20, 1025-45.
- Molyneux, P., Y.S. Altunbas and E.P.M. Gardener (1996), *Efficiency in European Banking*, John Wiley & Sons, Chichester, England.
- Mylonidis, N. and I. Kelnikola (2005), "Merging activity in the Greek banking system", *South-Eastern Europe Journal of Economics*, 1, 121-44.
- Noulas, A.G. (1997), "Productivity growth in the Hellenic banking industry: state versus private banks", *Applied Financial Economics*, 7, 223-8.
- Pasiouras, F. (2008), "Estimating the technical and scale efficiency of Greek commercial banks: the impact of credit risk, off-balance sheet activities, and international operations", *Research in International Business and Finance* (forthcoming).
- Rezitis, A.N. (2006), "Productivity growth in the Greek banking industry: a non-parametric approach", *Journal of Applied Economics*, 9, 119-38.
- Rhoades, S.A. (1986), "The operating performance of acquired firms in banking before and after acquisition", *Staff Studies* No. 149, US Federal Reserve Board.
- Rogers, K.E. (1998), "Non-traditional activities and the efficiency of US commercial banks", *Journal of Banking and Finance*, 22, 467-82.

Sathye, M. (2001), "X-efficiency in Australian banking: an empirical investigation", *Journal of Banking and Finance*, 25, 613-30.

Simar, L. and P.W. Wilson (2007), "Estimation and inference in two-stage, semi-parametric models of production processes", *Journal of Econometrics*, 136, 31-64.

Srinivasan, A. (1992), "Are there cost savings from bank mergers?", *Economic Review*, Federal Reserve Bank of Atlanta, March, 17-28.

Tsionas, E.G., S.E.G. Lolos and D.K. Christopoulos (2003), "The performance of the Greek banking system in view of the EMU: results from a non-parametric approach", *Economic Modelling*, 20, 571-92.

Vassiloglou, M. and D. Giokas (1990), "A study of the relative efficiency of bank branches: an application of data envelopment analysis", *Journal of Operational Research Society*, 41, 591-97.

Zhu, J. (2003), *Quantitative Models for Performance Evaluation and Benchmarking: DEA with Spreadsheets and DEA Excel Solver*, Springer.



Stock market integration: the Athens Exchange in the European financial market

Hiona Balfoussia¹

Bank of Greece,
Economic Research Department

1. Introduction and motivation

Financial market integration is a multifaceted and consequential subject, which has long attracted the attention of policy makers and academics alike. At a microeconomic level, enhanced capital market integration implies the opportunity for individual investors to access new markets and to further diversify the risk of their total investment portfolio or, equivalently, to reduce the levels of risk they have to accept in order to obtain a given return. From a macroeconomic point of view, economic theory suggests that the integration and development of financial markets and the removal of frictions and barriers to exchange contribute to a more efficient allocation of capital and hence to stronger economic growth. The main academic underpinnings of research on financial integration are therefore solidly founded in economic theory.

While a topic of interest in its own right, financial integration has become increasingly relevant as the globalisation of international financial markets has progressed. Indeed, many barriers to cross-border movement of capital have been dismantled over the last few decades. On a global scale, increasing economic and political cooperation within smaller or larger groups of countries, such as the EU, the NAFTA and the ASEAN, have led to a higher propensity to assess the economic and financial underpinnings of existing ties. At the European level in particular, the creation of the EU and the adoption of a single currency have implied dramatic changes in the European financial land-

¹ The views expressed in this article are those of the author and do not necessarily reflect those of the Bank of Greece. The author would like to thank Heather Gibson for her valuable comments.



scape, resulting in a need to analyse and monitor financial integration much more systematically.

Within the idiomatic context of a monetary union, financial integration acquires an additional dimension, stemming directly from the role of financial markets as the medium via which monetary policy is implemented and transmitted. From the perspective of a monetary policy authority in a monetary union, financial integration is of immediate interest as it critically influences the effectiveness of the monetary policy transmission mechanism in practice. Financial integration is inextricably related to the structure of the financial system; it is also pivotal with respect to the financial stability of a monetary union. Monitoring and assessing the degree of financial integration within the European Union and especially within the euro area is clearly within the mandate of European financial institutions, including the ECB, which has repeatedly and explicitly expressed interest in financial integration in its broad sense and has been monitoring its progress all the more closely, as evidenced by a series of publications, of which notable is the most recent *Financial Integration Monitor* (2007).

As a result of the aforementioned rapidly evolving international circumstances, a growing body of literature has addressed the topic of financial integration in considerable depth and from a variety of angles. Theoretical asset pricing models can be classified, in respect of their treatment of financial integration, into three broad categories: those which assume fully integrated financial markets; others which, conversely, assume completely segmented markets; and, lastly, those starting from the premise that international financial markets are integrated, but not fully so. The underlying premise of much of the first body of work is that assets in international

financial markets are priced on the basis of a common underlying stochastic discount factor. Typical examples of this strand of literature include theoretical or empirical studies of the international Capital Asset Pricing Model (I-CAPM) (see e.g. Harvey, 1991, Thomas and Wickens, 1993 and Ng, 2004). At the opposite end, an analogy can be drawn to works which study and test the validity of the standard CAPM of Sharpe (1964) and Lintner (1965), or of the general equilibrium consumption-CAPM for a single market in isolation, ignoring developments in the rest of the world and their dynamic influence on the domestic market. However, much of the literature falls in between complete segmentation and perfect integration, implicitly viewing the two aforementioned extremes as overly abstracted depictions of reality. It is this latter body of work that we are more interested in.

This more limited literature on cross-country equity linkages can itself be broadly grouped into two areas, at the level of empirics: on the one hand investigations for common factors that may, to some extent, be driving cross-country stock returns and variances (see for example Chiang and Jeon, 1991, Kasa, 1992 and Campbell and Hamao, 1992), i.e. research focusing on the underlying fundamentals, and, on the other hand, examinations of co-movements between national stock returns, return covariances and volatility dynamics, and spillover effects (see Hamao, Masulis and Ng, 1990, Theodossiou and Lee, 1995, Asimakopoulos, Goddard and Siriopoulos, 2000 and Martens and Poon, 2001), in other words approaches which emphasise the underlying dynamics of asset prices themselves.

As its underlying principle, our analysis of Athens Exchange returns assumes integration to be an

existing, albeit incomplete and time-varying, characteristic of today's financial markets, falling in line with the second of the two aforementioned empirical strands in terms of its empirical methodology. The main goal of this paper is to contribute to the literature examining financial market integration at the European level by investigating whether the degree of integration between the Athex and major European stock markets has varied over our sample period. An obvious motivation for such an undertaking stems from the relevance of integration to the implementation and transmission mechanism of the single monetary policy, as well as to the Bank of Greece in its role as the authority responsible for banking supervision. However, such a study is also in many ways relevant and of more general interest. Financial liberalisation came to Greece later than to many other EU countries, as did the euro itself, resulting in slower progress with financial integration.² Moreover, given that Greece is a small open economy, which (same as the Greek stock exchange) is recipient rather than driver of international fluctuations, the need to assess the country's success in following international financial developments is a further reason to focus on financial integration. As macroeconomic dynamics have fallen into step with EU-wide ones and several important institutional changes aimed at promoting financial integration have had some time to mature, an assessment of how far liberalisation has led to integration is now appropriate.

To this end, we first consider the evolution of pairwise correlations in Section 2 as a descriptive indication of financial market linkages. In Section 3 we proceed to a more formal assessment of financial market integration between the Athex and the selected stock markets, estimating a bat-

tery of alternative GARCH specifications over rolling windows of our sample, in an effort to ascertain whether the degree of integration between the markets in question has varied over time. Section 4 discusses the econometric results, and in Section 5 we offer some concluding remarks.

2. Correlation analysis

The correlation coefficient is a readily available measure of co-movement between different financial markets. The underlying idea is simple: integrated markets respond to common shocks; hence, returns on different markets will exhibit a higher co-movement the more integrated these markets are. Conversely, if a market is isolated from the rest of the world, its covariance with a common world factor may have little or no ability to explain its expected return.

In order to explore possible time-variation in the degree of co-movement between the Greek stock exchange and major euro area stock markets, we examine correlations between the main composite index for the Athens Exchange

² While the removal of investment restrictions does not directly imply higher integration but merely an improved potential for it, some restrictions are of varying importance across different countries and others are, in practice, non-binding. International evidence does nonetheless indicate that increases in alternative measures of integration have coincided with or closely followed capital market liberalisation. Kim and Singal (2000a, 2000b), used variance ratio tests and GARCH models to study 11 emerging markets and found that, in general, market liberalisation improved efficiency. For the Athex in particular, Chortareas, Ritsatos and Sfiridis (2000) examine the response of the Greek equity market to the liberalisation of capital flows during the 1992-1994 period which allowed domestic investors to hold foreign risky assets and find evidence of a wealth effect, implying efficiency gains, as well as a significant change in the daily return's distribution following the regulations' implementation.



(Athex), the ATHEX, and the corresponding indices of three other selected European stock exchanges,³ namely the Frankfurt CDAX, the Madrid IGBM and the Paris SBF 120. These comprise the core of our dataset which is used in the subsequent estimations. However, in the context of correlation analysis we also consider the benchmark high capitalisation indices of these same markets as secondary, exploratory datasets. These indices track the performance of selected blue-chip stock prices for the same markets and are the Athens FTSE/ATHEX20, the Frankfurt DAX 30, the Madrid IBEX 35 and the Paris CAC-40 respectively, while the FTSEUR1ST 300, which traces the top 300 big-capitalisation stocks in the euro area, is also considered. Finally, in an effort to disaggregate the composite price index dynamics, we compare the evolution of different sector-specific price indices of the ASE to the corresponding ones of the three aforementioned European stock exchanges. Our data source is Datastream, among whose country-specific sectoral stock market indices we use the following three major sectors: Banks, Non-financial and Technology.⁴

Our sample is daily, spanning the period from 7 February 1992, when the Maastricht Treaty was signed, to the end of 2007, i.e. a total of 4,067 common business days. Underlying this sample period selection is our aim to examine whether the degree of integration between the Athex and the major European stock exchanges has varied over time, concurrently with the enhancement of the overall degree of European political and economic integration. It would be especially interesting to see whether major milestones in the recent history of the European Union, and especially the creation of EMU, had a discernible impact on the

Athex in this respect, as well as, conversely, the extent to which major events specific to the Greek economy led to a significant deviation of the Athex's main indices from their long-run relationship with corresponding European stock market indices.

It is common practice in the related literature to separate the sample into plausible subsamples, by *ex ante* identifying economically meaningful breakpoints, in order to subsequently calculate and compare the respective correlation coefficients across subsamples. However, this would unavoidably involve an arguably arbitrary value judgment, which need not necessarily be reflected in the data. Moreover, in our case one needs to consider possible breaks in all series, which is a more challenging task. The possibility of non-contemporaneous breaks is likely to affect the coefficients estimated for any given subsample period, potentially rendering them meaningless. Therefore, we chose instead to calculate correlation coefficients for a rolling 2-year window of data, so as to have a more complete and informative view of how these have changed over our sample period.

Chart 1 contains a plot of the composite indices themselves, for reference. The two panels of

³ It is not uncommon in related literature to examine return series which have been “cleaned” of outlying observations of, for instance, moves of more than two standard deviations, or to examine the corresponding series of average monthly returns, claiming the need to ensure that the correlations are not unduly affected by outliers. Either method would be expected to yield higher correlation coefficients, large moves driven by idiosyncratic risk having been removed. This approach is not followed here, the raw data being considered preferable on the basis that no information is arbitrarily discarded.

⁴ Returns on all indices are calculated as the first difference of their natural logarithm.

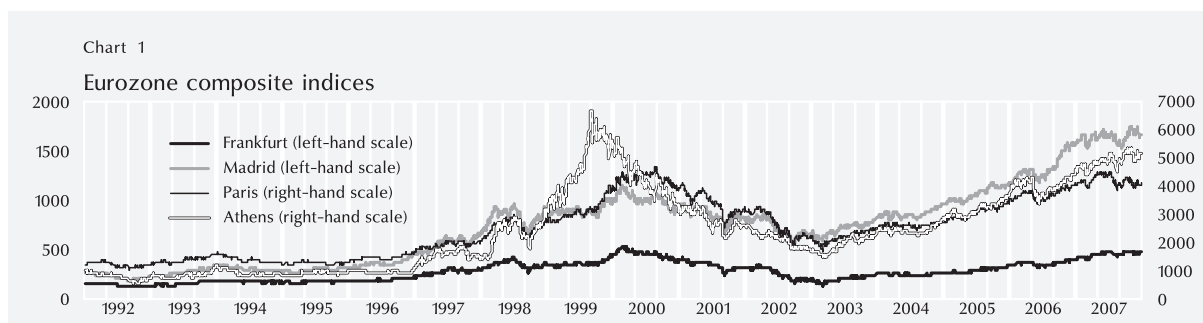


Chart 2 present the 2-year rolling correlation coefficients between returns on composite and blue-chip indices respectively.⁵ Those of Chart 3 depict the same information for returns on each of the three aforementioned sets of sectoral indices. In all charts, the correlations plotted are those between the returns on the relevant Athex index and those on each of the three selected European stock exchanges.

2.1 The composite and blue-chip indices

A visual examination of Chart 2 immediately creates the striking first impression that returns on the Athex and those on European stock markets have steadily become much more correlated over time. At the birth of the European Union⁶ and over the first three years of its existence, correlations between returns on the Athex composite price index and the corresponding composite indices for each of the other European stock exchanges were close to zero or even occasionally marginally negative.⁷ However, from the early to mid-1990s onwards they became positively correlated, reaching 0.35 for the last two years of the 1990s and at points exceeding 0.5 for the period 2001-2003. There is a subsequent period during which correlations exhibit a stabilisation or perhaps a marginal downturn, only to then continue their earlier increase. Correlations between composite

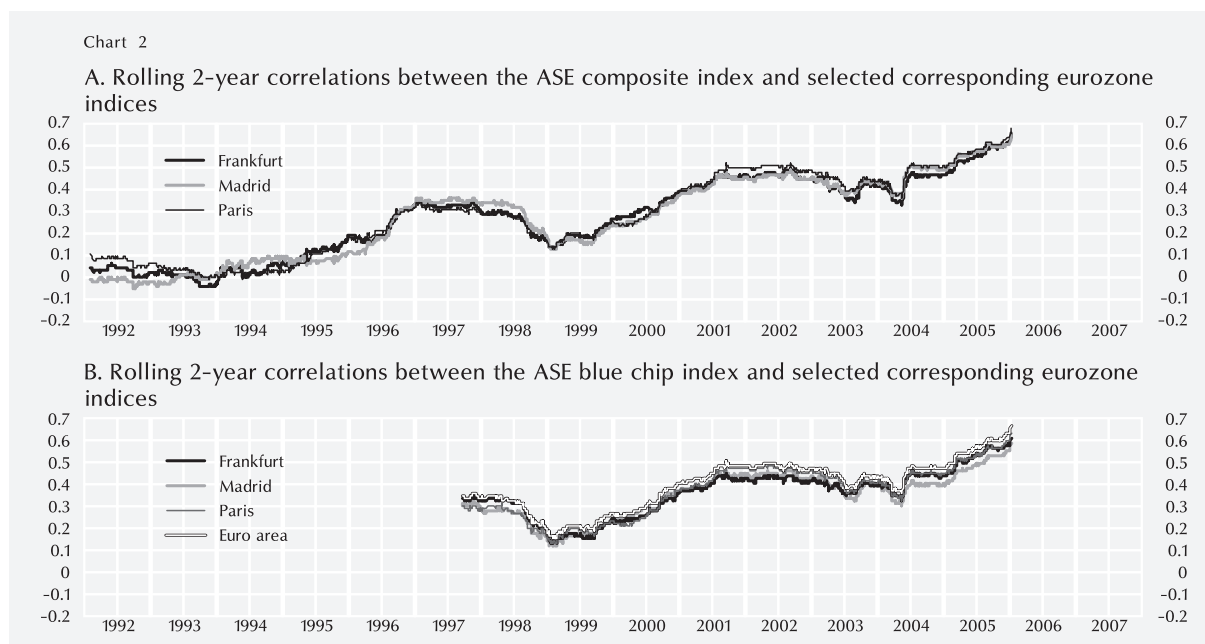
indices have been at their highest levels over the past two years, with correlation coefficients approaching 0.7 for the first time.

It is notable that, while the overall trend over the past 15 years is clearly a positive one, it is disrupted by one marked downturn, beginning with the two-year window starting in August 1998 and lasting for about 6 months, i.e. spanning the period August 1998 to end-2000. Over this period, correlations drop sharply to almost 0.1. This would seem to imply that the very sharp peak in share prices at the end of 1999 and the ensuing drop of the Greek stock market was not in tune with financial developments in Europe at the time. Indeed Chart 1 reveals that, while the period in question was one of high equity prices for all countries in our sample, those of companies listed on the Athex experienced a disproportionately sharp rise, their subsequent downturn preceding those of other countries' indices by roughly a year.

⁵ Wherever "rolling" estimated or calculated coefficients are plotted, these are positioned against the x-axis based on the ending date of the appropriate subsample. For instance, in Chart 2, the correlation coefficient between log-returns on Greek and Spanish banking sector stocks for the first two years of our dataset is plotted against the date 7 February 1994.

⁶ The European Community was replaced by the European Union with the signing of the Maastricht Treaty on 7 February 1992.

⁷ This is in contrast to Bekaert and Harvey (1995) who find that the Greek market was integrated into world capital markets, despite, as they note, its being classified as an emerging one with respect to the stock market.



Pronounced as this downturn may be, one can argue that it should not be viewed as evidence of decreased integration between the Greek and European stock markets, but rather as the manifestation of country-specific developments in the Greek economy during that time, i.e. a special, one-off effect which temporarily dominated price dynamics. From a macroeconomic perspective, Greece, from the mid-1990s onwards, was experiencing a prolonged period of progress in terms of its fundamentals, the exact prospects and downside risks of which were, however, undoubtedly a challenge for market participants to correctly price. Expected entry into the euro area and the associated macroeconomic stabilisation brought a sense of euphoria which led to prices rising beyond sustainable levels. The subsequent correction, which preceded the EU-wide downturn in stock markets, generally accounts for the decoupling of Athex returns from those of other stock exchanges in the period from August 1998 to end-2000. One should also bear in mind

that the Athex was, at the time, a relatively “young” stock exchange in terms of investors’ confidence and experience and of the robustness of the regulatory framework, the latter still in the early stages of a “fine-tuning” process. Indeed, until EMU entry, the Athex was broadly viewed as an “emerging” market.⁸ These characteristics set it somewhat aside from the other stock exchanges in our sample. In short, the Athex was, at the time, driven by strong country-specific dynamics which, in combination with the market’s inherent higher volatility, arguably account for the temporary divergence from the evident long-run trend.

⁸ By 1994, long-standing short-term capital restrictions had been largely removed and the role of the Capital Market Commission had been redefined. This process generated an environment conducive to investment, a flourishing stock market and the introduction of derivative instruments. The Athex gradually became part of international investors’ developed markets’ portfolio. However, it was not until May 2001 that the Athex was included in the Morgan Stanley Capital International index as a developed equity market, though the actual decision and the exact date had been announced in 2000.

Correlations between, on the one hand, returns on the FTSE/ATHEX20, which tracks the 20 biggest-capitalisation stocks on the Athex, and on other returns on the FTSE index of the top 300 European companies as well as on the corresponding benchmark big capitalisation indices of the other three European stock markets can be seen in the lower panel of Chart 2, broadly confirming earlier impressions.⁹ Here, too, the trend is clearly positive, disrupted only by the end-1999 period.

2.2 Sector-specific indices

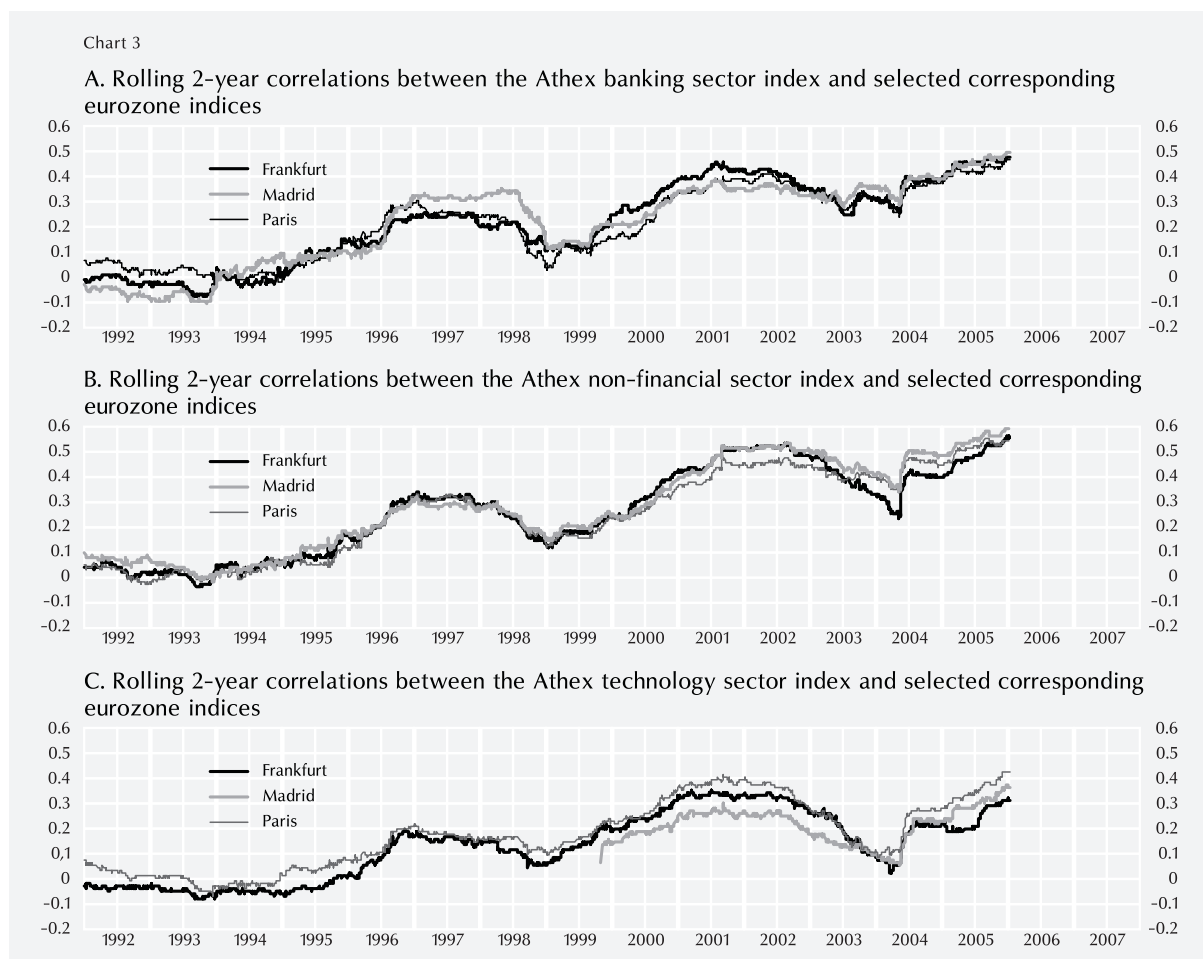
Turning to the top panel of Chart 3, we can inspect the evolution over time of correlations between returns on stocks of different countries' banking sectors. This is a sector which, in Greece, largely drives the composite index and is often pivotal, even if to a lesser extent, in the stock exchanges of the other European countries. Early on in our sample, the correlation coefficients between returns on Datastream's price index for the Athex banking sector and the same index for each of the other European stock exchanges were mostly negative, albeit marginally, and remained close to zero for a period longer than the one seen in the first panel of Chart 2. Their path largely reflects that of composite price indices' correlations. However, the end-1999 downturn is much more pronounced than it was for composite index correlations. The banking sector benefited from the very rapid convergence of interest rates to European levels and the concurrent decline of inflation, also reaping gains from the stock market boom itself and from the hosting of the 2004 Olympic Games by providing liquidity for many of the infrastructure works commissioned. The financial liberalisation of the sector throughout

the 1990s also led to its radical restructuring and consolidation, as rigidities hampering the Greek financial sector¹⁰ were removed. Overall, the profitability of Greek banks, whilst somewhat erratic, has been strong (Gibson, 2005). However, the character of banking itself changed significantly in Greece over our sample, as Greek banks slowly adapted to an increasingly liberalised environment. Hence, the dynamics of this sector could arguably be set apart from those of the banking sectors in other European countries, especially towards the end of the previous decade, and were perhaps largely driving the correlation pattern of the Athex as a whole.

Returns on the Datastream index for the non-financial stocks listed in the Athex and those on other markets seem to correlate in a very similar manner, save for the slightly less pronounced end-1999 downturn, as seen in the second panel of Chart 3. However, it is intriguing that a second milder downturn over the first few years of the current decade is now evident. The positive trend over our sample period is yet nonetheless again very clear, same as with the two aforementioned downturns. Conversely, correlations between returns on technology stocks, a subset of the non-financial stocks, albeit also increasing over time, are overall lower. Moreover, the first downturn of cross-country correlations is more prolonged for this sector, starting a year and a half earlier. Correlations between returns on Greece's technology index and corresponding European ones

⁹ Let it be noted that this is not a full-sample plot, as the FTSE/Athex 20 only goes back to September 1997.

¹⁰ A most striking distortion was the obligation of financial institutions to invest a fixed share of their deposits in government debt at rates often below inflation.



also move differently from those of composite indices, dropping from 0.4 to almost 0 over the first 4 years of the current decade. One should however note that, in contrast to the banking sector which is a crucial one in all the countries under consideration, technology does not have an equal weight in these countries' respective economies and, consequently, in their stock exchanges. The technology sector is much less developed in Greece than, for instance, in Germany and France. This would result in a less traded, less populated and more volatile index of Athex technology stocks and a relatively low weight of these stocks in the overall capitalisation of the Athex. Hence, while interesting, this

information is not a strong basis for conclusions about the markets themselves.

Thus, the sharp drop in correlations at the end of 1999, though pronounced for returns on individual sectors as well as for the composite indices, may be thought to reflect a special circumstance of the Greek economy and thus could be seen as an outlier period. The second milder downturn appears to be a sector-specific effect which does not filter through to the dynamics of the composite index, and as such, is of little interest in the context of this study. Therefore, it seems reasonable to conclude that neither period disproves the hypothesis that financial integration, as gauged by

the co-movements of price indices, has been on the increase since the signing of the Maastricht Treaty, as reflected in the general positive trend of correlations between returns on different composite indices.

Before moving on to a more econometric approach to measuring integration, it is worth noting two criticisms of the practice of using correlation coefficients as a measure of the degree of integration. Firstly, the domestic market could, in theory, exhibit low or negative return correlations and still be perfectly integrated with the international market, because it comprises a portfolio of sectors and economic activities very different to the international market's. Although theoretically sound, this argument may have relevance when comparing an asset market of, for example, the US market to that of a small developing country, but is much weaker for comparisons within the euro area.

Secondly, a more plausible but still related argument is based on the much more general theoretical concept that returns on any asset or market can be decomposed into a common or systematic component and an idiosyncratic one. Even assuming perfectly integrated, arbitrage-free markets, it can only be hoped that the systematic component is dominant enough to clearly weigh in the correlation coefficient. If, conversely, the idiosyncratic component dominates, correlations will be low even between highly integrated markets. Given however that the share of the idiosyncratic component is in itself likely to vary over time as domestic and international circumstances change, our examination of a moving window of correlation coefficients may allow us to identify such changes, and thus comment on the degree of financial integration between these markets.

In short, although these critiques do highlight our inability to concretely interpret low or negative correlations as evidence of limited financial integration, they discredit neither the converse interpretation of strong positive correlations nor, more importantly, the information content of changes in correlation coefficients, which were this section's object of study.

3. Econometric estimation

Our econometric approach builds on the above correlation analysis and aims at evaluating the extent to which returns on major European markets drive movements in the Greek stock exchange. We are, in other words, trying to investigate whether the increasing correlations discussed in Section 2 can be detected in models which attempt to use other EU countries' stock market returns as explanatory variables for returns on the Greek stock exchange.

While the rapid development of the Athex has given rise to an expanding literature investigating its stochastic behaviour (see for instance Barkoulas and Travlos, 1998, Koutmos, Negakis and Theodossiou, 1993, Laopodis, 1996, Siourounis, 2002 and Apergis and Eleftheriou, 2002), financial market integration has so far not been taken into particular consideration. An exception is Laopodis (2004) who performs cointegration and regression analysis, including as independent variables a "liberalisation dummy" and returns on German and the US equity markets, and finds a statistically significant improvement in the model's goodness of fit once the foreign equity variables have been included. However, the sample ends in 2001, allowing for little comparison.



Our two-step approach can be summarised as follows: As a first preliminary step we estimate an unrestricted VAR model for a vector of returns on the composite indices of the four stock markets, i.e. the Greek, German, Spanish and French stock exchanges, using the full sample. This first estimation has few theoretical underpinnings and provides little information regarding changes in the degree of financial integration over time, as it is a full sample estimation. The aim of this exercise is to obtain the residuals for the latter three European markets, in order to subsequently use them as proxies for the idiosyncratic shock processes corresponding to the three markets. The underlying reasoning is that, since in the VAR estimation each series of returns is regressed on its own first lag and on those of all others, what remains in the residuals should be a pure, market-specific innovation. Indeed, there is evidence to this effect in the literature, with Ross (1989) arguing as early as in 1989 that market volatility is directly related to the information flow and suggesting that information from one stock market can be incorporated into the volatility process of another.

We proceed to estimate four distinct Generalised Autoregressive Conditional Heteroskedasticity (GARCH) specifications on the returns series. Each of these is, as before, estimated on a rolling two-year window of our sample, thus allowing us to examine how estimated coefficients and diagnostics change over our sample period. This explicit focus on the time-dimension of financial integration is in contrast to part of the empirical literature that assumes incomplete integration, in which the degree of integration is often estimated one-off over an entire sample, implying, in contrast to popular perception, time-invariance. This

two-year window corresponds with our rolling correlation calculations and, since data are daily, allows enough observations within each subsample for the estimates to be consistent and for the test statistics we calculate to comfortably possess large-sample properties. Yet again, this approach is considered more interesting and less arbitrary than splitting our sample into arguably *ad hoc* subsamples and performing a small set of estimations on subperiods of unequal length and imprecise breakpoints. The relatively large size of our sample allows us to be confident that any period of coefficient constancy will be captured and revealed, even in the presence of possible outliers.

The motivation for using a GARCH specification is straightforward. Heteroskedasticity, i.e. time-varying volatility, is a stylised statistical characteristic of stock market returns and as such has been the subject of extensive academic research, both theoretical and empirical. Moreover, from a theoretical perspective, while in a perfectly integrated market only the covariance of assets with a common underlying stochastic discount factor is of interest, in imperfectly integrated markets the variance, which we study, is also a relevant measure of market risk. GARCH models in general and, among the univariate specifications, the very popular GARCH(1,1) in particular, are broadly seen as perhaps the most empirically successful econometric framework for capturing time-varying conditional volatility structures.¹¹ They postulate that the conditional variance of the dependent variable follows a time-dependent

¹¹ The now numerous variations of GARCH models have sprung from the groundbreaking work of Engle (1982) and Bollerslev (1986).

process conditional on information contained in the history of the process itself and, more specifically, conditional on the history of the variance itself as well as on that of the error process. In simpler terms, this implies that the volatility of the dependent variable – in our case of returns – is likely to be higher during periods of overall high volatility (a phenomenon known as volatility clustering) and may also be directly affected by the recent history of shocks to the dependent variable, both features of the model. In short, GARCH models are, by construction, a suitable basis on which to model not only equity price spillovers, prices being conditionally heteroskedastic, but also volatility spillovers as well as the interaction between price level and variance, since the latter is explicitly modelled and estimated.

We use the GARCH(1,1) as a benchmark and subsequently estimate different, sequentially nested extensions to it.¹² Approaches similar to ours are common in the literature. Hamao, Masulis and Ng (1990), Theodossiou and Lee (1995), Chiang and Chiang (1996) and Martens and Poon (2001), to mention but a few, apply related techniques, explicitly modelling the evolution of conditional variances (i.e. of volatility) in an effort to find evidence of volatility spillovers among major stock markets. Arshanapalli, Doukas and Lang (1997) find a common ARCH-component in groups formed by major equity markets and the corresponding world industry-return series while more recent evidence presented by Engle and Susmel (1993) also indicates that national stock markets are linked through their variance. Ayuso and Blanco (1999), in an approach comparable to ours, find evidence of increased stock market integration within the

euro area during the 1990s, while Busetti and Manera (2003) perform a similar estimation to assess financial market linkages, with significant findings.

Turning to the literature on the Athex, while much of the earlier research assumed a constant variance of returns, a growing number of publications tests this assumption, including Karathanassis and Patsos (1993), Koutmos, Negakis and Theodossiou (1993), Apergis and Eleftheriou (2001) and Siourounis (2002), who found substantial evidence of heteroskedasticity. In a related, albeit purely statistical analysis, Vrontos, Dellaportas and Politis (2000) also find that a range of GARCH models perform well, as expected, on Athex data, lending preliminary support to our econometric framework. However, while this literature explores the statistical properties and possible underlying dynamics of Athex returns and provides evidence in support of our GARCH approach, it does not consider financial integration between the Athex and the international financial markets; hence, it is not directly comparable to the present endeavour.

While our approach is not directly implied by any asset pricing theory, it has the appeal of allowing conditionally expected returns in the Athex and their variance processes to be affected by the mean and volatility of returns in other countries' equity markets, in an unrestricted and flexible framework. The set of regression equation specifications is designed to explore the nature of the linkages between these markets. The specifica-

¹² See Engle and Ng (1993) for an extensive comparison between alternative univariate conditional variance specifications.

tions are conditional, in the sense that predetermined information is allowed to affect the Athex expected returns and variances.¹³ The models estimated are presented in detail in the remainder of this section:

Model 1: The first specification is a simple GARCH(1,1), set out as follows:

$$r_{G,t} = a_1 + \beta_1 r_{t-1} + e_{1,t}$$

$$\sigma_{G,t}^2 = a_1 + b_1 \sigma_{G,t-1}^2 + c_1 e_{1,t-1}^2$$

where $r_{G,t}$ denotes the daily log returns on the Athex at time t and $e_{1,t}$ is an independently and identically distributed error term whose conditional variance at time t is $\sigma_{G,t}^2$. The first subscript of the estimated coefficients and error term denotes the model in question. Model 1 uses no information beyond that in the Greek stock market index and will serve as a benchmark for subsequent estimations.

Model 2: The specification of model 1 is augmented to include the lags of returns on the three major European stock markets in the mean equation. The exact specification of the regression equation is the following:

$$r_{G,t} = a_2 + \beta_2 r_{t-1} + \sum_{i \in \{D,S,F\}} \gamma_{2,i} r_{i,t-1} + e_{2,t}$$

$$\sigma_{G,t}^2 = a_2 + b_2 \sigma_{G,t-1}^2 + c_2 e_{2,t-1}^2$$

where $r_{D,t-1}$, $r_{S,t-1}$ and $r_{F,t-1}$ are the lagged daily log returns on the Frankfurt, Madrid and Paris stock exchanges. By γ we denote the respective coefficients. The immediate history of returns on three major eurozone stock markets is now allowed to affect the level of returns on the Athex. Hence,

estimating this specification over a rolling sample is likely to reveal the periods during which the newly added variables were significant, either individually or jointly.

Model 3: The third model is further augmented to include in the conditional variance equation the squares of the three series of residuals obtained from our unrestricted VAR estimation. The specification is the following:

$$r_{G,t} = \alpha_3 + \beta_3 r_{t-1} + \sum_{i \in \{D,S,F\}} \gamma_{3,i} r_{i,t-1} + e_{3,t}$$

$$\sigma_{G,t}^2 = a_3 + b_3 \sigma_{G,t-1}^2 + c_3 e_{3,t-1}^2 + \sum_{i \in \{D,S,F\}} d_{3,i} \tilde{e}_{i,t-1}^2$$

where $\tilde{e}_{D,t-1}^2$, $\tilde{e}_{S,t-1}^2$ and $\tilde{e}_{F,t-1}^2$ are the lagged squared estimated shocks to the three European markets in our dataset, as obtained from our unrestricted VAR in step 1, and d are the corresponding coefficients. The magnitude of idiosyncratic shocks specific to each of these three major European markets is now allowed to independently affect the conditional variance of Greek stock market returns, in line with an extensive body of literature examining the impact of news on volatility.¹⁴ This should allow us to decipher the effect of the idiosyncratic component of each European market's volatility on the conditional

13 It should be noted that the four stock markets under examination operate in overlapping but different time zones and have different closing times. Our intention here is not to investigate the instantaneous impact of the continuous-time innovation processes of the large eurozone stock markets on the Athex, which can best be attempted by exploiting the information in intraday or tick-to-tick data. Our aim is to examine the effect of market-closing information from the three euro-area markets on the Athex. Given that the latter is the first one to close, our setup allows the information content of closing prices at day $t-1$ to be incorporated in Athex investors' portfolio decisions over the next trading day.

14 A seminal paper in this literature, employing GARCH techniques, is that by Engle and Ng (1993).

variance of the Greek stock market and hence on variance risk.

Model 4: Finally, the fourth specification is a modification of the standard well-known threshold-GARCH (TGARCH) model. The TGARCH is an asymmetric model, introduced independently by Glosten, Jagannathan and Runkle (1993) and Rabemananjara and Zakoian (1993), which allows the conditional variance to be affected to a different extent by negative shocks. Indeed, the variance of equity prices often appears to be more volatile when a negative piece of information arrives, than when the converse occurs. This can in theory be attributed to a leverage effect, first noted by Black (1976), a decline in equity prices leading to a higher debt-to-equity ratio and hence to higher risk associated with a specific stock, or to the more popular behavioural finance theory intuition that market participants generally tend to be much more sensitive to negative signals and react more promptly and strongly as a result of excessive vigilance for a worst-case scenario, the possibility of cascading price declines. This propensity is usually reflected in highly significant estimates for TGARCH models on financial assets returns. A recent application of TGARCH in the context of financial integration is by Chena, Chiang and So (2003). Our specification is an augmented TGARCH model which allows negative shocks to returns on each of the four stock exchanges to be priced separately, rather than pricing shocks to the Greek index only. The exact formulation is as follows:

$$r_{G,t} = \alpha_4 + \beta_4 r_{t-1} + \sum_{i \in \{D,S,F\}} \gamma_{4,i} r_{i,t-1} + e_{4,t}$$

$$\sigma_{G,t}^2 = a_4 + b_4 \sigma_{G,t-1}^2 + c_4 e_{4,t-1}^2 + \sum_{i \in \{D,S,F\}} d_{4,i} \tilde{e}_{i,t-1}^2 + c_4^n e_{4,t-1}^{n_2} + \sum_{i \in \{D,S,F\}} d_{4,i}^n \tilde{e}_{i,t-1}^{n_2}$$

where $e_{4,t-1}^{n_2}$ denotes the squared series of negative shocks to Greek stock market returns which we now include in order to detect whether threshold effects are significant. By $\tilde{e}_{D,t-1}^{n_2}$, $\tilde{e}_{S,t-1}^{n_2}$ and $\tilde{e}_{F,t-1}^{n_2}$ we denote the squared series of negative shocks to the three European stock markets under consideration, as estimated in step 1.¹⁵

By estimating these four sets of rolling regressions, we hope to draw conclusions on the extent and nature of time-variation in linkages between the financial markets in our sample. To this end we shall be using individual and joint tests of parameter significance. The former essentially comprise t (t -statistics), which may reveal possible changes in the significance of individual explanatory variables over time. However, equal emphasis is placed on the test of joint significance. As the four models are sequentially nested, each can be tested against the alternative of any of the preceding, more constrained specifications. For single equation models an F -test would suffice. However, as a GARCH specification requires the joint estimation of the mean and variance equations, a likelihood ratio test is

¹⁵ Typically, the threshold itself is determined using information criteria such as AIC and BIC and is subsequently fixed to an optimal value, before the other parameters are estimated by least squares. Alternatively, a Bayesian approach is well suited for the joint estimation of the threshold and the parameters, allowing uncertainty regarding the threshold itself to be taken into account simultaneously when performing statistical inference for the other parameters. This issue is not addressed here, our zero threshold being arbitrarily predetermined, and may to some extent account for the low power of this model.

required. We construct appropriate likelihood ratio tests using each of the last three models as the null against each of the more constrained alternatives, thus directly testing each specification against every other.¹⁶

As a qualification to this econometric framework and analysis, it should be stated that our models are exploratory, aimed primarily at gauging changes in the linkages between the Athex and international financial markets rather than at accurately describing and testing structural one-to-one relationships between specific markets.¹⁷ Our interest is in unveiling and depicting possible changes in dynamic dependencies and not in selecting a single model. For this purpose, information on all models can and shall be used, in conjunction with the analysis in section 3, to draw conclusions.

4. Econometric results

4.1 Coefficient estimates

We estimate a number of models, ranging in their parameterisation from 5 to 15 unconstrained coefficients and do so over a rolling window of our sample, rather than simply performing 4 distinct estimations. Consequently, the presentation of all estimates is not possible due to space limitations. We only present the parameter estimates obtained for model 3 which, as we shall see in section 4.2, appears to be a specification superior to the others for most of our sample.¹⁸ Nonetheless, in section 4.2 we shall be discussing the relative performance of all models in some detail, on the basis of model specification tests and their evolution over our sample.

The main findings of our econometric estimations are presented in Charts 4 to 6. Rolling estimates of the coefficients α_3 , β_3 , $\gamma_{3,D}$, $\gamma_{3,S}$ and $\gamma_{3,F}$, which appear in the mean equation of model 3, are plotted in the five panels of Chart 4. Those of the coefficients σ_3 , b_3 , c_3 , $d_{3,D}$, $d_{3,S}$ and $d_{3,F}$, which appear in the variance equations, are presented in Chart 5. The bands surrounding the estimates are a rolling confidence interval of two standard errors above and below the estimates.

4.1.1 The mean equation

The estimated constant coefficient α_3 is significant in the estimations that cover the five years from 1996 to 2001, as well as over the past four years. In line with our intuition, the estimated constant component of returns is clearly positive and significant in estimations leading up to and including

16 One should mention that, in theory, low predictive power of one market's returns for those of another might in fact be reflecting a high degree of market integration. The underlying reasoning is that if information flows efficiently, any relevant (i.e. non-idiosyncratic) news would be immediately absorbed by all prices quoted on any market. However this premise assumes fully synchronous trading and a very high degree of infrastructure integration. However, the settlement infrastructure for euro area equities is much less integrated than, for example, for bonds, international settlements of equities still heavily relying on national central securities depositories rather than on a few international ones, as is the case for the European bond market. In addition, despite the substantial progress made, other qualitative barriers, such as the differences in settlement cycles or the handling of corporate events and taxation, continue to hinder further progress in the integration of equity infrastructure (Financial Integration Monitor, 2007). Moreover, this argument posits the formulation of a joint hypothesis of financial integration, absence of arbitrage and informational efficiency, the empirical examination of which would require an alternative specification and is beyond the scope of this study.

17 A theoretically more robust treatment of this topic would entail setting out and estimating a model of common fundamental components of the underlying stochastic discount factors driving these markets. This, however, is beyond the scope of the present study.

18 All results are available upon request.

the end-1999 boom, subsequently steeply declining into negative territory, reflecting the extensive losses recorded over the ensuing period. The coefficient on the first lag of returns on the Athex is, as would be expected, also highly significant almost throughout the entire period under examination, i.e. in all rolling estimations with the exception of a period including the boom and downturn of the Athex and the first few years of the following decade, when daily returns appear not to be highly predictable from their lagged values. This is in line with Antoniou, Galariotis and Spyrou (2005) who find that serial correlation in Athex equity returns is strong enough to permit significant short-run contrarian profits.

Turning now to the variables of interest, we see that the lagged returns on the Frankfurt stock exchange composite index were entirely insignificant throughout the first part of our sample, becoming however clearly and increasingly significant from the end of 1999 onwards, and remaining so for all estimations which cover up to part of 2006, even during periods when lagged returns on the Athex itself appear to be only marginally significant. One could conjecture that, once the excessively high prices were corrected, that is from early 2000 onwards, the Athex became increasingly influenced by shocks to the German stock market. Indeed, as indicated by Charts 1 and 2, the trajectory of the Athex was increasingly aligned with those of the other major stock markets, as opposed to reacting exclusively to domestic stimuli. This is admittedly a period during which the Athex was maturing from an emerging stock market to a developed one, gradually earning its recently acquired title. This finding notwithstanding, over the last two to three years of our sample this

variable appears to be declining in significance and closer to zero.

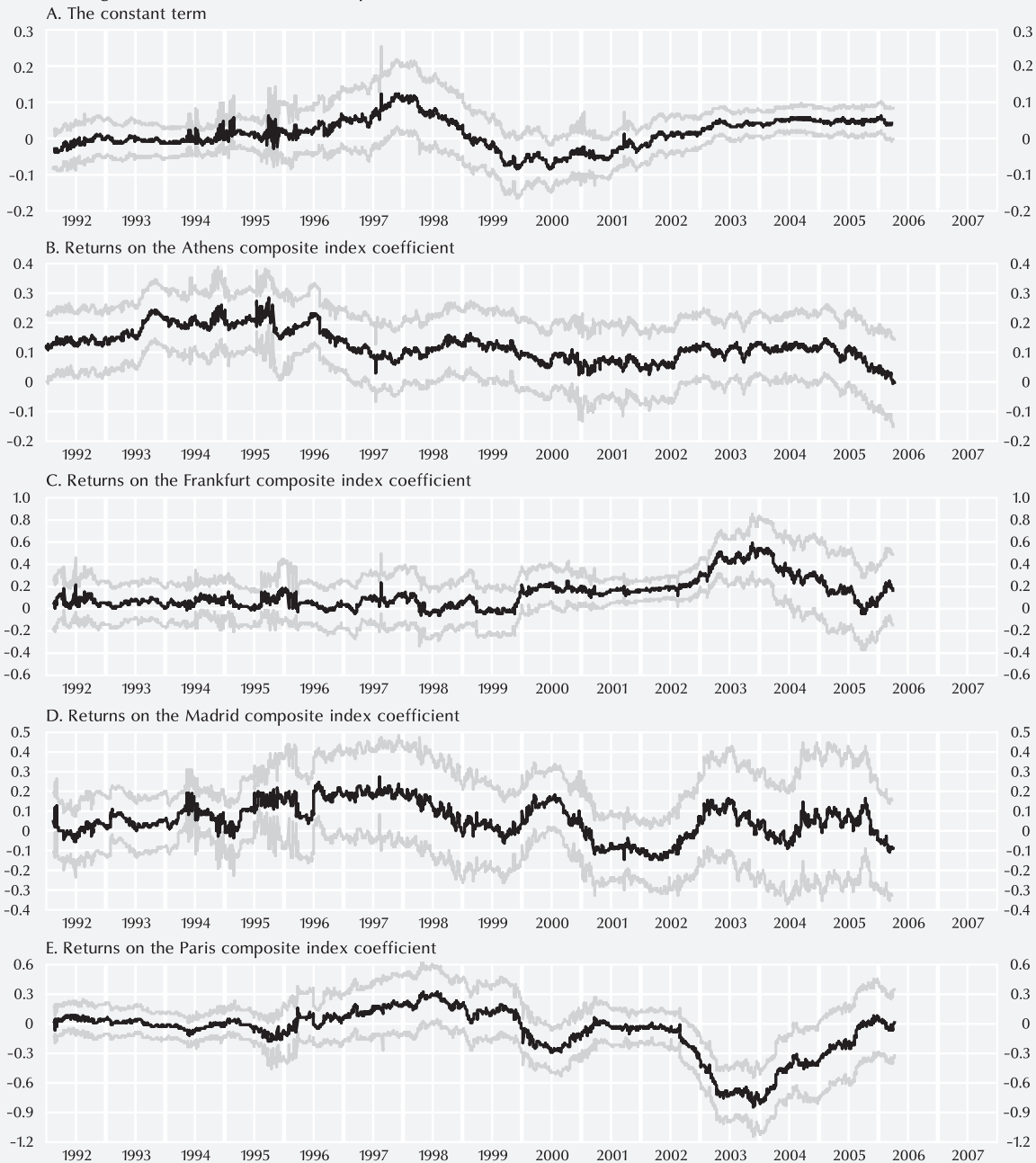
The estimated coefficient on returns on the Madrid composite index, presented in panel D, exhibits a less clear trend over our sample period. Returns on the Madrid stock exchange appear to be significant, or nearly so, during several albeit short periods of our sample, the most prolonged and noteworthy one being that from mid-1996 to essentially the end of the decade, or the peak of the boom period. While still not strongly significant, it would appear this is the period during which their role was most pronounced. In recent years this variable is entirely insignificant. Hence it would seem that, during the rapid increase towards its maximum value of almost 6,400, movements in the Madrid stock exchange may have been significant for the dynamics of the Athex composite index or, alternatively, the two markets may have followed parallel trajectories. However, admittedly, the overall significance of the variable's contribution may be questionable.

Similarly, the rolling coefficient of returns on the Paris Bourse appears to be largely insignificant, with the exception of two periods. One covers the 2 years prior to the collapse of the Athex price index at end-1999 and early 2000. The second period spans the sample from mid-2002 to the end of 2006. Especially during the latter period, returns on the Paris stock exchange appear to be highly significant for our model. However, yet again, for estimations over the last few years, i.e. those including the years 2005 to 2007, they are not.

Seeing that the latter period of significance of the returns on the Paris index is one of negative esti-

Chart 4

Rolling estimates for the mean equation



mated coefficients, a general comment on the sign of our estimated parameters is called for. Our *ex ante* intuition would be that these in-the-mean coefficients should be positive, thus implying that a move in any of the European stock markets

prompts Athex returns to move in the same direction. However, we must bear in mind that, having included the returns on more than one stock market in our specification, we are unable to distinguish the extent to which significant individual

parameters reflect the spillover of market-specific shocks into the Athex or a common European trend picked up by the Athex with delay. In the case of the latter, there is bound to be some overlap in the information included in our regression equations. Indeed, we have already seen that the overall evolution of the aforementioned correlation coefficients is roughly common for all stock markets, indicating that the Athex has been increasingly co-moving with European stock markets as a whole rather than with any specific one in particular. This may, to some extent, explain why there are periods when returns on all of the European stock markets appear to be insignificant, as the inclusion of all three may be detracting from their individual significance. It can also justify why we occasionally get significantly negative estimates, as they may be capturing a market-specific trend which did not in fact filter through to the Athex.

An alternative interpretation of a negative coefficient on one of the European stock markets' returns may be that it acts as an adjustment to the contribution of the positive coefficient on another market within the same estimation. Indeed, this may well be the case in our estimates, as returns on the Frankfurt stock exchange, clearly the most influential of the three, are positive and strongly statistically significant over a prolonged period, perhaps allowing us to interpret this as the main proxy for returns on the euro area stock market as a whole, estimates on the other two stock exchanges perhaps acting effectively as "fine tuning" instruments. This is the reason why the positivity constraint was not explicitly tested or imposed on our estimations. We note that, indeed, the period under discussion with respect to the Paris Bourse returns is essentially the only

one corresponding to a significantly negative estimated coefficient, and coincides with one of positive and strongly significant coefficients on Frankfurt stock exchange returns. Hence, with respect to the sign of the estimated in-the-mean coefficients of European stock market returns, we can argue that our estimates are largely intuitive. Nonetheless, as we do not impose a structural interpretation on our model, it is significance, individual and joint, that we are most interested in. On the level of individual tests, the variables included seem to take on increasing informational value as we move along our sample.

It is also worth making a note of the fact that the lagged returns on European stock markets are entirely insignificant in estimations spanning our sample up to 1997, a period during which lagged returns on the Athex are the only significant variable. Additionally, while return dynamics during the Athex boom seem to be predominantly captured by the constant term and the lag of Athex returns, indicating that, barring the brief significance of Madrid returns, this was largely a market-specific phenomenon, the period of gradual but relatively steady index growth from 2003 onwards is explained not only by the evolution of returns on the Athex itself but also by that of returns on the Frankfurt stock market primarily and the Paris Bourse to a lesser extent. The constant component is significant but virtually constant from 2003 onwards. In short, early on in our sample the only significant driving force of Athex returns dynamics is its own history. During the boom and downturn, other variables appear to come into play, most notably the returns on the Frankfurt stock exchange, though much of the sharp market-specific change in Athex returns is also captured by movements in the constant term.



Finally, in the subsequent segment of our sample, returns on European stock markets and the Frankfurt stock exchange in particular appear to hold significant information over a prolonged period of time. This trend seems to intuitively trace the evolution of the Athex from a highly volatile “emerging” stock exchange, fraught with idiosyncratic shocks and excessive volatility, into a more stable stock market and, perhaps, one better integrated with its European peers.

Lastly, we cannot but mention again that all three variables appear to be insignificant over the last two to three years of our sample, all the explanatory power being absorbed by the constant term which is significant over this period. This is perhaps a feature which could be explained on the basis of the underlying macroeconomic fundamentals of Greece vis-à-vis those of the other euro area countries, and specifically by the fact that Greece was experiencing very strong growth at a time when other countries were not, Germany in particular being at the opposite end of the spectrum. However, it is also noteworthy that, in our estimation of the fourth specification, this is precisely the period during which the negative shocks to European markets appear to be highly significant¹⁹ and, as shall be seen in the following section, the TGARCH specification as a whole appears superior to all others.

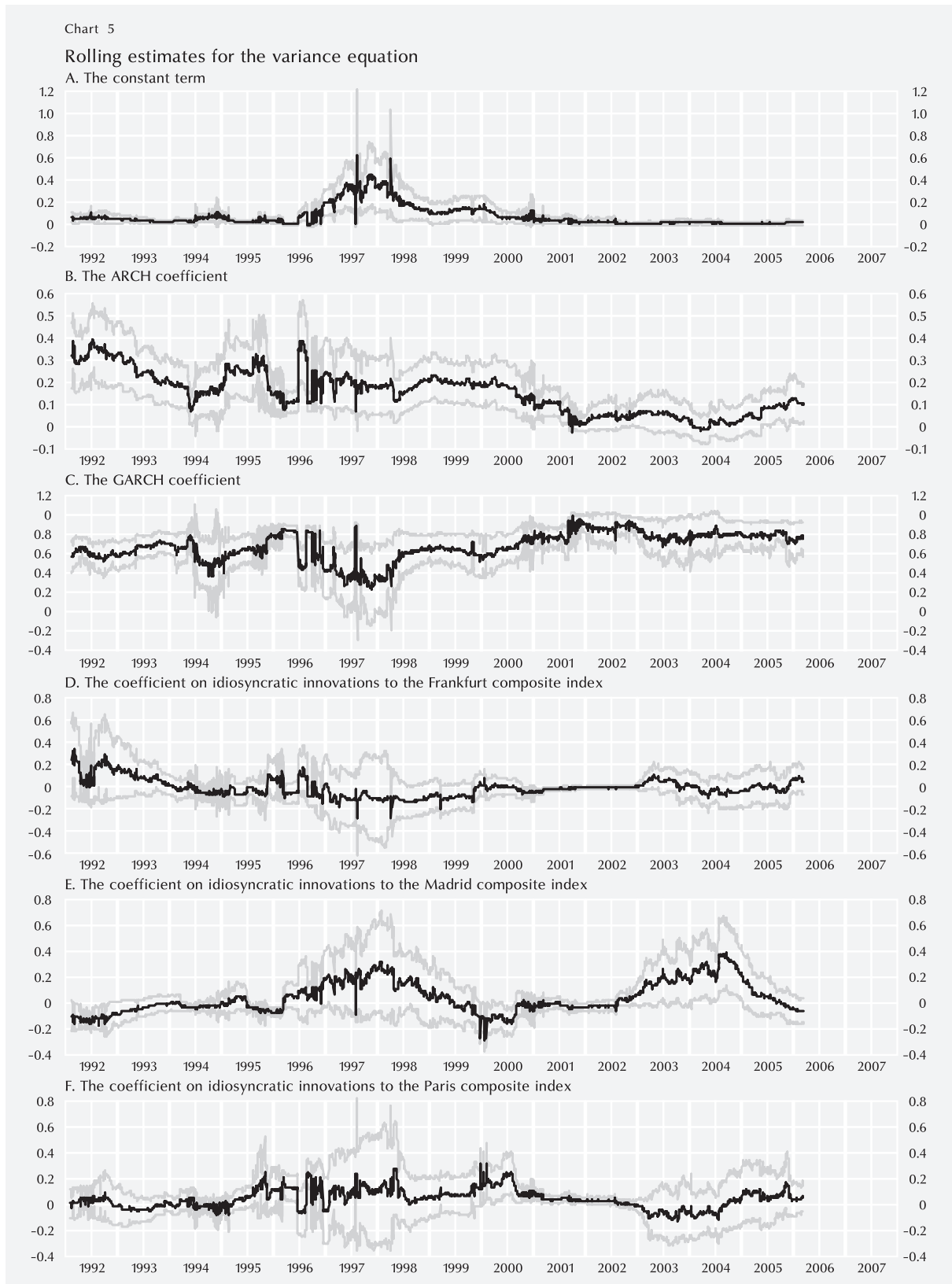
4.1.2 The variance equation

Chart 5 presents the estimates and corresponding confidence intervals for the conditional variance equation of model 3. The first panel depicts the rolling estimate of the constant in this equation, the estimate of α_3 . This coefficient estimate is significant throughout the sample, capturing the

constant component of the conditional variance of Athex returns, albeit in a time-varying form as a result of our rolling estimations. It would appear that the constant component of the conditional variance increases quite substantially during the period leading up to the collapse of the 1999 stock market bubble. This finding is intuitive, this being a period during which the volume of trade increased rapidly in the Athex, as a result of reasons touched upon in section 3. Henceforth, the constant component of conditional volatility drops substantially, stabilising at a much lower level and, from 2000 onwards, often becoming insignificant.

Turning to the dynamic structure of the conditional variance, the estimated ARCH and GARCH parameters c_3 and b_3 are highly significant in the vast majority of our estimations, implying it significantly depends on both the lagged conditional variance and on lagged innovations. The GARCH coefficient is clearly larger than the ARCH one throughout, indicating that the conditional variance of returns is driven predominantly by its own history, evidence of the common in financial markets phenomenon of volatility clustering. Additionally, a notable change in the volatility dynamics appears to occur from mid-2001 onwards, i.e. after the correction for the end-1999 surge in prices, as of when ARCH effects become increasingly insignificant while, conversely, GARCH effects entirely dominate the conditional variance equation, stabilising at around 0.8. This could be interpreted as evidence of an increasingly less erratic returns’ volatility process, and hence of increasingly smooth market dynamics,

¹⁹ The estimates are available upon request.



the overall level of volatility of the period becoming clearly much more important in recent years than the immediate history of random shocks to returns.

The specification of model 3 also includes the squared lagged estimated innovation processes obtained from our preliminary unconstrained VAR estimation in step 1. The corresponding estimated coefficients are plotted in panels D to F of Chart 5. It must be borne in mind that we are using only a proxy for idiosyncratic shocks to these European markets, i.e. a very filtered measure of news, which should, by construction, be insignificant in the mean of Athex returns, should it be included. As is the case for any model including a proxy, this specification's estimates are only as meaningful as the proxy itself. To the extent that it appears significant in the variance equation, it should, in principle, reflect spillovers of idiosyncratic volatility –i.e. movements in the volatility of a European market's returns generated by news specific to that market– into the Athex returns volatility process. It thus essentially captures volatility contagion from European markets to the Athex and reflects the domestic stock market's overall vulnerability to European shocks.

Turning to the fourth panel of Chart 5, the volatility of idiosyncratic shocks to the Frankfurt composite index, as measured by the squares of our proxy variable, does not appear to be significant, with the exception of the period from mid-2000 to mid-2004 when they have the opposite sign to what one would expect, i.e. they are negative. The plot in panel F is similar though, in a sense, inverse, since the coefficients on idiosyncratic shocks to the French market are significant only during the same period, but with a positive coef-

ficient, perhaps implying the presence of volatility spillover effects. In contrast, shocks to the Madrid stock exchange seem to be nearly significant during parts of the period leading up to the bursting of the 1999 bubble, as was their level in the returns equation, and are more clearly significant over the last 5 years, a period during which shocks to the other markets –and indeed, occasionally, those to the Athex itself– are not.

In brief, while our measure of idiosyncratic shocks appears to filter through to the volatility process of Athex returns over several subsample periods, a precise interpretation of the coefficients' evolution is elusive. Nonetheless, as we shall see in the following section, this specification is jointly significant over much of our sample when tested against the immediately preceding simpler one, thus providing support for its underlying concept. In brief, we may conclude that, in the run-up to the end-2000 downturn, conditional volatility underwent an upward shift, as evidenced by the rolling estimate of the constant term in the variance equation. The remainder of the variance dynamics appears to increasingly depend on the history of conditional variance itself, i.e. on the overall level of variance in the markets at the time, and, to a lesser extent, on lagged innovations to returns. The latter clearly develops into a stable characteristic of the market towards the end of our sample, arguably providing evidence of an increasingly less erratic stock exchange.

4.2 Tests of joint significance

In this section, we present and discuss likelihood ratio tests computed as a means of assessing the relative performance of the alternative models

over different periods of our sample. The likelihood ratio test is appropriate for nested specifications and hence can be used to compare each of our four sequentially nested models to those less parameterised. This test statistic has been calculated for all pairs of models and for all rolling estimations, essentially testing the joint significance of the coefficients included in the corresponding unrestricted estimation over the rolling window of our sample. Its value for different pairs of models and over the sample is presented in the six panels of Chart 6.

The top panel of Chart 6 presents the likelihood ratio tests for each of the rolling estimations of models 1 and 2, as we move along over our dataset. The likelihood ratio test assesses whether the addition of a set of variables to an existing equation makes a significant contribution to the likelihood function, the null hypothesis being that it does not, i.e. the constrained model. In the top panel of Chart 6 we are essentially considering the impact of including the lagged daily returns on the Frankfurt, Madrid and Paris stock exchanges in the mean of a simple GARCH(1,1) model as specified in model 2. Similarly, panel B tests model 1 against the alternative unconstrained specification of model 3 etc., as indicated in the title. The null hypothesis in each case is the constrained model, the straight line indicating the critical value for the corresponding degrees of freedom.

Looking at the top panel of Chart 6, it would appear that both models 2 and 3 are preferable to model 1, the simple GARCH(1,1), which does not include information on European markets, over substantial periods of our sample. It is interesting however that the significance of this test statistic

varies over time. It would appear, from panels A and B of this Chart, that in estimations on data up to mid- or end-1996 the inclusion of additional variables in the mean, as in model 2, or in the mean and variance, as in model 3, is not jointly significant. This is broadly in line with our earlier correlation analysis where, over the corresponding sample periods, our data exhibited very low correlation, while the inclusion of information on European stock returns in the mean equation was clearly insignificant on the basis of individual coefficient significance. Subsequently, the likelihood ratio statistic gradually increases as we move forward over our sample, becoming very highly significant over the second half of the 1990s and, except for a brief downturn, over most of the current decade as well. This time-variation is mirrored, to at least some extent, in all panels. We can once again draw parallels to the preceding correlation analysis, in which we found that correlations between returns on various Athex indices and the corresponding ones of foreign stock markets increased dramatically over the same period, only to drop again as the very sharp price increases in 1999 and the subsequent decline in 2000 come into our sample. A similar pattern emerges from our likelihood ratio tests; while, in the second half of the 1990s, developments in the Athex were increasingly linked to those in European financial markets, the trajectory of the Athex composite during the end-1999 boom and its subsequent rapid decrease over the year 2000, mark a decoupling from earlier trends, if not in the overall pattern, certainly in terms of timing and magnitude.

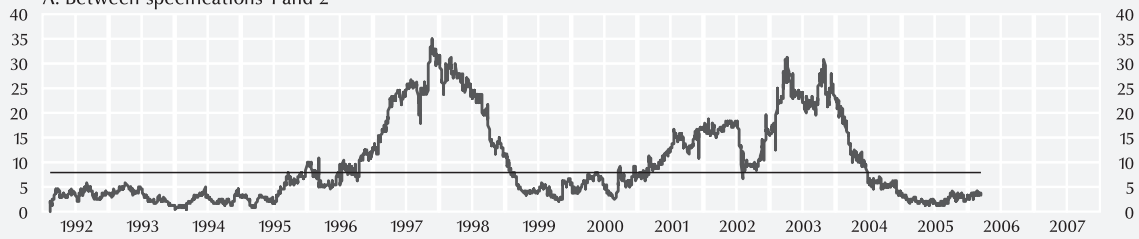
From mid-2001 onwards, the inclusion of European stock market returns in the mean of our benchmark model 1 becomes significant and



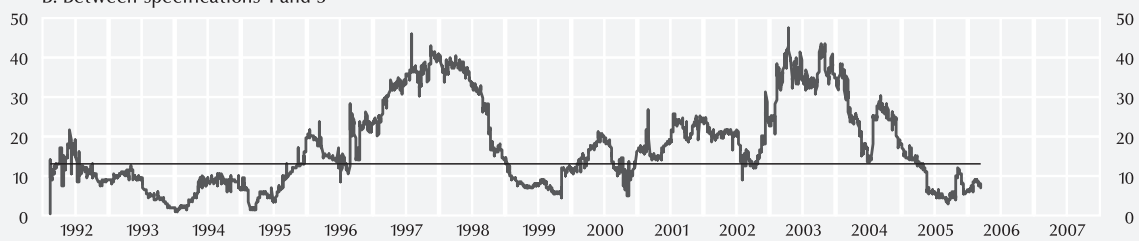
Chart 6

Likelihood ratio tests

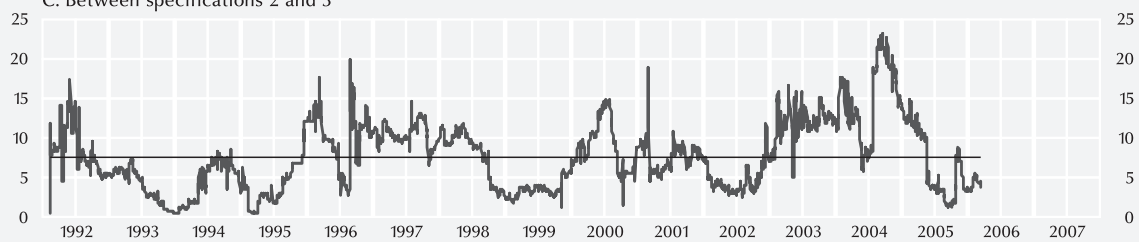
A. Between specifications 1 and 2



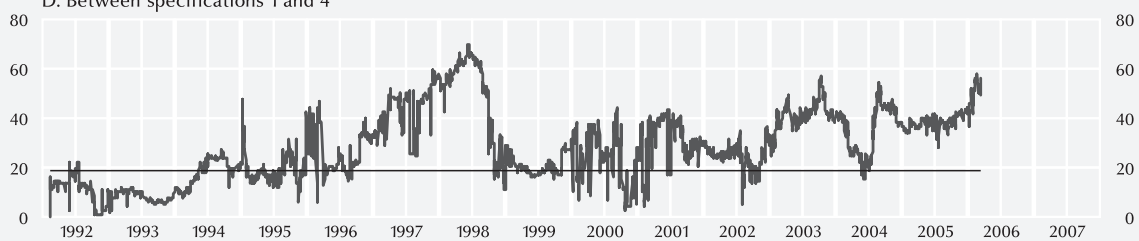
B. Between specifications 1 and 3



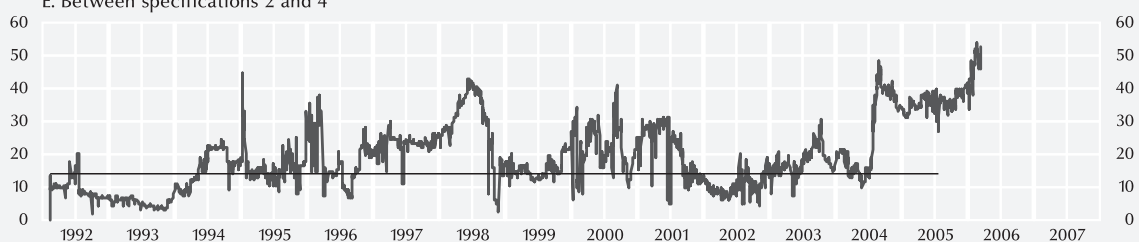
C. Between specifications 2 and 3



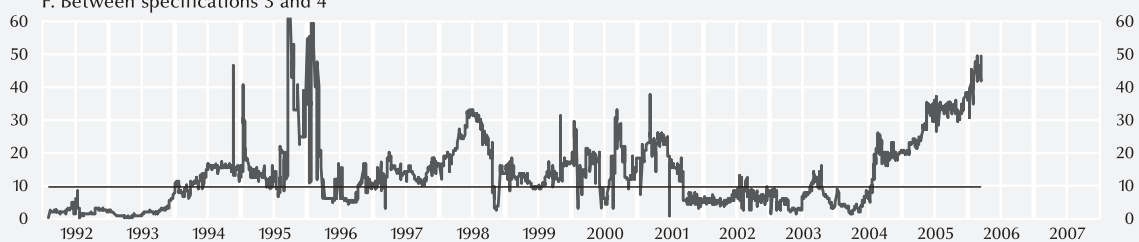
D. Between specifications 1 and 4



E. Between specifications 2 and 4



F. Between specifications 3 and 4



remains so until roughly end-2006. The additional inclusion of idiosyncratic shocks to these markets in the conditional variance equation model 3 appears to be jointly significant vis-à-vis our benchmark model for an even more prolonged period following the 1999 bubble. However, both models 2 and 3 underperform over the last one or two years of our sample. Model 3 would appear to be preferable to model 2 overall, (panel C of Chart 6), especially for the periods leading up to the 1999 boom and for most of the current decade, though not continuously so.

Finally, panels D to F of Chart 6 present likelihood ratios where the unrestricted model is specification 4, using in turn each of the other nested models as the null hypothesis. This model performs considerably better than both the benchmark model 1 and model 2, virtually over the entire sample, with the exception, once again, of approximately the first four to five years of our dataset, when no external information appears to provide a superior specification. The model's additional variables appear to be jointly significant on the basis of the likelihood ratio tests, even over the 1999 bubble, albeit only marginally. However, it does not seem to perform better than models 2 and 3 over much of the first half of the current decade, perhaps implying that negative idiosyncratic shocks to the three European markets led to spillover volatility effects from the mid-1990s to the early years of the current decade, their significance subsequently subsiding. This is in contrast with Koutmos and Philippatos (2007) who, albeit in a different framework and a full-sample estimation, find that stock returns on the Athex respond with significant asymmetry to past information. Interestingly, this last specification seems to be

clearly superior at the very end of our sample, in contrast to all previous models.

While estimates are not presented here in detail, the inclusion of the additional threshold variables of model 4 in the conditional variance specification does not notably alter the results previously obtained over our rolling sample, nor does it cast doubt on the conclusions drawn in the preceding sections. Regarding the conditional variance equation in particular, the estimated coefficients on shocks to the French index are largely unaffected, the corresponding negative idiosyncratic shocks also being insignificant almost throughout our sample period. Conversely, and in stark contrast to the estimates presented in panel D of Chart 5, estimates of the coefficients $d_{4,D}$ and $d_{4,D}^n$ of the squared estimated idiosyncratic shocks to the Frankfurt composite index appear to be highly significant towards the end of our sample. This is arguably our final estimation's most interesting characteristic, as it lends itself to an intuitive interpretation of the specification's superiority over all others, as gauged by likelihood ratio tests, at the very end of our dataset; namely, that over the last three to four years, negative shocks to the Frankfurt stock exchange – and hence, arguably, to the German economy – have had a pronounced spillover effect on the volatility of Athex returns.

5. Conclusion

In this paper we investigated a specific aspect of financial market integration, focusing on the dynamic dependence between daily stock-index returns on the Athex and those on three other large euro zone stock markets. Conforming to



well-established empirical regularities, stock-index returns exhibit persistence and volatility clustering, their volatility process appearing well described by a GARCH specification. In particular, we detect a positive shift of stock market volatility during 1998-2001, while variance dynamics appear to be increasingly driven by the overall level of market volatility at the time, and less so by the history of shocks to returns, arguably providing evidence of an increasingly less erratic stock market. By employing a series of alternative nested specifications for both the mean and the variance we are able to examine the nature of market integration between the

Athex and the other stock markets. The level of Athex returns appears to be clearly influenced by the selected European stock markets, same as their variance, the extent of dependence however varying over our sample period. The detected linkages seem much weaker during the stock market bubble and its subsequent bursting which appears to be an outlier period. The overall trend is however positive, lagged cross-market returns and innovations appearing jointly significant in both the mean and the variance throughout most of our sample and cross-correlations approaching 0.7, their maximum value, at the end of our sample.

References

- Antoniou, A., E.C. Galariotis and S.I. Spyrou (2005), "Contrarian profits and the overreaction hypothesis: the case of the Athens Stock Exchange", *European Financial Management*, 11, 1, 71-98.
- Apergis, N. and S. Eleftheriou (2002), "Interest rates, inflation and stock prices: the case of the Athens Stock Exchange", *Journal of Policy Modelling*, 24, 231-36.
- Apergis, N. and S. Eleftheriou (2001), "Stock returns and volatility: evidence from the Athens stock market index", *Journal of Economics and Finance*, 25, 50-61.
- Arshanapalli, B., J. Doukas and L.H.P. Lang (1997), "Common volatility in the industrial structure of global capital markets", *Journal of Money and Finance*, 16, 187-209.
- Asimakopoulou, I., J.A. Goddard and C. Siriopoulou (2000), "Interdependence between the US and major European equity markets: Evidence from spectral analysis", *Applied Financial Economics*, 10, 41-7.
- Ayuso, J. and R. Blanco (1999), "Has financial market integration increased during the nineties?", Banco de Espana, Working Paper 9923.
- Barkoulas, J. and N. Travlos (1998), "Chaos in an emerging capital market? The case of the Athens Stock Exchange", *Applied Financial Economics*, 8, 231-43.
- Bekaert, G. and C.R. Harvey (1995), "Time-varying world market integration", *The Journal of Finance*, 50, 2, 403-44.
- Black, F. (1976), "Studies in stock price volatility changes", Proceedings of the 1976 Business Meeting of the Business and Economics Statistics Section, American Statistical Association, 177-81.
- Bollerslev, T. (1986), "Generalised autoregressive conditional heteroskedasticity", *Journal of Econometrics*, 31, 307-27.
- Busetti, G. and M. Manera (2003), "STAR-GARCH models for stock market interactions in the Pacific Basin region", Japan and US, Fondazione Eni Enrico Mattei, Nota di lavoro 43.
- Campbell, J. and Y. Hamao (1992), "Predictable stock returns in the U.S. and Japan: a study of long-term capital market integration", *Journal of Finance*, 47, 1, 43-69.
- Chena, C.W.S., T.C. Chiang, and M.K.P. So (2003), "Asymmetrical reaction to US stock-return news: evidence from major stock markets based on a double threshold model", *Journal of Economics and Business*, 55, 487-502.
- Chiang, T.C. and J. Chiang (1996), "Dynamic analysis of stock return volatility in an integrated international capital market", *Review of Quantitative Finance and Accounting*, 6, 5-17.
- Chiang T. and B. Jeon (1991), "A system of stock prices in world stock exchanges: Common stochastic trends for 1975-1990? ", *Journal of Economics and Business*, 43, 329-38.
- Chortareas, G., T. Ritsatos and J. Sfiridis (2000), "Capital outflow liberalization and stock market reaction in an emerging market: Experience from Greece", *Journal of Economics and Finance*, 24, 77-89.
- Engle, R.F. (1982), "Autoregressive Conditional Heteroscedasticity with estimates of the variance of



- United Kingdom inflation", *Econometrica*, 50, 987-1008.
- Engle, R.F. and V.K. Ng (1993), "Measuring and testing the impact of news on volatility", *Journal of Finance*, 48, 5, 1749-78.
- Engle, R. F. and R. Susmel (1993), "Common volatility in informational equity markets", *Journal of Business and Economic Statistics*, 11, 2, 167-76.
- European Central Bank (2007), *Financial integration in Europe*, Frankfurt.
- Gibson, H. (2005), "Greek banking profitability: recent developments", Bank of Greece, *Economic Bulletin*, 24, 7-26.
- Glosten, L., R. Jagannathan and D. Runkle (1993), "On the relation between the expected value and the volatility of the nominal excess return on stocks", *Journal of Finance*, 48, 1779-801.
- Hamao, Y., R. Masulis and V. Ng (1990), "Correlations in price changes and volatility across international stock markets", *Review of Financial Studies*, 3, 2, 281-307.
- Harvey, C.R. (1991), "The world price of covariance risk", *Journal of Finance*, 46, 111-57.
- Hondroyannis, G. and E. Papapetrou (2005), "Stock returns and inflation in Greece: A Markov switching approach", *Review of Financial Economics*, 15, 1, 76-94.
- Karathanassis, G. and C. Patsos (1993), "Evidence of heteroscedasticity and misspecification issues in the market model: results from the Athens stock exchange", *Applied Economics*, 25, 1423-38.
- Kasa, K. (1992), "Common stochastic trends in international stock markets", *Journal of Monetary Economics*, 29, 95-124.
- Kim, E.H. and V. Singal (2000a), "Stock market openings: experience of emerging economies", *Journal of Business*, 73, 1, 25-66.
- Kim, E.H. and V. Singal (2000b), "The fear of globalizing capital markets", *Emerging Markets Review*, 1, 183-98.
- Koutmos, G., C. Negakis and P. Theodossiou (1993), "Stochastic behaviour of the Athens Stock Exchange", *Applied Financial Economics*, 3, 119-26.
- Koutmos, G. and G.C. Philippatos (2007), "Market frictions and stock return dynamics – Evidence from the Athens Stock Exchange", *Managerial Finance*, 33, 3, 210-9.
- Laopodis, N.T. (1996), "Distributional properties and weekly return patterns of the Athens Stock Exchange", *Applied Economics Letters*, 3, 769-74.
- Laopodis, N.T. (2004), "Financial market liberalization and stock market efficiency: Evidence from the Athens Stock Exchange", *Global Finance Journal*, 15, 103-23.
- Lintner, J. (1965), "The valuation of risk assets and selection of risky investments in stock portfolios and capital budgets", *Review of Economics and Statistics*, 47, 13-37.
- Martens, M. and S.H. Poon (2001), "Returns synchronization and daily correlation dynamics between international stock markets", *Journal of Banking and Finance*, 25, 1805-27.

Ng, D.T. (2004), "The international CAPM when expected returns are time-varying", *Journal of International Money and Finance*, 23, 2, 189-230.

Rabemananjara, R. and J. Zakoian (1993), "Threshold ARCH models and asymmetries in volatility", *Journal of Applied Econometrics*, 8, 31-49.

Ross, S.A. (1989), "Information and volatility: The no-arbitrage martingale approach to timing and resolution irrelevancy", *Journal of Finance*, 44, 1-17.

Siourounis, G.D. (2002), "Modelling volatility and testing for efficiency in emerging capital markets: the case of the Athens Stock Exchange", *Applied Financial Economics*, 12, 47-55.

Sharpe, W.F. (1964), "Capital asset prices: a theory of market equilibrium under conditions of risk", *Journal of Finance*, 19, 425-42.

Theodossiou, P. and U. Lee (1995), "Relationships between volatility and expected returns across international stock markets", *Journal of Business Finance and Accounting*, 22, 2, 289-300.

Thomas, S.H. and M.R. Wickens (1993), "An international CAPM for bonds and equities", *Journal of International Money and Finance*, 12, 4, 390-412.

Vrontos I.D., P. Dellaportas and D.N. Politis (2000), "Full Bayesian inference for GARCH and EGARCH models", *Journal of Business and Economic Statistics*, 18, 2, 187-98.



Child poverty: recent developments and determinants*

Theodore Mitrakos

Bank of Greece

Economic Research Department

1. Introduction

The issues of poverty and social exclusion are often central to social and political debate. The arguments put forward in Greece have been reinforced in recent years by the findings of a number of studies, now that the availability of statistical data has enabled an in-depth investigation of several aspects of poverty and social exclusion. Thus, the quantitative dimensions, structure and characteristics of poverty have often been investigated both for the total population and for certain vulnerable social groups, such as migrants, the elderly, etc.

However, in spite of the progress made in the research of poverty issues, there is still a serious deficiency in the relevant literature for Greece: very few studies have investigated (and those that have, only in piecemeal fashion) the dimensions and the characteristics of *child* poverty. This shortcoming can, to some extent, be attributed to the relatively “moderate” dimensions of the problem in Greece, compared with other EU countries or with the EU average.¹ However, the latest data cast a considerably different light on the situation. *Child* poverty in Greece has been increasing in recent years, a fact which, in itself, warrants in-depth investigation. The present analysis aims, to the extent possible, to uncover the underlying causes of this trend.

* This article reflects the views of the author and not necessarily those of the Bank of Greece. Thanks are due to all those who offered their valuable comments.

¹ A few earlier studies on Greece had recorded a relatively small or even negative correlation between poverty and the existence of children in the household, a finding which some researchers interpreted as denoting a kind of family planning on behalf of Greek couples, who seemed to put off getting married and having children until they could provide the latter with a satisfactory standard of living (employment, income, etc.).

Our main objective will be to analyse and comprehend the issue of child poverty, which in Greece apparently concerns 23% of all children aged up to 17 years (on the basis of the distribution of monetary income in 2006), although the problem is noticeably less widespread on the basis of the distribution of consumption expenditure. Establishing the real dimensions of poverty, analysing in detail the characteristics of the child population living in a state of economic precarity and poverty, and investigating the factors that contribute to the development of such phenomena will be some of the additional objectives of our analysis.

The study is structured as follows: Section 2 presents the statistical data, the methodology and the various difficulties involved in any attempt to record and analyse child poverty. Section 3 presents comparative data for the EU Member States and the relative position of Greece. Section 4 identifies, in a descriptive manner, the groups at high risk of child poverty, based on geographic, demographic, occupational and other social and economic characteristics of the households and their members. Section 5, with the use of alternative econometric models, investigates the factors that influence the risk of child poverty, as well as the relative contribution of the respective factors. The findings of this analysis can help to evaluate different social policy measures aimed at reducing child poverty. The last section of the study provides a summary of the conclusions drawn and offers certain policy proposals.

2. Child poverty measurement and statistics

It is widely recognised that poverty is a multi-dimensional phenomenon and that any attempt

to investigate and analyse child poverty in particular must inevitably take into account a number of methodological difficulties, starting with the very definition of poverty and the method used to measure it, i.e. how to estimate the total number of poor and express the relevant information with an easy-to-use statistical indicator (Sen, 1983, 1992, Atkinson, 1987). Both these issues are examined immediately below, together with a presentation of the statistical data.

2.1 Definition and measurement of child poverty

Poverty in any given society is generally recorded in either “absolute” or “relative” terms. According to the concept of *absolute* poverty, people are considered poor when they cannot secure the minimum resources necessary for their survival, i.e. for their physical wellbeing and health. The concept of absolute poverty therefore places an emphasis on basic needs, overlooking social and cultural ones. In order to escape from absolute poverty, an individual must have access to and be able to afford a minimum “basket” of quantitatively and qualitatively defined goods and services, comprising food, clothing, shelter, etc. The monetary value of this basket corresponds to what is commonly referred to as the poverty line. The consensual understanding is that absolute poverty in any society is intolerable and that its eradication should be a primary objective of economic and social policy.

According to the concept of *relative* poverty, people are considered poor when their income does not allow them to maintain a quality of living that is consistent with the customs and standards of the society in which they live. Being

defined in relation to the economic and other characteristics of the group to which the individual belongs, the *relative* poverty line therefore varies across countries, social groups, and even time. The concept of relative poverty acknowledges the existence not only of biological, but also of social and cultural needs, which to a certain extent make an individual a “complete” and productive member of society. Hence, the relative approach to poverty focuses on the economic inequality between the members of a social group, whereas the absolute approach stresses economic insufficiency.

It follows, from the above that the first step in defining and measuring poverty is to establish a poverty line or threshold, relative to which poor households can be distinguished from their non-poor counterparts. Some studies choose the official, state-defined minimum income for an individual or household as their poverty line. For instance, in earlier studies on the United Kingdom, the poverty line was based on the eligibility criteria for “National Aid”, whereas in France several studies adopted the minimum wage as their poverty line. In yet other cases, poverty lines have been based on the observation that the poor have a different consumption pattern than the rest of society, spending a large part of their income on food. Thus, anyone who spends a significant part of his income on food, clothing and other essentials would “qualify” as poor. Finally, some researchers, who question the reliability of income and consumption indicators as a means of defining and measuring poverty, consider to be poor those who are deprived of certain goods or amenities (e.g. a refrigerator, indoor plumbing, the ability to take a vacation, etc.).

Absolute poverty lines are rarely used in the international literature – especially in reference to developed countries – because of numerous difficulties associated with their formulation and because of the subjectivity and arbitrariness involved in their selection. The present study therefore uses the widely accepted definition of the poverty line, adopted by most international organisations (OECD, etc.) and by Eurostat, the statistical office of the European Communities. *On the basis of the relative poverty concept* and this definition, the poverty line in a given country is defined as 60% of the median of income distribution for its total population. Having defined the poverty line, it is then easy to determine whether an individual is “poor” (if his/her income is below the poverty line) or “non-poor” (if his/her income is above it).²

The concept and the definition of child poverty are no different from those of overall poverty, which refer to the total population. Furthermore, in the international literature, poverty is nearly always defined at the household rather than the individual level, as it is fair to assume that the incomes of all members of a household are redistributed between them and that many goods and services are consumed collectively. Besides, it would be a paradox to have both poor and non-poor individuals within a same household. Having therefore adopted the household as the unit of reference for the purpose of defining poverty, a child can be considered poor if it

² All the studies on poverty in Greece are based on the relative concept and define the poverty line as a percentage of the mean or the median of the distribution used in each case (*per capita* income, *per capita* consumption expenditure, etc). The median corresponds to the income of the “middle” individual or household, with 50% of the population living above it, and the other 50% living below it.



belongs to a poor household.³ Nevertheless, a more comprehensive definition of child poverty should, apart from the total income of all household members, take into account other parameters, such as the household's living and housing conditions, the health of its members, the socio-economic environment and the household members' relations with other individuals, etc. Besides, wellbeing, especially where children are concerned, is not only determined by the household's level of disposable economic resources, but by other important factors, such as the presence of both parents, access to specific goods, the existence of friends and relatives, etc. This need for a broader definition of child poverty has been underscored in the reports of most international organisations dealing with the issue (UNICEF, the World Bank, the United Nations, the European Commission, etc).⁴

In spite of efforts to broaden the concept and content of child poverty in recent years, the economic dimension is the one most widely referred to. We have therefore chosen in the present study to measure child poverty as the number of individuals up to age 15 (or alternatively up to age 17) living in families or households whose total income is below the poverty line (60% of the median of total income) as a percentage of the total number of children in the same age group. This child poverty indicator was opted for because, though lacking some of the advantages of other poverty indicators, it provides a relatively simple and clear indication of the dimensions of the phenomenon within a population. For our cross-country comparisons, we chose, in addition, to use the relative poverty gap, which provides an estimate of the intensity or "depth" of child poverty and, according to the Eurostat definition, is calculated as the

difference between the median income of persons below the at-risk-of-poverty threshold and the risk-of-poverty threshold, expressed as a percentage of the latter.

Finally, a few more observations must be made regarding the choices of the present analysis. For the reasons detailed above, the household is adopted as the unit of analysis. However, this approach has the drawback of placing equal emphasis on small and large households, especially in cases where the average size of rich and poor households is found to be systematically different. If, for instance, the average size of relatively poorer households is larger than the average size of the richer ones, the household level analysis will lead to an underestimation of poverty, compared with the individual level analysis and vice-versa. This is precisely why, as is often done in the international literature, we have chosen to use the number of members in a household as a coefficient for reweighting the household sample. Thus, in our analysis, a four-member household is taken into account four times more than a single-member one. However, regardless of whether the individual or the household is adopted as the unit of analysis, two other

³ The approach to child poverty on a household level has definite advantages, but also some serious drawbacks. For instance, some children living in non-poor households may in fact be deprived of adequate resources for their education, health, etc. and may therefore be in a real situation of poverty and deprivation. At the other extreme, some children living in poor households may have their own income, usually from an inheritance, and may not be poor. In addition, the approach at the level of the household assumes that the total income of the household is equally distributed among its members, irrespective of gender, age and other key characteristics, which in reality make for differences in needs and consumption patterns. For an analysis of this issue, see Bouzas (2006).

⁴ For a presentation of the alternative definitions of child poverty used by various international organisations and agencies, see Fajth and Holland (2007).

major considerations need to be addressed when analysing child poverty: (i) the existence of economies of scale in household consumption and (ii) the different needs of adults and children. In order to address these issues, we have chosen to use the so-called “family equivalence scales”, which give weights of 1.0 to the head of the household, 0.5 to the other household members aged over 13, and 0.3 to children up to age 13.⁵ This enabled us to calculate the number of *adults* to which the number of each household’s members is equivalent. The household income was then divided by the number of “adult equivalents” in order to obtain equivalent current income or expenditure distributions that are comparable and suitable for use.⁶

2.2 Statistical data and selected variables

For our analysis of child poverty, we used data from the European Union Statistics on Income and Living Conditions (EU-SILC) and primary data from the latest available Household Budget Survey (HBS) conducted by the National Statistical Service of Greece (NSSG) over the period from February 2004 to January 2005. The EU-SILC provides comparable data on child poverty, based on the disposable *monetary* income of households in the EU countries, while the primary data from the HBS 2004/05 allow us, in addition, to estimate the dimensions and structure of child poverty on the basis not only of the distribution of households’ *total* disposable income, but also of the distribution of their total consumption expenditure. Both these variables, apart from monetary data, also include imputed income and expenditure data, such as imputed rent due to owner-occupied housing, the consumption of own production

(mainly in the case of rural households), the provision of goods and services free-of-charge to the household by other households or enterprises, etc. Unlike what is observed in other countries, owner-occupancy and other imputed incomes are more widespread in Greece among poor households than among rich ones. Thus, an omission of these total real income (or consumption) data would inevitably lead to an over-estimation of the total level of poverty in Greece and possibly to an erroneous analysis of its structure and characteristics.

The main objective of the EU-SILC survey is to study the living conditions of households and their members in relation to their monetary income, employment and working conditions, housing conditions, level of education and vocational training, state of health and various other social and economic indicators. This survey is the main source of comparable statistical data and indicators for the distribution of income, poverty, social cohesion and social exclusion at the European level. The EU-SILC replaced the European Community Household Panel (ECHP), which covered the 1994-2001 period and was the

⁵ We chose to use Eurostat’s family equivalence scales, which, as opposed to others, are based on the assumption that the economies of scale in household consumption are moderate (Hagenaars *et al.*, 1994). In the international literature, equivalence scale values usually range between two extremes: either no adjustment is made to the total household income based on the household’s size and composition or per capita income is used and the existence of economies of scale in the consumption of goods and services is ignored.

⁶ In order to verify the reliability of the results, we tested their sensitivity to the various options of the analysis, such as the children’s age limits (up to 7, 14, 16 years, etc.), the definition of the poverty threshold (40%, 50% of the median), the unit of analysis (individual, household) and the family equivalence scales. Of all these options, the different weighting scheme in the equivalence scales (for the purpose of calculating the number of household adult equivalents) is the factor which most modified the results.



major source of primary data for the analysis of inequality and poverty in the EU countries. The design and formulation of the survey questionnaires, in accordance with Eurostat guidelines and under its supervision, have presumably ensured the comparability of data across the respective countries. It is precisely for the purpose of comparative analysis of child poverty data across the EU that the following section uses the EU-SILC data released by Eurostat.

The main aim of the HBS is to enable the NSSG to revise the consumer price index by calculating new weighting coefficients for various categories of consumption expenditure. For a number of reasons, however, these surveys also happen to be the most suitable source of statistical data for the study of such social phenomena as inequality, poverty, social exclusion, etc. These are the only household surveys that simultaneously gather information on monetary and imputed consumption expenditure (broken down into some 900 different codes/items), income (broken down into some 70 different sources), housing facilities, consumer durables, as well as the socio-economic (occupational, demographic, educational, etc.) characteristics of the households and their members. The combination of these variables later in this study will allow us to identify the determinants of child poverty in Greece and specific groups at high risk.

Finally, two further methodological remarks need to be made regarding the statistical data of *both* aforementioned surveys (EU-SILC, HBS). The first remark concerns the *coverage* of the surveys: more specifically, given that only private households are covered, the survey data by definition exclude certain small, but particularly poor

sections of the child population (children living in institutions and asylums, homeless children, etc.). In addition, it is fair to presume that the rather large group of (economic) migrants is underrepresented in the HBS sample.⁷ Considering that Greece's migrant population has increased considerably over the last fifteen years and that their standard of living is noticeably worse than the average for the HBS sample, the actual dimensions of child poverty are probably even greater than those presented below.⁸ The second observation concerns the *variables* used in the analysis (private consumption expenditure and disposable income). These variables do not include the value of goods and services provided for free by the State or government subsidies for certain goods and services. This omission would not have had serious implications, if the institutional framework governing the provision of these goods and services or if the extent to which they are used had been similar across households. This, however, is not the case.⁹ For instance, large households (with four or more children) in Greece which, as shown by our analysis, are at a very high risk of child

⁷ The *roma* are also underrepresented, as the number of children per *roma* household is considerably higher than the average for the total population. The number of children per migrant household is also above average (see Tragakis, 2006, Bank of Greece, *Annual Report 2005*, Table III.3, p. 108).

⁸ Zografakis and Mitrakos (2006) conclude that economic inequality is significantly higher among Greek households than it is among migrant households, whereas both poverty and poor housing and living conditions were found to be worse for migrants. As regards the dimensions of poverty, all of the relevant indicators show the migrant population to be affected twice as much as Greek households, although the factors affecting the at-risk-of-poverty rate are basically the same for both population groups. On the basis of the latest European Commission report, the poverty rate for households with children born outside the EU and living in Greece is 43.1% (European Commission, 2008).

⁹ Certain fragmentary studies from both the Greek and the international literature show that non-monetary government benefits usually have a positive redistributive effect.

poverty, are eligible for a number of subsidised or free services (reduced fares on public transport, lower utility rates, exemption from car registration fees, etc.). The fact that these benefits are not taken into account in the income and expenditure definitions obviously leads to an overestimation of the poverty risk, not only for the specific population group, but for the total population as well.

3. The dimensions of child poverty in EU countries

In recent years, EU Member States have become increasingly aware of child poverty, to some extent because of the dimensions of the problem, but also because of the worsening situation in some States.¹⁰ Indeed, according to the latest European Commission report (European Commission, 2008), the need to substantially reduce child poverty and social exclusion in the EU has become even more pressing in the past decade, given that, in most countries, children are at a greater risk of poverty than the total population, while, in half of the countries in question, at least one in every five children lives below the poverty line. Furthermore, children growing up in conditions of poverty and social exclusion are less likely to perform well at school and to be healthy, and are likely to be more prone to delinquency and to have greater difficulty integrating into the labour market. Child poverty also has a negative effect on children's future life opportunities and future civic engagement.

In order to facilitate a comparative presentation and analysis of the dimensions of child poverty in Greece and the EU countries, Table 1 lists the per-

centages of children up to age 15 (out of total children of the same age group) living below the poverty line over the period 1996-2006. These figures, published by Eurostat, are based on the primary data for the distribution of monetary household income from the aforementioned ECHP and EU-SILC surveys.¹¹

According to the data for 1996-2001, Greece was among the EU countries with a "medium" rate of child poverty, as opposed to other Mediterranean countries (Italy, Spain, Portugal), the United Kingdom and Ireland where the child poverty rate was higher, and the Scandinavian countries (including Denmark) where it was considerably lower. Specifically for Greece, the poverty rate among children aged 0-15 years ranged from 17% to 19% during this period, and was slightly lower than the poverty rate for the total population (20%-21%).¹² In contrast, the average EU child poverty rate was 19%-20% over the same period, i.e. some 4 percentage

¹⁰ For interesting analyses of the dimension and dynamics of child poverty in developed countries, see among others the collection of articles in Vlemminckx and Smeeding (2001) and Bradbury, Jenkins and Micklewright (2001). From the mid-1980s to the early 2000s, child poverty, in relative terms, declined in only 3 of the 13 wealthy countries covered by Munzi and Smeeding (2006). As mentioned in the UNICEF reports (2005, 2007), some 50 million children in the developed countries of the OECD live below the poverty line. Despite the fact that the national income in most developed countries has doubled and sometimes even more than doubled since 1950, an important percentage of children live in families so poor that their health and development are threatened. Even larger is the percentage of children living in a state of relative poverty: although their basic needs are met, these children are deprived of activities and services that are considered standard for most children their age.

¹¹ Based on EU-SILC 2006 data (2005 incomes), the monetary poverty line for Greece was €5,910 (annual income) for a single-member household and €12,411 for households with two adults and two children.

¹² For a presentation of the dimensions of poverty for the total population, see Bank of Greece, *Annual Report 2006*, Box IV.2, pp. 140-145.

Table 1
Child poverty in EU countries
(Children aged 0-15 living in poor households as a percentage of total children of the same age group)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	18	15	15	14	12	13	:	16b	15	15	15
Belgium	15	14	13	12	11	12	:	16b	18p	18	15
Denmark	:	6	:	7	:	7	:	9b	9	10	10
Finland	5	5	5	7	6	9b	10	10	10b	10	9
France	16	16	16	17	18	16b	16	15	14b	14	13
Germany	15	15	13	13	13	14	:	:	:	11b	12
Greece	19	18	17	17	19	18	:	21b	20	19	22
Ireland	27	25	23	21	22	26	:	20b	22	22	21
Italy	24	23	21	22	25	25	:	:	25b	23	24
Luxembourg	14	16	20	19	18	18	:	15b	18	20	19
Netherlands	14	13	14	14	17p	17p	17p	18p	:	16b	14
Portugal	23	25	26	26	26	27	:	:	24b	23	20p
Spain	23	26	24	25	25	26	21b	19	24b	24	24
Sweden	:	7	:	7	:	7	10b	:	11b	8	14
United Kingdom	25	27	29	29	27b	23	23	22	:	23b	24
New Member States	:	:	:	:	:	19s	20s	20s	22s	24b	23
EU-15	19s	19s	19s	19s	20s	20s	:	19s	20s	18b	18
EU-25	:	:	19s	19s	20s	20s	:	19s	20s	19b	19

Note: Dates indicate the years when the survey was conducted, referring to the incomes of the previous year.
s Eurostat estimates; **:** not available; **b** break in the series; **p** provisional data.
Source: Eurostat (ECHP, EU-SILC).

points higher than the poverty rate for the total population.

However, as shown in Chart 1, Greece's child poverty rate (among children up to age 15) shifted upward after 2002, and in 2006 jumped to 22%, rising by three percentage points in just one year (from 19% in 2005).¹³ Greece now has one of the highest child poverty rates in the EU-15, surpassed only by Italy, Spain and the United Kingdom.¹⁴ The increase in the child poverty rate, from 20% in 2005 to 23% in 2006, among children aged up to 17 was similar. On the basis of the child poverty rates for 2006, Greece has some 380,000 children aged up to 15 (out of a total 1.71 million children in this age group) or 450,000 children aged up to 17 living below the poverty line. It should be noted that in the EU as a whole there has been no clear trend in the dynamics of child poverty over the past decade, based on the distribution of disposable monetary household income.¹⁵

Similar conclusions can also be drawn on the basis of the relative gap or "depth" of child poverty, which measures the distance separating the poor from the poverty line. The value of this indicator, when calculated for children aged up to 15, was 26% in Greece in 2006 (2005 incomes),¹⁶ compared with 22% for EU-15 (EU-25: 23%).

13 Child poverty declined slightly in most of the EU from 2005 to 2006. Apart from Greece, the only other exceptions in the EU-15 were: the United Kingdom, Italy and Germany, where child poverty increased by one percentage point, and Sweden, where child poverty climbed to 14% in 2006, from 8% in 2005. In the newer EU countries, child poverty increased only in Latvia and Hungary (to 25% in 2006, from 20% in 2005).

14 Among the twelve new EU countries, higher child poverty rates were recorded for Latvia (25%), Lithuania (24%), Hungary (25%), Poland (26%) and Romania (23%).

15 Greece's relative position appears to be even worse on the basis of the *absolute* child poverty concept, at least according to Munzi and Smeeding (2006) whose analysis shows Greece's absolute poverty rate among children up to age 17, at 31.6%, to be the highest in the eleven developed countries covered by their study (with an average of 12.5%). As a definition of absolute poverty, the authors adopted the official US poverty line for 2000, adjusting it for price levels and household size.

16 This means that half of the poor households with children aged up to 15 in Greece have an income equal to 74%-100% of the poverty line, while the income of the other half is below the 74% mark of this line.

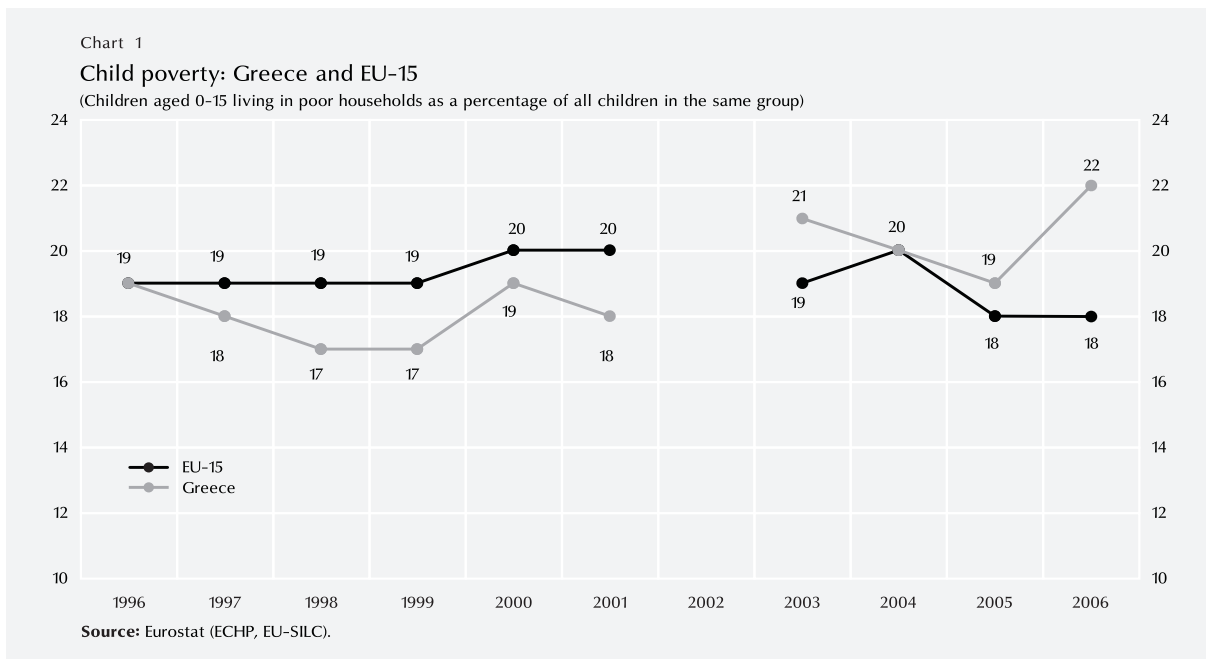
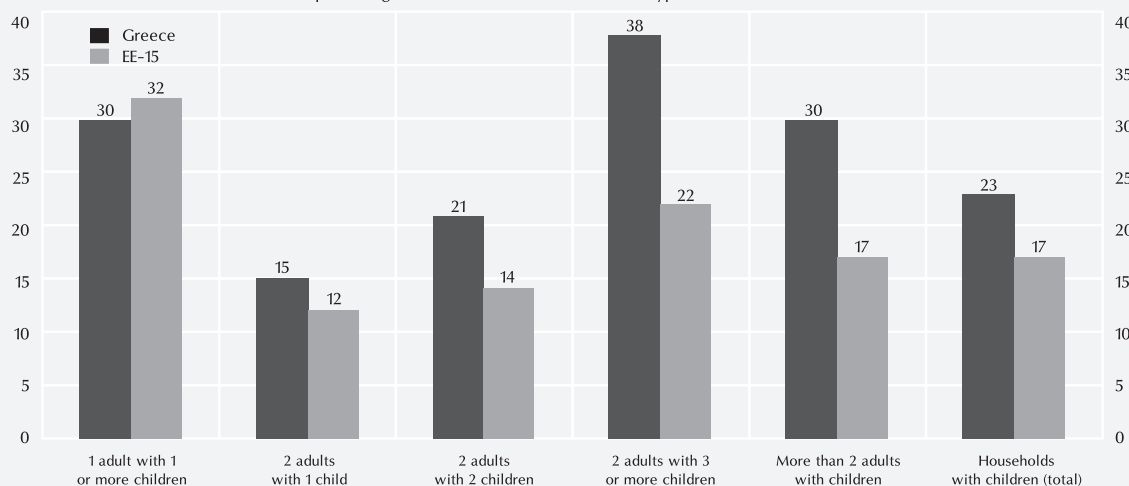


Chart 2

Poverty rates of households with children by household type: Greece and EU-15, 2006

(Poor households with children as a percentage of total households of the same type)



Source: Eurostat (ECHIP, EU-SILC).

Throughout the last decade, this indicator has been considerably higher in Greece, compared with the EU average.¹⁷

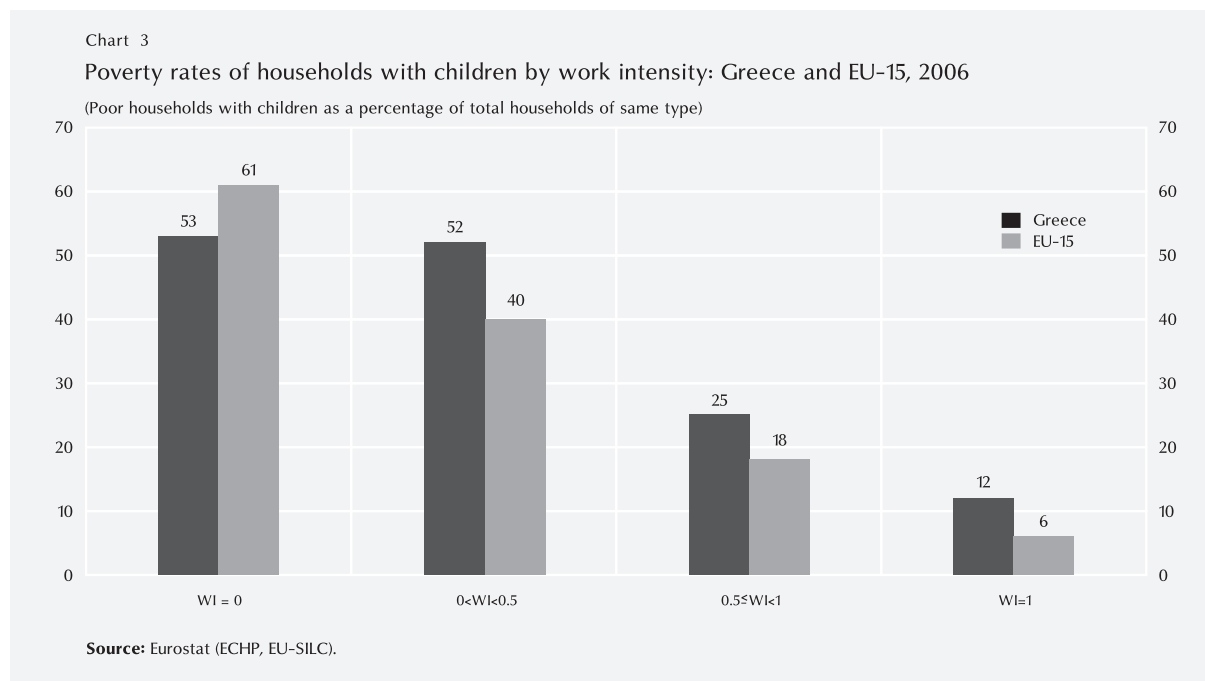
It is appropriate at this stage to introduce two important determinants of child poverty, both in Greece and the EU as a whole, on the basis of the same statistical data. These parameters are household composition and work intensity, and the role they play in shaping the dimensions of child poverty. Insofar as household composition is concerned (see also Chart 2) and based on the latest available data (for 2006), the poverty risk faced by single-parent households with dependent children is almost double the risk faced by total households in Greece and, even more so, in the EU as a whole. Single-parent-hood has been correlated with poverty rates of 30% in Greece, compared with 32% in the EU as a whole.¹⁸ In households with two adults present, the dimensions of child poverty increase

dramatically in relation to the number of children. In fact, the poverty rate nearly doubles when the number of dependent children rises from two (Greece: 21%, EU-15: 14%, EU-25: 14%) to three or more (Greece: 38%, EU-15: 22%, EU-25: 24%).

Finally, as shown in Chart 3, there is a definite positive correlation between work intensity in households with dependent children and the avoidance of child poverty. Indeed, the poverty rates drop significantly as the number of working

¹⁷ On the basis of the latest available data for the EU-15, only Italy and Spain have a child poverty gap index higher than Greece's. The index value recorded for Greece in 2006 (26%) was the same as the average recorded for the 12 new EU entrants.

¹⁸ The percentage of total households with children accounted for by lone-parent households is much smaller in Greece (4%) than in the rest of the EU (9%), especially the northern European countries (Kikilias, 2007). As also noted in the latest European Commission report (European Commission, 2008), 13% of all children in the EU live in lone-parent households, one out of three of which is at risk for poverty.



household members increases and the work intensity index¹⁹ increases from 0 to 0.5, and subsequently to 1. Characteristically, in households with no working members aged 15-64 years, more than half the children live in poverty (Greece: 53%, compared with 61% for the EU-15). When the ratio of working-to-total members of a household with dependent children has a positive value of up to 0.5, the poverty rate drops negligibly for Greece (52%), but substantially for the EU (EU-15: 40%, EU-25: 42%). These rates drop further (to 25% for Greece and 18% for EU-15) when the working-to-total members of a household with dependent children take a value of 0.5 to 1. It should be noted that, as shown by the intertemporal data analysis, poverty increases substantially in Greece after 2002 in households with dependent children and a relatively lower work intensity. In other words, there is a definite negative correlation between a household's work intensity and its child poverty rate. In fact, the

work intensity of household members in Greece is becoming an increasingly decisive factor in averting child poverty.²⁰

4. The characteristics of child poverty in Greece

Until recently, child poverty had not been a problem of serious dimensions in Greece and was

¹⁹ Work intensity is defined as the ratio of working members in a household to its total working-age members (aged 15-64 years). Regardless of age, students do not count as household members.

²⁰ As pointed out in the latest European Commission report on child poverty (European Commission, 2008), Greece belongs to a group of EU countries (together with Spain, Italy, Portugal, Lithuania, Latvia and Poland) characterised by comparatively higher child poverty rates, but where only a small percentage of poor children lives in jobless households and, on the contrary, the poverty rates are very high among working households. The determinants of poverty in working households in these countries are: low work intensity (e.g. the small percentage of households with two or more working members) in conjunction with low worker incomes (e.g. high poverty rates for households with two working members).

therefore not a major issue for social policy. This perhaps also explains the limited interest of researchers in the question. Only a few studies have focused specifically on child poverty, while others have examined the characteristics of the poor and the determinants of poverty for the total population and simply linked them with the presence or the number of children in the household without any further investigation. This section presents the characteristics of child poverty in Greece and identifies the groups at high risk, using microdata from the last HBS 2004/05. As indicated earlier, this source of data was chosen because it enables us to take both the consumption expenditure and the income of households into account, and to make further distinctions between monetary and imputed items.²¹

4.1 The dimensions of child poverty: alternative estimates

Table 2 presents the dimensions of child poverty in Greece for alternative age groups, using four different variables/distributions: (i) the distribution of total expenditure (including imputed expenditure, such as imputed rent, own consumption, etc.), (ii) the distribution of monetary expenditure (without imputed items); (iii) the distribution of households' total disposable monetary income (including imputed items); and (iv) the distribution of households' total disposable monetary income (without imputed items). As shown, in 2004, 19.8% or 18.3% of Greece's population was living below the poverty line (60% of the median) on the basis of the distribution of disposable monetary income or monetary expenditure, respectively. In other words, over two million people in Greece were living in a state of poverty. These rates fall by 2.3 to 3.5 per-

centage points or 300,000-400,000 people, when the imputed items are included in the respective income and consumption expenditure definitions.²²

As for the dimensions of child poverty, based on the distributions of total and monetary income, 20%-21% of children up to age 16 live below the poverty line.²³ These child poverty rates, which are higher than the respective rates for the total population, translate, in absolute numbers, into some 365,000-390,000 children living in a state of poverty. It is also worth noting that the imputed components of income and consumption considerably reduce poverty in the total population (see "total population" figures in Table 2), but bring about a small reduction in child poverty, only on the basis of the distribution of income (for instance, child poverty among children up to age 16 falls from 21.0% on the basis of monetary income to 19.9% on the basis of total income). This can be attributed mainly to the relatively lower contribution of imputed income (such as imputed rent owing to owner-occupation) to the income and expenditure of younger couples with

21 Most empirical studies use consumption expenditure data, when available, rather than income data, as the former are considered to provide a closer assessment of households' "permanent" or long-term income, owing to the existence of a consumption smoothing mechanism (Zeldes, 1989, Atkinson, 1991, Sen, 1992, Chaudhuri and Ravallion, 1994, Triest, 1998, Meyer and Sullivan, 2003). In addition, the NSSG considers the HBS consumption expenditure data to be more reliable than income data.

22 The poverty rate for the total population based on the disposable monetary income distribution of the HBS 2004/05 (19.8%) is practically the same as the corresponding rate (19.6%, or, rounded upward, 20%) obtained based on the EU-SILC 2005 (2004 incomes). See NSSG Press Release, 18.1.2007 and Bank of Greece, *Annual Report 2006*, Box IV.2, pp. 140-45.

23 Using the EU-SILC data for 2003, Bouzas (2006) estimates that 23 out of 100 children aged up to 18 live in a state of poverty and found the child poverty rate to be on an upward trend, rising from 19% in 1995 to 21% in 2000 and 23.5% in 2003.

Table 2
 Child poverty in Greece on the basis of alternative income and expenditure distributions
 (Children living in poor households as a percentage of all children in the same age group)

Age groups	Expenditure distribution		Income distribution	
	Total	Excluding imputed items	Total	Excluding imputed items
0-6 years	12.5	11.1	20.1	20.3
0-14 years	12.6	12.0	19.2	20.8
0-16 years	11.9	11.2	19.9	21.0
0-18 years	13.2	12.4	20.4	21.9
Total population	16.0	18.3	16.3	19.8

Source: Calculations based on data from the Household Budget Survey 2004/05, NSSG.

children, compared with the rest of the population. Furthermore, a large part of imputed income is increasingly provided to high-ranking staff who are usually not at the lower end of the income distribution.²⁴

What is perhaps most worthy of note from the figures of Table 2 is that the child poverty rates, based on the distribution of total consumption expenditure (11.9% for children up to age 16) or monetary consumption expenditure (11.2%) are much lower than the rates based on the income distributions.²⁵ The fact that this remains true for children across all ages validates our use of alternative distributions for the purpose of analysing child poverty in Greece. A possible explanation why child poverty is considerably lower on the basis of the distribution of expenditure than on the basis of that of income, according to economic theory, is the presence of a smoothing mechanism for short-term fluctuations in income incorporated into the distribution of expenditure. In other words, while a household's income changes rather easily, its con-

sumption expenditure tends to remain stable over a longer period of time or at least changes at a slower pace. Thus, during an economic downturn, households are often able to avoid poverty by maintaining their consumption expenditure at the previously higher levels, in relation to their declining income. It is, therefore, reasonable to assume that, with the easier

²⁴ This may also explain why child poverty rates are slightly higher on the basis of total expenditure than on the basis of monetary expenditure. The inclusion of imputed expenditure in total household expenditure raises the poverty line for the total population and, subsequently, increases the number of poor young couples with children who usually do not have such imputed expenditure.

²⁵ A similar observation can be made about the results obtained for the relative gap or "depth" index of child poverty. Based on the distributions of total income and total expenditure, the average distance from the poverty line recorded for children up to age 16 living in poor households as a proportion of that poverty line was 22.9% and 17.2%, respectively. Considerable differences in child poverty rates, depending on whether income and expenditure distributions were used, were also reported, although to a lesser extent, by several studies for other countries (Cutler and Katz, 1991, 1992, Sabelhaus and Groen, 2000, Meyer and Sullivan, 2003, Johnson *et al.*, 2005, Munzi and Smeeding, 2006). Some studies have also recorded different poverty rates, depending on the distribution used (income, expenditure), for other population groups as well, such as the elderly, lone-parent households, etc. (Hagenaars *et al.*, 1994, Hurd and Rohwedder, 2006).

access to bank borrowing,²⁶ Greek households have in recent years been able to maintain a high consumption level and avoid situations of poverty to a far greater extent than they would have been able to solely on the basis of their income. This sort of tactic seems to have been adopted even more so by households with children, and is probably also attributable to the fact that the family institution remains very strong in Greece.

The family institution, it would appear, remains largely supportive of younger couples with children and often provides them with substantial monetary and non-monetary assistance (offering them a place to stay or paying for such as expenses as rent, nursery or private school fees, groceries, etc.).²⁷ Secondly, young couples with children are not usually willing to see their children's and families' living standards fall as a result of their own low income, and therefore look for ways (by borrowing or selling some asset or real estate, etc.) to keep their expenditure levels high, thereby sparing their children from deprivation. This interpretation is further corroborated by the rapid expansion of consumer credit and total household borrowing, which, according to Bank of Greece data, has increased at a rate of over 30% in the past five years. In addition, Bank of Greece sample surveys of household borrowing show that the loan burden of households belonging to the lower income bracket (up to €7,500) increased noticeably over the period 2002-05 (median outstanding debt-to-income ratio, 2005: 61.2%, 2002: 25.7%) and significantly exceeds the total household average (33.5%). During the same period, the average outstanding debt more than doubled for households belonging to the lowest income bracket and increased by a significant 52.9% in

the second lowest one (€7,501 to €15,000), while the increase for total households was 26.4%.²⁸ Nearly all of Greece's poor households with children seem to belong to the two lowest income brackets, as e.g. the poverty line in 2005 for a couple with two dependent children was €12,441. The above figures also imply that these poor households have considerable access to bank lending.²⁹

26 This was due to increased competition within the banking system as a result of the market's deregulation, the ensuing and continuous decline in interest rates, but also the financial stability that prevailed once Greece joined the EU and adopted the single currency. Furthermore, the deregulation of the financial system over the past decade in Greece has most probably contributed to the drop in the household saving rate, as the removal of administrative constraints in the capital markets enhanced household borrowing and, thus, the propensity for household to consume. Indeed, according to the latest revision of the National Accounts data, household saving (as a percentage of household disposable income) was only slightly positive over the period 2000-06.

27 It is fair to assume that benefits of this type are not adequately recorded in the HBS. According to Hondroyannis (2002), the fact that population ageing, contrary to the predictions of standard life cycle theory, has a positive impact on private saving in Greece, can be attributed to the strength of the family institution. As the author observes, the elderly consider it their duty, not only to financially support their children even after the latter have come of age, but also to leave them some form of inheritance.

28 See Bank of Greece Press Release, 24 March 2006, entitled "Borrowing and financial pressure on households: a household survey". In 2005, the Bank of Greece repeated the household sample survey it had first conducted in 2002 in order to investigate the degree of Greek household indebtedness, especially the extent of their borrowing in relation to their income and wealth, as well as the other important traits of their borrowing behaviour. The same survey was repeated in the last quarter of 2007 and its results were released on 19 May 2008.

29 The similarity of survey sample findings for other countries are attributed to factors related to household borrowing, asset liquidation and increased consumption in younger age groups associated with positive expectations concerning higher future income levels. Furthermore, some of these studies, by comparing income figures for poor households with relevant data from administrative sources, conclude that some of these households' incomes are underestimated (social benefits, etc.). According to certain studies, this underestimation accounts for part of the higher child poverty rates based on the distribution of income, compared with the distribution of consumption expenditure (Cutler and Katz, 1991, 1992, Sabelhaus and Groen, 2000, Meyer and Sullivan, 2003). A similar reason could possibly also explain part of the observed difference for Greece.

4.2 Groups at high risk for child poverty

As shown by the previous analysis, the dimensions of child poverty do not vary significantly in relation to the definition of child age and whether or not imputed items are included in the distributions used. However, a significant difference was recorded depending on whether the income or the consumption expenditure variable was used. The same distributions were then used to perform a comparative analysis of child poverty in combination with the characteristics of the household and its members. Such an analysis enables the researcher to identify which groups are at a high risk for child poverty and, by extension, to make a first estimate of its determinants.

For the purpose of this comparative analysis, Table 3 provides the relative risk values or child poverty concentrations for certain population groups, selected on the basis of the geographic, demographic, occupational and other characteristics of the households and their members. These index values were obtained by dividing the child poverty rate for each population group by the respective rate for total households with children aged up to 16. High index values, therefore, denote a comparatively high concentration and high risk of child poverty, while the index value for total households with children has a value of 1.00 (see "Total" figures given in the last line of Table 3).³⁰

As shown by the figures, rural households³¹ with children as well as multi-member households are at a particularly high risk for child poverty, when it comes to the households' place of residence and composition. Child poverty takes on particularly dramatic proportions in single-parent house-

holds, where the concentration of child poverty more than quadruples relative to total households with children, on the basis of both expenditure distributions. From the analysis of the demographic and other characteristics of the head of the household, the households whose head is an economic migrant³² or aged up to 34³³ are groups at high risk for child poverty. A strong negative correlation was also found to exist between the risk of child poverty and the educational level of the head of the household – the lower the educational level, the higher the values of the relative poverty risk index.³⁴ Similar results are obtained when the child poverty risk is correlated with the educational level not only of the head of the household, but also of the other parent in the household. In this case *as well*, the relative child poverty risk falls dramatically as the educational level of one of the two parents increases. As regards the occupational status of

³⁰ By multiplying the relative concentration indices of child poverty by the poverty rates of Table 2 for children aged 0-16, one obtains child poverty rates which, depending on the distribution used, correspond to one of the groups of Table 3.

³¹ A breakdown of the child poverty rates by geographical region shows a high concentration of poor children in Eastern Macedonia and Thrace, Thessaly, Western Greece, the Peloponnese and the Northern Aegean, which basically all correspond to Greece's more rural regions.

³² Mainly from Eastern or South-Eastern Europe (Albania, Bulgaria, Romania, Poland, the former Soviet Union, etc.), but also from Asia or Africa. With regard to the dimensions of poverty in migrant households, the study of Zografakis and Mitrakos (2006) came up with similar results, i.e. double the "normal" poverty rates.

³³ A more detailed analysis shows that child poverty rates decline in households headed by someone in the 35-44 years age group and again increase slightly for households headed by someone in the older age groups. In other words, there seems to be an inverse bell-shaped relationship ("U") between the age of the household head and the child poverty rate.

³⁴ E.g., households whose head has not finished primary school face child poverty rates in the order of 33%-38%, depending on which distribution is used. The rates are even higher for households whose head has not received any schooling.



Table 3
Groups facing high risk of child poverty: indicators of relative risk or child poverty concentration
(Relative risk for total population: 1.00)

Classification criteria	Expenditure distribution		Income distribution	
	Total	Excluding imputed items	Total	Excluding imputed items
Type of household				
Rural	1.99	2.41	1.67	1.83
Households with 5 members	1.16	1.05	1.37	1.24
Households with 6 members or more	2.30	2.42	1.65	1.60
Single-parent households	4.53	4.20	2.96	2.23
Demographic and other characteristics of the household head				
Economic migrant	3.31	2.35	2.20	1.37
Female	0.96	1.15	1.32	1.54
Aged less than 25 years	4.18	4.45	2.50	2.36
Aged 25-34	1.53	1.51	1.43	1.47
No formal education	5.65	6.01	3.79	3.09
Primary schooling not completed	3.17	2.69	1.68	2.27
Primary schooling completed	2.00	2.17	1.69	1.82
Lower secondary education completed	1.98	1.76	1.76	1.57
Occupational characteristics of the household head				
Uninsured	4.51	4.31	2.67	3.13
Insured with IKA	1.48	1.31	1.26	1.09
Insured with OGA (farmers' fund)	2.22	2.86	2.03	2.26
Unemployed	1.63	1.35	1.69	1.75
Inactive	1.98	3.20	2.78	3.04
Unable to work	4.32	4.60	4.38	4.17
Part-time employment	2.25	2.21	1.97	1.73
Fixed-term employment contract or occasional work	2.02	1.91	2.03	1.86
Farmer, livestock breeder, fisherman	1.88	2.47	2.22	2.55
Technician and related occupations	1.88	1.81	1.61	1.33
Unskilled worker	2.52	1.78	2.01	1.58
Employed in primary sector	2.09	2.68	2.19	2.49
Employed in construction	2.16	1.94	1.94	1.58
Self-employed	1.23	1.49	1.66	1.97
Total	1.00	1.00	1.00	1.00

Source: Calculations based on data from the Household Budget Survey 2004/05, NSSG.

the household head, the relative child poverty risk is particularly high among those who are either outside the workforce or unemployed. When the head of the household is employed, this risk increases drastically among those employed in the primary sector (or covered by the Farmers' Insurance Fund-OGA) and in manufacturing, among unskilled and manual workers, as well as among those in occasional employment, working under a fixed-term contract or under contract employment, the uninsured or the part-time employed.³⁵

5. The determinants of child poverty

Several traits of the groups at high risk for child poverty presented in the descriptive analysis above are obviously strongly correlated. For instance, many couples with children living in rural areas are usually employed in the primary sector, insured by OGA and have a relatively low educational level. Therefore, it is important, in terms of the structure of child poverty, to determine which factors significantly affect the risk of a child falling below the poverty line, *ceteris paribus*. In other words, what are the real factors that drive households with children into a state of relative poverty? This question can be answered using a multivariate logit econometric model. This model is based on the assumption that the risk of an individual falling below the poverty line is essentially random and depends on the concurrent impact of a number of socio-economic and demographic factors. The results of the relevant estimates are presented in Table 4.

The reference group used to estimate our model are households consisting of a couple with two

children up to age 18, living in a semi-urban area, and whose head is aged between 45-54 years, a private sector white-collar worker and has finished lower secondary school. The estimates presented in Table 4 are the odds ratios that measure the marginal impact of the change of one of the reference group's characteristics, *ceteris paribus*. Specifically, the numerator of the odds ratio is obtained by calculating the quotient of the odds of a child with specific characteristics (e.g. all of the reference group characteristics except one) falling below the poverty line divided by the odds of the child not being poor. The denominator is the respective odds quotient for the reference group. An odds ratio greater (smaller) than one suggests that, *ceteris paribus*, a change in the specific characteristic of the reference group leads to an increase (reduction) in the child poverty odds.

Generally speaking, the results of Table 4 do not differ significantly from those of Table 3. From the first part of the table, it arises that, all other factors remaining the same, the child poverty odds³⁶ are negatively correlated with the degree of urbanity of the household's place of residence. On the basis of the consumption expenditure distribution, the odds of a child aged up to 16 and

³⁵ The findings of the descriptive analysis of Bouzas (2006), based on disposable income data from the EU-SILC for 2003 are similar. According to the author, the determinants of child poverty are the household head's either very young or advanced age, status as unemployed, retired or economically inactive, whereas the holding of a job by the household head is the best way to avoid child poverty. However, the author's finding that the child poverty rate is positively correlated with the children's age, i.e. that children as they grow older have greater needs that are not matched by a commensurate increase in family income, was not corroborated by the present study (see figures of Table 2).

³⁶ Indeed, as also shown by the descriptive analysis, the lower the degree of urbanisation of the household's place of residence, the greater the increase in the child poverty rate, which, in rural areas, rises as high as 33.2% and 23.7%, depending on whether the expenditure or the income distribution is used.



Table 4

Logit estimates of child poverty risk

(Probability of a child aged 0-15 in a given household group being poor as a ratio of the respective probability for the reference group)

Factor	Expenditure distribution		Income distribution	
	Total	Excluding imputed items	Total	Excluding imputed items
Location and type of residence				
Urban areas	0.87	0.95	0.69**	0.83*
Rural areas	2.32**	2.47**	1.43**	1.47**
Rented housing	2.04**	0.63*	3.96**	1.33**
Demographic characteristics				
Head of household is an economic migrant	4.33**	4.34**	1.94**	1.29*
Number of children aged 0-16	1.48**	1.79**	1.22**	1.27**
Couple with one child aged 0-18	0.86	1.20	0.74*	0.62**
Couple with three or more children aged 0-18	1.25*	0.88	1.86**	1.18*
Single-parent households	0.81	1.68	2.36**	1.58*
Female head of household	0.50**	0.53*	0.30**	0.70*
Head of household aged up to 34	0.98	1.18*	1.16*	1.77**
Head of household aged 35-44	0.59**	0.65**	1.15*	1.36**
Head of household aged 55 or over	0.48**	0.45**	0.33**	0.40**
Work type and intensity				
Head of household is employed	0.28**	0.21**	0.07**	0.21**
Wife is employed	0.43**	0.54**	0.18**	0.18**
Number of other members with employment	0.71**	0.78**	0.42**	0.37**
Head of household works part-time	0.97	0.98	2.03**	1.35*
Head of household works under fixed-term or contract employment or occasionally	1.24*	1.20	2.27**	2.21**
Occupational characteristics				
None of the members is insured	3.21**	2.96**	1.56*	2.66**
Non-agricultural employment	0.17**	0.28**	1.29	0.91
Non-agricultural self-employment	1.51*	1.71**	4.71**	4.27**
Agricultural employment	2.29**	2.97**	7.75**	5.96**
Blue-collar worker in the private sector	1.87**	2.34**	2.64**	1.53**
Blue-collar worker in the public sector	1.66*	1.76*	0.81	0.53**
White-collar worker in the public sector	0.80	0.58*	0.37**	0.27**
Unemployed	0.83	0.70	0.56	1.32
Educational level				
Tertiary education	0.17**	0.25**	0.20**	0.19**
Secondary education	0.54**	0.65**	0.58**	0.69**
Primary education	1.14	1.48**	1.01	1.56**
Primary education not completed	4.05**	3.74**	2.78**	7.71**
Constant	0.18**	0.13**	1.38	0.74
Statistics				
-2 Log likelihood	3,975.3	3,926.6	4,801.6	5,026.8
Nagelkerke R ²	0.358	0.329	0.444	0.430
Percentage of successful classification	88.1	89.1	85.0	84.0

Reference group: Residence: semi-urban areas; demographic characteristics: couple with two children aged 0-18; age group: 45-54 years; occupational characteristics: white-collar worker in the private sector; educational level: secondary education completed.

* significance at 5% level.

** significance at 1% level.

Source: Calculations based on data from the Household Budget Survey 2004/05 (NSSG).

living in a rural area falling below the poverty line are more than double the odds for the reference group (semi-urban areas). Very strong child poverty odds were also found for households living in rented housing, as opposed to those in owner-occupation, particularly when the analysis takes into account the imputed elements of income and expenditure, which in this case are mainly imputed rent.

In relation to household composition and to the demographic characteristics of household members, the following arise from the second part of the table: The households of economic migrants face heightened odds of child poverty, compared with non-migrant households. What is more, these odds are much higher on the basis of the distribution of consumption expenditure than on the basis of the distribution of income, as migrant households are more inclined to save rather than consume, driven by the need to help their relatives back home and accumulate some wealth.³⁷ A strong positive correlation was also recorded between child poverty odds and the number of children in the household.³⁸ For couples with children, based on most indications and the distribution of income, the child poverty odds increase in relation to the number of children.³⁹ The case of single-parent households is similar. They face increased odds of child poverty on the basis of the distribution of income. This finding, however, is not corroborated by the distribution of consumption expenditure: in fact, the opposite seems to happen in Greece of what is observed in most other countries, where children living with only one parent nearly always face increased odds of child poverty.⁴⁰ This more favourable situation in Greece may be attributable to the relatively small number of single-parent households and to the

decisive support provided by the extended family (grandparents, other relatives), mainly in terms of consumption expenditure (Kikilias *et al.*, 2007, Mitrakos and Tsakoglou, 2006). With regard to the household's demographic characteristics, the present analysis also confirms the negative correlation between child poverty (mainly on the basis of the income distribution) and the age of the household head. The odds of child poverty are smaller when the head of the household is female or belongs to an older age group.

In the two following sections of Table 4, the odds of child poverty are estimated on the basis of the intensity and the characteristics of the household members' occupational status. As shown by the figures, the key to averting child poverty lies in the increased degree of household member employ-

³⁷ See Bank of Greece, *Annual Report 2006*, Box III.3, pp. 115-18.

³⁸ Similarly, a strong positive correlation was found to exist between the odds of child poverty and the size of the household, which was used as an alternative interpreting variable to the number of children aged up to 16. On the basis of the total income distribution, child poverty increases from 10.1% for two-member households to 27.3% for five-member ones and 32.7% for households numbering 6 or more.

³⁹ A similar analysis by Mitrakos and Tsakoglou (2003) found that the poverty risk for couples with children increases considerably for those with three children or more aged up to 18. The same conclusion was drawn by Fotakis (2006) for 22 countries of the EU-25. However, an earlier study by Mitrakos *et al.* (2001) showed this finding not to be robust, as it varied depending on the poverty analysis variable chosen (income, expenditure, "permanent" income). Zografakis and Mitrakos (2006) conclude that the existence of children in a household substantially increases the poverty risk facing it. This conclusion holds both for migrant and non-migrant households, as well as for the total population.

⁴⁰ As shown by the results of the descriptive analysis, presented in Table 3, child poverty takes on dramatic proportions in lone-parent households, where the relative risk indicators of child poverty more than quadruple, in comparison with total households with children, on the basis of both expenditure distributions. However, the results of the multivariate analysis show that the specific increase in these indicators cannot be attributed with certainty to single-parenthood and may be related to other characteristics, such as the household head's gender (usually female), level of education or young age.

ment. More specifically, the odds of child poverty fall significantly when the head of the household is employed, but also when the spouse or other household members enter the labour market. In other words, the odds of child poverty drop significantly as the number of working household members increases. With regard to the type of labour contract held by the head of the household, it is found that occasional employment, fixed-term employment, contract employment and also, but to a lesser extent, part-time employment may be associated with higher odds of child poverty. This finding is found to be valid mainly on the basis of the distribution of income, and was not always corroborated by the results using the distribution of expenditure. Once again, this can probably be attributed to the decisive supportiveness of the Greek family and the extended family network, which help younger couples with their consumer expenditure. This is also probably why, in contrast with the results of the descriptive analysis of Table 3, no statistically significant correlation was found to exist between the odds of child poverty and the unemployed status of the head of household.⁴¹ As regards the occupational characteristics of the head of household, households were found to be at a higher risk for child poverty (in comparison with the reference group households, which were defined as headed by a private sector white-collar worker), when they were headed by manual workers (blue-collar workers, farmers) or someone self-employed. The child poverty risk was, on the other hand, substantially lower among households headed by employers and civil servants. The absence of work specialisation appears to go hand in hand with a high risk of child poverty, as does uninsured work.⁴²

As shown by the last part of Table 4, the risk of child poverty falls significantly as the educational

level of the household head improves. As expected, households with children, headed by a graduate with tertiary level or doctoral studies, are far less likely to experience child poverty than the corresponding households headed by a lower secondary school graduate (reference group). The same can be said, though to a lesser extent, for households headed by an upper secondary school graduate. In contrast, households with children headed by someone who has not completed primary schooling face a very high risk of finding themselves below the poverty line, even when the effect of various other factors is isolated.

6. Summary, conclusions and policy proposals

The objectives of this study were (i) to record the real dimensions and dynamics of child poverty in recent years in the EU, and (ii) to investigate the characteristics of children living in a state of poverty and identify the factors underlying the

⁴¹ Indeed, the descriptive analysis and the figures of Table 3 show child poverty to be directly linked with the household head's labour market status. Specifically, child poverty increases considerably if the head of household is unemployed, unable to work or belongs to the economically inactive. The relative risk index for child poverty is very high when the household head is unemployed (ranging from 1.35 to 1.75, depending on the distribution), out of the workforce (1.98-3.20) or unable to work (4.17-4.60).

⁴² Instead of the occupational characteristics presented in this paragraph, our study examined the type of insurance fund household members were members of, as an alternative explanatory variable. The results showed that, isolating the effect of all other factors, a higher risk of child poverty, compared with the reference households (households whose members are insured not in the same, but in more than one insurance fund) is recorded for households whose members are either uninsured or insured with OGA, the Social Insurance Fund (IKA) and probably also the Fund for Self-Employed Artisans and Craftsmen (TEBE). In contrast, especially on the basis of the distribution of consumption expenditure, this risk is smaller for those who are insured with other funds (banks, engineers, public utilities, etc.).

apparent increase in child poverty in Greece. To this end, we used both data released by Eurostat for the period 1996-2006 and primary microdata from the latest HBS (2004/05). This second source enabled us to use both the distribution of income and that of expenditure alternatively, as well as multiple criteria in order to identify the groups at high risk for child poverty on the basis of geographical, demographic, occupational and other socio-economic characteristics of the households and their members. Furthermore, by estimating econometric models (logit models), we were able to determine the factors that affect the odds of a child falling below the poverty line, as well as the contribution of each factor to the shaping of child poverty. The findings of this analysis should prove useful for the formulation of social policy measures aimed at tackling the problem.

6.1 Conclusions

In spite of the efforts by major international organisations (UNICEF, the World Bank, the United Nations, the European Commission, etc.) to broaden the concept and content of child poverty, the economic dimension of the term is the one most widely referred to. Simple alternative statistical indicators of poverty are therefore usually estimated, based on economic parameters. Such indicators include the percentage of children whose financial resources (as determined by the household they belong to) are below a specific, often arbitrarily set, level, the gap or depth of poverty, etc. By analysing the statistical poverty indicators published by Eurostat and based on the distribution of households' disposable monetary income derived from the EU-SILC survey, our study was able to ascertain that the dimensions of child poverty in Greece are

probably widening, as the rates of child poverty have shifted upward since 2002. Furthermore, contrary to what has happened in most other EU countries, the percentage of children up to age 15 living below the poverty line increased by three percentage points to 22% in 2006, from 19% in 2005. In absolute numbers, this percentage translates into some 380,000 children aged up to 15 or 450,000 children up to age 17 living below the line of relative poverty in Greece. This rate is currently among the highest in the EU-15, surpassed only by Italy, Spain and the United Kingdom.

Two other important conclusions can be drawn from the analysis of Eurostat data. First, there appears to be a clear negative relationship in most EU countries between household work intensity and the child poverty rate, a relationship which has strengthened in Greece since 2002. Second, the dimensions of child poverty are affected by the type and the composition of the household. For instance, in nearly all of the EU countries, children from single-parent households are at a much higher poverty risk than the total population, while in the case of two-parent households, the poverty risk increases substantially in relation to the number of children. In fact, quite characteristically, the child poverty rates nearly double when the number of children increases from two to three or more. Clearly, these are the groups at greater risk for child poverty which should be targeted by social policy measures.

It is now clear that any in-depth analysis of child poverty must be based on detailed data that allow the combination of multiple criteria, at the level of the household and its members, for the purpose

of identifying specific underlying factors. The microdata from the latest HBS, used in the present study to investigate child poverty in Greece, had the advantage of enabling both the identification of poverty-inducing factors and the use of alternative variables and definitions. In fact, our investigation found that the percentage of children living below the relative poverty line differs considerably depending on whether the distribution of total or monetary consumption expenditure is used, rather than the one of total or monetary income. The fact that the dimensions of child poverty are considerably smaller based on the distribution of consumption expenditure (rather than income) can perhaps be explained by the households' effort to avert a drop in their children's standard of living during economic downturns or periods of low income. This effort is very often supported by the *extended* family, in line with the widespread social belief that "a better life must be secured for the kids", and has been enhanced by the greater sensitivity in recent years of policy makers to matters concerning the younger generations (social security, abolition of inheritance taxes, etc.).⁴³

It is therefore reasonable to assume that, in recent years, bank borrowing has enabled Greek households to maintain a higher level of consumption and to avert a state of poverty far more than they would have been able to solely on the basis of their income. This type of tactic seems to have been adopted even more so by households with children, as young parents are not usually willing to see their children's and family's standard of living decline as a result of their low income. Various means are resorted to (borrowing, asset liquidation, etc.) to keep their expenditure level high and, at the same time,

avert situations of poverty for their children. Besides, as also suggested by economic theory, the distribution of expenditure incorporates a mechanism that smoothes out short-term changes in income. This mechanism has obviously been facilitated in recent years by factors associated with the easier access of households to borrowing and the gradual drop in bank rates mainly as a result of increased competition after financial liberalisation. The economic stability that ensued from Greece's EU entry and its adoption of the single currency has evidently not only facilitated the drop in interest rates, but has probably also had a positive effect on the expectations of households with regard to their future income, thereby encouraging recourse to bank loans for the purpose of maintaining a higher standard of living. This explanation is also supported by the exceptionally strong rate of consumer credit expansion over the last five-year period.

The descriptive analysis of the characteristics of households with children identified the following groups as being at high risk for child poverty: rural area households, multi-member households with three or more children, households headed by a young person (aged up to 34) or an economic migrant, single-parent households, as well as households headed by someone unemployed, economically inactive or unable to work. For

⁴³ As also pointed out in the European Commission's latest report (European Commission, 2008), Greece, Spain, Lithuania, Portugal and Poland are characterised by a family structure and an intergenerational solidarity that continue to play an important role in reducing child poverty. The coexistence of different generations in the same household (e.g. grandchildren with grandparents) and the substantial transfers in money or in kind between the members of the same family can partly offset the lack of support from the official social welfare system).

households where the head was in work, a higher risk of child poverty was found for those whose members were all uninsured or insured with OGA, or whose head works either occasionally or under fixed-term or contract employment, or whose occupation is low skilled (agriculture, construction, etc.). It should also be noted that the rate of child poverty fell significantly as the educational level of the household members improved and the number of its working members increased.

However, after isolating the effect of other factors by means of a multivariate analysis, the risk of a child falling below the poverty line was mainly determined by: a poor level of education, residence in a rural area or in rented housing, and a large number of children. The risk of child poverty increased substantially for the households of economic migrants, the uninsured or those insured with OGA and those working in manual occupations (workers, farmers). In other words, the lack of occupational specialisation seems to be linked with a high risk of child poverty. Similar observations were made for single-parent households, which in Greece are at an increased risk for child poverty on the basis of income distribution, even though this finding was not verified by the results based on the distribution of consumption expenditure. This last fact can perhaps be attributed to the decisive supportiveness of the extended family (grandparents and other relatives), primarily in helping them meet their consumption expenditure. The strength of the family institution in Greece seems to have a similar influence on the overall support offered to younger couples with children, and to those under occasional, fixed-term, contract, or part-time employment, not to mention the unemployed. Our multivariate analy-

sis showed these last categories to be at a high risk of child poverty mainly on the basis of the distribution of income, a finding which was usually not verified in a statistically significant manner when the distribution of consumption expenditure (both monetary and total) was used.

Finally, it is worth mentioning that, as indicated by the findings of the study, the risk of child poverty falls markedly, as the number of household members in work increases. The holding of a job by the head of the household considerably reduces the risk of child poverty, while the same is also true for the labour market entry of the spouse or other household members. In other words, an increase in the intensity of employment of the households' members was conducive to lower child poverty. Open-ended or permanent employment relationships also reduce the risk of child poverty.

6.2 Further observations and policy proposals

The dimensions of child poverty are directly related to the size of the welfare state and the efficiency of social expenditure. In this respect, it is worth noting that fiscal measures and social expenditure have had an exceptionally limited impact on child poverty in Greece, compared with most other EU countries and with the EU average. Despite the considerable increase in social expenditure as a percentage of GDP in Greece over the past decade (from 20.5% in 1996 to 24.2% in 2005, compared with 27.8% for the EU-15 and 27.2% for the EU-27), child poverty has not only persisted, but has most probably widened in recent years. Specifically, total social expenditure in Greece reduced the dimensions of poverty among children aged up to 15 (EU-SILC 2006



data) by merely 4 percentage points (from 26% to 22%), compared with a reduction of 16 percentage points (from 35% to 19%) for all EU-15 countries combined. Furthermore, on the basis of the European Commission's latest report (European Commission, 2008), social expenditure in the EU (excluding pensions) reduced the poverty risk for children aged 0-17 years by 44% in 2005. In Greece, this percentage did not exceed 13%, the lowest in the entire EU.⁴⁴

Some remarks must be made about the limited effectiveness that the benefits provided under Greece's fragmented social welfare state have in reducing child poverty. First of all, the redistributive role of social benefits is usually more important in countries that spend a larger share of their GDP on such benefits. In the case of Greece, the size of the welfare state is difficult to establish. Based on the last revision of Greece's GDP figures, social expenditure in 2005 amounted to 24.2% of GDP, i.e. about three percentage points below the EU-15 average. However, there are certain other important factors, apart from the level of available funds, that affect the final result, such as the manner in which social benefits are distributed between the various types of transfers, as well as the "targeting" efficiency of the respective benefits.

Specifically, as was to be expected, pensions, which are the most important type of social transfer in the EU, make a limited contribution to reducing child poverty. Indeed, of the 16 percentage points by which child poverty is reduced in the EU thanks to total social benefits, only 2 percentage points can be attributed to the allocation of pensions, while the remaining 14 percentage points are attributed to non-pension social bene-

fits, such as unemployment benefits, disability allowances, welfare benefits, sickness allowances, housing benefits, family benefits, etc. In the case of Greece, pension expenditure plays an important role, accounting for 2 of the total 4 percentage points by which child poverty is reduced as a result of social expenditure. As already stressed, this can be explained both by the structure of the Greek family (frequent coexistence of grandchildren and grandparents in the same household) and the prevailing social beliefs, which support transfers in money and in kind between the members of the extended family environment.

Only 12.7% of Greece's non-pension social expenditure (or 6.3% of its *total* social expenditure and 1.5% of GDP) is targeted at family and children, and even the "child targeting" of this social expenditure is problematic: characteristically, the wealthiest 10% of the population receives 12.9% of family benefits (EU-SILC data). The fact that an important share of the financial assistance to families with children is not targeted at the poorest ones, given that this assistance (third child benefits, additional tax-exemption for the third child, benefits for families with many children, etc.) is granted regardless of the family income,⁴⁵ reduces its effectiveness in reducing

44 With regard to the effectiveness of social policy in reducing child poverty in the OECD Member States, the UNICEF report (2005) shows that in Greece, Ireland, Italy, Portugal and Spain, not only is the percentage of government expenditure allocated to non-pension social benefits generally small, but these benefits also play a much smaller role in protecting low-income families. In these countries, which present high child poverty rates, government funds intended for the lower income groups are mainly targeted at people aged over 50, and less at children. Recent studies by Matsaganis *et al.* (2003, 2006a, 2006b) also conclude that the role of the State in family policy matters and the public support programmes to poor families with children have had very disappointing results in Southern European countries. Similar findings are reported by Papatheodorou (2005).

child poverty. Thus, in practice, not only is a minimum standard of living not secured for poor households with children, but certain categories of beneficiaries are also probably discriminated against, owing to the highly fragmented and bureaucratic nature of the benefits system. Consequently, a better targeting of social benefits in favour of families with children and in comparatively greater financial need would obviously increase the efficiency of these benefits in terms of their contribution to reducing child poverty and help contain the widening of this phenomenon.

The findings of the present study lead to certain other obvious conclusions regarding the formulation of a more effective policy to combat child poverty in Greece. For instance, given that the low educational level of the head of household was shown to be closely linked to child poverty and consequently to be a decisive factor in its transmission from generation to generation, the conduct of a policy aimed at improving the educational level mainly of the poorer segments of population would almost certainly help contain child poverty in the long run. The various sub-targets of such a policy could include: reducing the number of school drop-outs, increasing the duration of compulsory education, improving the quality of services rendered (supportive teaching, reduction of lost teaching hours, etc.), encouraging the poorer segments of the population and their children to participate in non-compulsory levels of education, and by reducing the recourse to shadow education as a means of improving the chances of access to tertiary education. The findings of our study also indicate that a containment of non-insured work and a faster integration of migrants into Greece's society and economy would, besides other benefits, most likely reduce the dimensions of child poverty. The

effect of a policy aimed at increasing the employment and employability of household members and facilitating their labour market entry would be similar. As shown by our analysis, there is a strong negative correlation between the risk of child poverty and the *non-employment* of the head of household, spouse and other household members. Consequently, the formulation of any policy aimed at enhancing the access of young couples with children to the labour market and employment would almost certainly make a decisive contribution to averting child poverty. Examples of such policy measures include: improving the childcare infrastructure for pre-school and school-aged children (nursery schools, all-day schools, etc.), adjusting young people's knowledge and skills to market needs (through vocational training, by improving the flexibility of formal education to fields in increased demand, etc.), the better matching of labour market supply and demand (through information channels, the restructuring of the Greek Manpower Employment Organisation–OAED, etc.).

From the debate that has erupted in recent years regarding the definition of child poverty, it transpires that the comprehension and resolution of this particularly complex and multi-dimensional issue calls for a combination of multiple dimensions and corresponding parameters. The economic dimension is definitely an important one, with parameters that include the household's

⁴⁵ For instance, the €10,000 increase in recent years (from €10,000 to €20,000) in the tax-free income for families with a third child has indubitably benefited families that have an annual taxable income in excess of €20,000. Poor households with three children, however, do not fall into this category as their total income is no more than €14,184 (i.e. the respective poverty line according to EU-SILC 2006 data).



income, other disposable resources and financial assistance, its consumption expenditure and/or its wealth. However, several other important dimensions must be taken into consideration both when analysing child poverty and, primarily, when deciding on the most appropriate policy for its eradication. These include the household's standard of living and quality of life, the access of its members to public social services (health, education, recreation, etc.), their health and sense of security, the presence of both parents, as well as family and civic relationships. In any case, the defining and monitoring of child poverty in Greece must be addressed in a comprehensive way, so that targets can be set, progress monitored and the chosen policy evaluated. In its 2005 report, UNICEF urges governments to focus their research and policy formulation on the relation between the broader determinants of children's economic well-being: i.e. the family, the market and the state. In a similar vein, the European Commission's latest report (European Commission, 2008) notes that the national quantitative goals set for the reduction of child poverty must be based on an investigation of the phenomenon and an identification of the underlying causes in each country. The progress made in the respective countries must be assessed

in relation to the targets set, and measured not only in terms of the economic dimension but also of the other dimensions of child poverty and well-being such as the ability/inability to acquire certain goods, housing, health, the exposure to risks and risky behaviours, civic participation and the family environment, education and the local environment.

In conclusion, reducing the risk of child poverty must now be brought to the forefront of social policy in Greece, and addressed in a manner that will take into account the problem's multi-dimensionality. The deprivations faced by children in a state of poverty are not only a matter of insufficient income. A multifaceted course of action is therefore required not only to increase monetary social expenditure, but also to provide services in the fields of education, health, social security, culture, etc. and to facilitate the access of such households to social services and, first and foremost, to better-quality jobs. In other words, what is needed is a coordinated course of action that will support the family work-income and non work-income, social expenditure, social investment and non-income social benefits in kind, so as to produce the necessary synergies.

References

- Atkinson, A (1991), "Comparing poverty rates internationally: Lessons from recent studies in developed countries", *World Bank Economic Review* 5, 3-21.
- Atkinson, A. (1987), "On the measurement of poverty", *Econometrica*, vol. 55, 749-63.
- Bouzas, N. (2006), "Children living in poor households in Greece: a first investigation of their characteristics", in *Poverty, Exclusion & Social Inequalities*, pp. 159-65, National Centre of Social Research – Institute of Social Policy, Athens (in Greek).
- Bradbury, B., S. Jenkins and J. Micklewright (2001), *The Dynamics of Child Poverty in Industrialised Countries*, Cambridge University Press, Cambridge.
- Chaudhuri, S. and M. Ravallion (1994), "How well do static indicators identify the chronically poor?", *Journal of Public Economics*, 53, 367-94.
- Culter, D. and L. Katz (1991), "Macroeconomic performance and the disadvantaged", *Brookings Papers on Economic Activity* 2, 1-61.
- Culter, D. and L. Katz (1992), "Rising inequality? Changes in the distribution of income and consumption in the 1980s", *American Economic Review*, 82, 546-51.
- European Commission (2008), *Child poverty and well-being in the EU: current status and way forward*, The Social Protection Committee, Directorate-General for Employment, Social Affairs and Equal Opportunities, Unit E2.
- Fajth, G. and K. Holland (2007), "Poverty and children: a perspective", UNICEF, Division of Policy and Planning, Working Papers, July.
- Fotakis C. (2006), "The social situation in the European Union and social policy debates after the enlargement", in *Poverty, Exclusion & Social Inequalities*, 159-65, National Center of Social Research – Institute of Social Policy, Athens.
- Hagenaars, A. J., K. de Vos and M. A. Zaidi (1994), *Poverty statistics in the late 1980s: Research based on micro-data*, Eurostat Theme 3, Series C, Luxembourg.
- Hondroyannis, G. (2002), "Private savings in Greece: economic and demographic determinants", Bank of Greece, *Economic Bulletin* No. 19, pp. 23-42, Athens (in Greek).
- Hurd, M. and S. Rohwedder (2006), "Economic well-being at older ages: income and consumption based poverty measures in the Health and Retirement Survey", National Bureau of Economic Research, Working Paper 12680, Cambridge.
- Johnson, D., T. Smeeding and B. Torrey (2005), "United States inequality through the prism of income and consumption", *Monthly Labor Review* 128 (4), 11-24.
- Kikilias, E., O. Papaliou and E. Fagadaki (2007), *Dimensions of lone-parent families' exclusion in Greece*, National Centre of Social Research – Institute of Social Policy, Athens (in Greek).
- Matsaganis, M., C. O'Donoghue, H. Levy, M. Coromaldi, M. Meracder-Prats, C.F. Rodrigues, S. Toso and P. Tsakloglou (2006a), "Reforming family transfers



in Southern Europe: Is there a role for universal child benefits?", *Social Policy and Society* 5, 189-97.

Matsaganis, M., C. O'Donoghue, H. Levy, M. Coromaldi, M. Mercader-Prats, C.F. Rodrigues, S. Toso and P. Tsakloglou (2006b), "Family transfers and child poverty in Greece, Italy, Spain and Portugal", in O. Bargain (ed.), *Research in Labor Economics*, Vol. 25: Microsimulation in action: policy analysis in Europe using EUROMOD, 101-24, Elsevier, Amsterdam.

Matsaganis, M., M. Ferrera, L. Capucha and L. Moreno (2003), "Mending nets in the south: anti-poverty policies in Greece, Italy, Portugal and Spain", *Social Policy and Administration*, 37(6), 639-55.

Meyer, B. and J. Sullivan (2003), "Measuring the Well-Being of the Poor Using Income and Consumption", *The Journal of Human Resources*, Vol. 38, Special Issue on Income Volatility and Implications for Food Assistance Programs, 1180-220.

Mitrakos, Th., G. Panopoulou and P. Tsakloglou (2001), "Economic inequalities and poverty in Greece: Quantitative dimensions of the problem", in *Society of the 2/3*, pp. 255-78, Panteion University of Social and Political Science, ed. Th. Pakos, Athens (in Greek).

Mitrakos, Th. and P. Tsakloglou (2003), "Economic inequality and poverty in Greece: Structure and changes over time", in Venieris D. and Papatheodorou Ch. (eds.), *Social Policy in Greece: Challenges and Prospects*, 411-44, Ellinika Grammata publishers, Social Policy series, Athens (in Greek).

Mitrakos, Th. and P. Tsakloglou (2006), "Inequality and poverty in the last quarter of the 20th century",

in M. Petmesidou and E. Mossialos (eds.), *Social policy development in Greece*, Ashgate Publishing Limited, Chapter 6, 126-43, Aldershot, United Kingdom.

Munzi, T. and T. Smeeding (2006), "Poverty and inequality: Greece and Mediterranean Europe in comparative perspective", in *Poverty, Exclusion & Social Inequalities*, pp. 159-65, National Centre of Social Research – Institute of Social Policy, Athens.

Papatheodorou, C. (2005), "Child poverty and social protection in Greece: What the evidence shows", *WELLCHI Network – Workshop 4, Children in multicultural societies*, National Centre for Social Research (EKKE), Athens.

Sabelhaus, J. and J. Groen (2000), "Can permanent-income theory explain cross-sectional consumption patterns?", *Review of Economics and Statistics* 82 (3), 431-8.

Sen, A. (1983), "Poor, relatively speaking", *Oxford Economic Papers* 35, 153-69.

Sen, A. (1992), *Inequality re-examined*, Oxford University Press.

Tragaki, A. (2006), "Immigrants in Greece: a driving force or a demographic threat?" Conference at Harokopion University entitled "Immigrants and Human Security in South-Eastern Europe", Athens (in Greek).

Triest, R. (1998), "Has poverty gotten worse?", *Journal of Economic Perspectives*, Vol. 12 (1), 97-114.

UNICEF (2005), "Child poverty in rich countries 2005", Innocenti Research Centre Report Card No. 6, Florence, Italy.

UNICEF (2007), "Child poverty in perspective: An overview of child well being in rich countries", Innocenti Research Centre Report Card No. 7, Florence, Italy.

Vleminckx, K. and T. Smeeding (2001), *Child Well-Being, Child Poverty and Child Policy in Modern Nations: What Do We Know*, The Policy Press, Bristol.

Zeldes, S. (1989), "Consumption and liquidity constraints: An empirical investigation", *Journal of Political Economy* 97, 305-46.

Zografakis, S. and Th. Mitrakos (2006), "Social indicators and immigration in Greece", *International and European Policy*, Papazissis publishers, Vol. 1, January-March 2006, pp. 124-51, Athens (in Greek).



Working Papers

(August 2007 – April 2008)

This section contains the abstracts of Working Papers authored by Bank of Greece staff and/or external authors and published by the Bank of Greece. The unabridged version of these publications is available in print or electronic format on the Bank's website (www.bankofgreece.gr).

Contents

61. A portfolio balance approach to euro-area money demand in a time-varying environment
Stephen G. Hall, George Hondroyannis, P.A.V.B. Swamy and George S. Tavlas
62. Optimal monetary policy in the euro area in the presence of heterogeneity
Sophocles N. Brissimis and Ifigeneia Skotida
63. The contribution of sectoral productivity differentials to inflation in Greece
Heather D. Gibson and Jim Malley
64. Wagner's law in 19th century Greece: a cointegration and causality analysis
Dimitrios Sideris
65. Some empirical evidence on the effects of U.S. monetary policy shocks on cross exchange rates
Sarantis Kalyvitis and Ifigeneia Skotida
66. Real exchange rates over a century: the case of the drachma/sterling rate, 1833-1939
Dimitrios Sideris
67. Spatial interdependencies of FDI locations: a lessening of the tyranny of distance?
Stephen G. Hall and Pavlos Petroulas



A portfolio balance approach to euro-area money demand in a time-varying environment

Working Paper No. 61

Stephen G. Hall, George Hondroyiannis, P.A.V.B. Swamy and George S. Tavlas

As part of its monetary policy strategy, the European Central Bank has formulated a reference value for M3 growth. A prerequisite for the use of a reference value for M3 growth is the existence of a stable demand function for that aggregate. However, a large empirical literature has emerged showing that, beginning in 2001, essentially all euro-area M3 demand functions have exhibited instability.

This paper considers euro-area money demand in the context of the portfolio-balance framework over the period, 1980:Q1-2006:Q3. Our basic premise is that there is a stable, but complex, demand-for-money function, but the models presently used to estimate euro-area money demand are not well-specified, given the lack of good wealth data. Consequently, in the absence of a well-specified model, most recent studies of euro-area money demand exhibit instability. We adopt two empirical methodologies to shed light on this issue – a co-integrated vector equilibrium correction (VEC) approach and a time-varying coefficient (TVC) approach. The latter approach is designed to reveal the biases in coefficients that may result from model misspecifications.

With the portfolio-balance framework as our point of departure, we constructed a set of proxies for euro-area wealth; our basic wealth variable was used to develop an opportunity cost variable,

which we defined as the rate of return on equities minus the own rate of return on M3. Employing the VEC approach this specification yields a stable money demand relationship. Apart from confronting this relationship with a variety of stability tests, all of which rely on the assumption of fixed coefficients, how much assurance can we have that this fixed-coefficient relationship approximates the true underlying relationship? To shed light on this issue, we used a TVC approach, which removes the biases caused by model misspecifications and recovers the underlying parameters of the system. This technique reveals a constant underlying set of parameters. Thus, both VEC and TVC techniques suggest that there is, in fact, a stable relationship determining the demand for money in the euro area.

Our measures of wealth are partial measures, constructed strictly on the basis of stock-market variables. One conclusion that emerges from our study is the need for more resources devoted to developing inclusive measures of euro-area wealth. Another conclusion is the usefulness of testing empirical specifications using both fixed-coefficient and time-varying coefficient estimation methods. In those cases, such as in our specification of a portfolio-balance approach to money demand, in which the methods yield similar results, a linear approximation can be considered useful and congruent.



Optimal monetary policy in the euro area in the presence of heterogeneity

Working Paper No. 62

Sophocles N. Brissimis and Ifigeneia Skotida

This paper examines the optimal design of monetary policy in the European monetary union in the presence of structural asymmetries across union member countries. It derives analytically an optimal interest rate rule under commitment and studies the dependence of its coefficients on the parameters of the structural model of each economy, the central bank's preferences for inflation and output stabilisation as shown in its loss function, and the relative size of each country. Based on a two-country, forward-looking, general equilibrium model, which is estimated for two euro area countries (Germany and France), we show that there are gains to be achieved by the ECB taking into account the heterogeneity of economic structures. This finding

appears to be robust under alternative weights given by the central bank to the stabilisation of the target variables.

Although the implementation of the proposed rule involves difficulties relating to data and estimation constraints as well as risks of accommodating structural divergences, it is important that the ECB takes into consideration national characteristics in formulating its monetary policy, especially in view of more countries joining the European monetary union in the future. However, as monetary and financial integration advances, the welfare benefits of monetary policy responding to individual countries' variables may become less significant.

The contribution of sectoral productivity differentials to inflation in Greece

Heather D. Gibson and Jim Malley

Working Paper No. 63

This paper estimates the magnitude of the Balassa-Samuelson (BS) effect for Greece in order to determine the extent to which its inflation differential with the euro area can be attributed to it. The Greek case is an interesting one. Since 2001, when Greece entered the euro area, inflation has been consistently above that of the euro area average. Greece also has, or at least had, significantly lower per capita income than the euro area average and has experienced two periods of rapid catch-up separated by relative stagnation. It is thus a prime candidate for experiencing the BS effect.

We assess the BS effect by calculating it directly. To this end, we use sectoral national accounts data, which permits estimation of total factor productivity (TFP) growth in the tradeables and non-tradeables sectors. By doing so, we are able to determine the size of the BS effect and, hence, the proportion of inflation attributable to it. That we consider TFP growth (and not just labour productivity growth) in calculating the size of the BS effect has the advantage that it is consistent with theory.

Our results suggest that it is rather difficult to produce one estimate of the BS effect. Any particular estimate is contingent on the definition of the tradeables sector and the assumptions made about labour shares. Moreover, a priori, we expect the BS effect to have been declining through time as catch-up occurs not only with respect to the rest of the world, but also as the non-tradeables sector within Greece catches up with the tradeables. Thus, the approach we have taken has been to present a variety of results with an emphasis on their robustness.

One strong conclusion that emerges has been to confirm that the size of the BS effect has not been constant throughout the whole period. The evidence is consistent with a strong BS effect of around 3 percentage points during the 1960s and early 1970s, the first period of catch-up. During the late 1970s and 1980s, the BS effect shrinks and, for some specifications, even turns negative. It then rises again to around 1.5-2.0 percentage points in the second half of the 1990s, the second major period of catch-up. Not surprisingly, recent data suggest that the size of the BS effect has declined significantly, to around 0.5 of a percentage point, if not lower. Considering that many other EU countries also have a BS effect, this finding implies that the relative effect for Greece (the so-called international BS effect) in all probability disappears. This result is perhaps not surprising since Greek standards of living on average are now approaching those of the euro area (or EU) as a whole and the size of the nontraded sector has diminished in the light of the break down of traditional barriers to trade in certain goods and services due to globalisation and technological development. We show in the paper that this result is reasonably robust across different definitions of the tradeables and non-tradeables sectors.

Since joining the euro area, the average annual differential inflation between Greece and the euro area has been 1.27 percentage points. The estimates provided here suggest that, at best, only about one-fifth of that differential can be accounted for by the Balassa-Samuelson effect.



Wagner's law in 19th century Greece: a cointegration and causality analysis

Dimitrios Sideris

Working Paper No. 64

Wagner's law states that, in the process of economic development, government economic activity increases relative to private economic activity. There are three main reasons, which support this hypothesis: (i) during industrialisation, the administrative and regulatory functions of the state would substitute public for private activity; (ii) economic growth would lead to an increase in cultural and welfare services, which are assumed to be income elastic; (iii) state participation would be required to provide the capital funds to finance large-scale projects made to satisfy the technological needs of an industrialised society, not met by the private sector. Based on these arguments, the law also implies causality running from national income to public sector expenditure.

Due to its important policy implications, Wagner's law has been one of the most extensively investigated relationships in public economics over the last three decades. A large number of studies assess empirically the validity of the law for developed and developing countries using both time series and cross sectional data sets. Within this strand of the literature, a number of economists argue that the law is expected to be valid in economies in their early stages of development. Thus, they examine the validity of the law for currently developed economies using historical time series data – from the 19th and early 20th century – so that the examined period covers mainly

the industrialisation phases; they provide evidence in favour of the law. In the present paper, we extend this strand of the literature by testing the validity of the law for the case of Greece for the period 1833-1938, using data released only recently in 2007. The years under consideration, represent a period of growth, industrialisation and modernisation of the economy, conditions which should be conducive to Wagner's law. In addition, the long data sample – it consisting of more than a hundred observations – ensures the reliability of the results in terms of economic significance and statistical inference.

In the paper, the methodological suggestions proposed in the relevant literature are followed. After an examination of the time dependence properties of the series, cointegration analysis validates the existence of long-run relationships between the variables, as expressed by the six most popular versions of the law. In addition, the estimated signs and magnitudes of the parameters support Wagner's conception. Then, Granger causality tests indicate causality running from the variables approximating income to the government expenditure variable, in most cases. The results support the validity of the law, and are in line with other studies, which use data for other economies during the 19th century. The findings indicate that Wagner's law is valid for economies which are in their early phase of development.

Some empirical evidence on the effects of US monetary policy shocks on cross exchange rates

Sarantis Kalyvitis and Ifigeneia Skotida
Working Paper No. 65

Following the classic Dornbusch (1976) 'overshooting' model on the impact of monetary policy on exchange rates and interest rates in the presence of price stickiness, a large empirical literature has focused on the assessment of these effects. However, their size is likely to vary between countries due to, for instance, to discrepancies in the structural characteristics of the economy, differences in nominal rigidities and/or asymmetries in the monetary policy functions of foreign countries driven by differential responses to deviations of inflation or output from their respective targets. A challenging empirical issue is therefore the potential asymmetry of 'delayed overshooting' between cross exchange rates, i.e. whether the magnitude of, say, the dollar appreciation against major currencies following a US monetary policy tightening differs.

In this vein and taking 'delayed overshooting' as a stylised fact, this paper examines the impact of US monetary policy shocks on the cross exchange rates of major currencies pound (sterling, Japanese yen and German mark). The main finding of the paper is a 'delayed overshooting' pattern for all currency cross rates examined following an unexpected US monetary policy shock, which in turn generates excess returns. The evidence also shows that the 'delayed overshooting' pattern in cross exchange rates is accompanied by asymmetric interventions by central banks in the foreign exchange markets under consideration (that is, interventions which differ in size and/or direction) triggered by US monetary policy shocks.



Real exchange rates over a century: the case of the drachma/pound sterling rate, 1833-1939

Working Paper No. 66

Dimitrios Sideris

The behaviour of real exchange rates is one of the most extensively investigated topics in the financial economics literature during the last thirty years or so. The question of interest is whether real exchange rates tend to revert to a constant mean, or, equivalently, whether the purchasing power parity (PPP) doctrine holds as an equilibrium relationship. A large body of the literature attribute the empirical rejection of mean reversion of the real exchange rates to short spans coupled with the low power of conventional unit root tests and advocate the use of long span data series.

The present paper makes a contribution to this strand of the literature as it analyses the properties of the real drachma/sterling exchange rate using observations covering more than a century. The study is the first one to analyse the properties of a drachma exchange rate using historical series going back to the early 19th century and spanning an interesting period which covers different exchange rate regimes and the effects of important historical events. The applied work employs a battery of unit root tests and a powerful cointegration technique. Given the longer time span, the choice of data at annual frequency and the high power of the tests, the results can be considered as statistically robust. The work also attempts to overcome problems associated with long span studies: Long span studies have been criticized (i) in that they mix data from both fixed and flexible exchange rate regimes, (ii) con-

tain serious structural breaks and (iii) not being able to answer the question of whether PPP holds for floating exchange rate regimes. To this end, analysis is performed in sub-periods, one of which can be considered as a flexible exchange rate regime period.

The empirical work based both on univariate testing and on cointegration fails to support stationarity of the real exchange rate or the validity of strong PPP. However, the cointegration analysis indicates that the nominal drachma/pound sterling rate and Greek and UK prices form a valid cointegrating vector and support the weak form of PPP. The estimated long-run relationship turns out to be robust across periods characterised by different exchange rate regimes and valid during the flexible exchange rate regime period. Consistent with the sticky price hypothesis, weak exogeneity tests indicate that adjustment to equilibrium comes via movements of the nominal exchange rate. In addition, modelling the short-run dynamics of the nominal drachma/sterling exchange rate in an error correction framework shows that adjustment to equilibrium is reached at the relatively high speed of 38% per annum, which implies a half-life of parity reversion of 1.5 years. In general, the results support that, in equilibrium, the drachma/pound sterling real exchange rate reverts to a PPP-based level, evidence which is in line with studies using long span data for other currencies.

Spatial interdependencies of FDI locations: a lessening of the tyranny of distance?

Working paper No. 67

Stephen G. Hall and Pavlos Petroulas

The purpose of this paper is the investigation of the existence and nature of spatial (inter)dependencies of Foreign Direct Investment (FDI) locations. Casual empirical observation, identifying multinational enterprises that increasingly follow so-called complex integration strategies, stresses the need for a richer set of factors that determine the location and nature of FDI. While there is some evidence that FDI in different locations may be complementary, little has been done to incorporate the potential cross-country dependencies into the empirical analysis of the determinants and structure of FDI.

We have used a large set of country pair data on real outward FDI stocks, covering a majority of world FDI (476 country pairs over the period 1994-2004). The bilateral model we use as a reference includes both market access (horizontal) motivations as well as production fragmentation (vertical) motivations. We model our spatial dependencies as emanating both from the explanatory variables and the errors, through the use of a distance-based weight matrix, in order to better distinguish between interdependencies due to market access motivations and production fragmentation motivations.

Both the maximum likelihood estimator and the generalised moments estimator indicate strong evidence of spatial dependence in the determinants of FDI. To wit, FDI is mainly driven by bilateral determinants that support horizontal (market access) motivations while the spatial, third country effects tend to support vertical (production fragmentation) motivations, both with respect to third country factor endowments as well as trade costs. The additional finding that surrounding market potential is important increases the complexity of these interdependencies. The results are consistent with the notion of multinational enterprises forming regional supply chains of production. For example, if a US firm were to invest in Germany, it would be a horizontal investment (final good assembly). This investment could not only act as a base for sales in Germany but also in neighbouring countries. The US firm would also invest in 'cheaper' countries close by that would serve the German affiliate with intermediate products. Hence, third country FDI act as complements to the bilateral. However, even if third country effects are important, the location decision of FDI is dominated by bilateral considerations. These results support the existence of complementary FDI and indicate that the tyranny of distance has probably lessened and that forces of dispersion have increased in importance.



Monetary policy and financial system supervision measures

(October 2007 – May 2008)

Monetary policy measures of the Eurosystem

4 October, 8 November and 6 December 2007

The Governing Council of the ECB decides that the minimum bid rate on the main refinancing operations and the interest rates on the marginal lending facility and the deposit facility will remain unchanged at 4.00%, 5.00% and 3.00% respectively.

August 2007 – May 2008

The Governing Council of the ECB decides to conduct supplementary open market operations, i.e. in addition to the regularly conducted main and longer-term refinancing operations, aimed at supporting the normalisation of the functioning of the euro money market.

10 January, 7 February, 6 March, 10 April and 8 May 2008

The Governing Council of the ECB decides that the minimum bid rate on the main refinancing operations and the interest rates on the marginal lending facility and the deposit facility will remain unchanged at 4.00%, 5.00% and 3.00% respectively.

Bank of Greece decisions on the establishment and operation of credit institutions and the supervision of the financial system

25 October 2007

– “Alpha Bank SA” is authorised to establish five new branches in Albania.

– “National Bank of Greece SA” is authorised to establish ten new branches in Egypt.



31 October 2007

– The provisions of Bank of Greece Governor's Act 2577/2006 on Internal Audit Systems are specified pursuant to Law 3606/2007 "Markets in Financial Instruments (MiFID)".

– "National Bank of Greece SA" is authorised to acquire 100% of the share capital of its subsidiary "The Ethniki, Hellenic General Insurance Company SA".

– "Emporiki Bank SA" is authorised to acquire a qualifying holding in the share capital of "Emporiki General Insurance Company SA" under establishment.

2 November 2007

– The supervisory framework for covered bonds issued by credit institutions is established.

– The maximum limit on credit extended by credit institutions and Athens Exchange members to their customers to finance stock exchange transactions is abolished.

22 November 2007

The Greek branch of "HSBC France" is authorised to prolong its administrative, accounting and tax operations.

26 November 2007

The Greek branch of the Russia-based "Kedr Close Joint Stock Company Commercial Bank" commences operation.

28 November 2007

– The terms and conditions for the registration with the Bank of Greece of persons who offer services on behalf of credit institutions as intermedi-

aries or affiliates in the meaning of article 29, Law 3606/2007 are determined.

– American Express Company group is authorised to continue the operation of its bank branch in Greece.

6 December 2007

– The Netherlands-based "BCP Investment BV" is authorised to acquire 100% of the share capital of "Millennium Bank SA".

– "EFG Eurobank Ergasias SA" is authorised to acquire 100% of the share capital of "Eurobank EFG Cyprus Ltd" under establishment in Cyprus.

– Authorisation to the representative office of the Germany-based "Deutsche Bank AG" is revoked.

– The provisions of Bank of Greece Governor's Act 2442/29.1.1999 on the adequacy of credit institutions' loan loss provisions are amended and clarified.

21 December 2007

"Alpha Bank SA" is authorised to acquire the majority of the share capital of the Ukraine-based "OJSC ASTRA BANK".

2 January 2008

The Greek branch of the Germany-based "Deutsche Bank AG" commences operation.

10 January 2008

The Greek branch of "Société Générale", which is under liquidation, is authorised to prolong its administrative, accounting and tax-related operations.

22 January 2008

– Authorisation is given for the merger by absorption of “Proton Financial Consultants, Technology and IT SA” by “Proton Bank SA”.

– The Cyprus-based “Costanus Limited” is authorised to acquire a qualifying holding in the share capital of “Aegean Baltic Bank SA”.

4 February 2008

– The ceiling for the penalties that the Bank of Greece applies to its supervisees is increased and a deadline for their payment is set.

– Bank of Greece existing decisions on the criteria and the examination procedure of credit institutions’ applications for the establishment of new branches in Greece or abroad and for the acquisition of “qualifying holdings” in the share capital of financial corporations are codified and amended.

21 February 2008

Credit institutions’ obligations to periodically report supervisory data and other information to the Bank of Greece and to determine the persons having a “special relation” with them, which results in the application of special supervisory provisions to their transactions, are codified.

22 February 2008

Annex 4 of Bank of Greece Governor’s Act 2577/9 March 2006, specifying the basic principles and

evaluation criteria for the organisational structure of credit institutions’ Internal Audit Systems, in relation to the prevention of money-laundering and terrorist financing, is amended.

1 March 2008

The Greek branch of American Express Bank Ltd changes name to “American Express Banking Corporation”.

14 April 2008

The Greek branch of the France-based “BNP Paribas Private Bank” commences operation.

2 May 2008

– The provisions of Bank of Greece Governor’s Act 2501/31.10.2002 on credit institutions’ disclosure requirements to customers with respect to the terms and conditions that govern their transactions are clarified.

– The deadline for the implementation of International Accounting Standards by credit co-operatives is extended.

– “Alpha Bank SA” is authorised to establish 25 new branches in Albania.

15 May 2008

A former Act of the Monetary Policy Council on the instruments and procedures for the implementation of the monetary policy by the Bank of Greece is amended.



Decisions of the Bank of Greece

Bank of Greece Governor's Act 2597/31 October 2007 – Amendments to Bank of Greece Governor's Act 2577/2006 re: "Framework of operational principles and criteria for the evaluation of the organisation and Internal Control Systems of credit and financial institutions, and relevant powers of their management bodies"

1. The new Act was issued upon authorisation of Law 3606/2007 which implemented Directive 2004/39/EC on Markets in financial instruments (MiFID) and empowered the Bank of Greece to specify credit institutions' obligations in terms of organisational requirements and conflicts of interest, in line with the provisions of Commission Directive 2006/73.
2. In greater detail, the new Act:
 - a) amends the provisions of Bank of Greece Governor's Act 2577/2006 on Internal Control Systems, in respect of the outsourcing by a credit institution of any banking, investment or ancillary activity without delegation of responsibility;
 - b) specifies credit institutions' obligations in relation to:
 - conflicts of interest, potentially detrimental to a client, which may arise in the course of providing investment services, including investment research and advice, and corporate finance business or in the course of personal transactions carried out by a manager or employee of the credit institution or any other person having access to privileged information, etc. Banks, at group level, should seek to adopt a



comprehensive conflicts of interest policy, designed to ensure the identification and management of such conflicts, as well as their disclosure to the clients concerned;

- rules enabling credit institutions to distinguish client assets from their own assets; and
- rules on keeping records.

Bank of Greece Governor's Act 2597/31 October 2007 has been prepared following consultation with banks and in cooperation with the Hellenic Capital Market Commission, taking into account the related guidelines of the Committee of European Securities Regulators (CESR).

In this context, the competent units of the Bank of Greece are authorised to provide any instructions necessary to ensure the consistent implementation of the new provisions by all credit institutions and investment firms in the form of sociétés anonymes.

Bank of Greece Governor's Act 2598/2 November 2007 – Supervisory framework for covered bonds issued by credit institutions

Act 2598/2 November 2007, issued upon authorisation of Article 91 of Law 3601/2007, lays down requirements for the supervisory recognition of asset-backed securities issued by credit institutions or by special purpose entities as "covered bonds".

Covered bonds provide additional safety to investors, as they are backed by a fully separated (ring-fenced) pool of assets fulfilling high credit standards, including mortgage loans and government bonds ("cover pool").

In contrast to securitisation, the issuance of covered bonds does not imply a transfer of credit risk and therefore does not affect the issuing credit institution's capital adequacy requirements.

In greater detail, Bank of Greece Governor's Act 2598/2 November 2007 prescribes:

- minimum requirements in terms of the risk management and internal control systems of issuing credit institutions, as well as in terms of capital adequacy;
- eligibility criteria for assets to be included in the cover pool (loans secured by residential or commercial real estate, government bonds, etc.) and rules on valuation and collateral adequacy checks; and
- reporting and disclosure requirements on issuing credit institutions including their obligation to publish all related data on their respective financial statements and websites.

The foregoing provisions and the provisions of Article 91 of Law 3601/2007 ensure harmonisation of Greek law with that of the rest of the EU, where covered bonds are an increasingly widespread instrument and offer domestic credit institutions, too, access to the issuance of covered bonds, which is a longer-term and less costly source of funding for banks.

Bank of Greece Governor's Act 2599/2 November 2007 – Abolition of the maximum limit on credit extended by credit institutions and Athens Exchange (Athex) members to their customers to finance stock market transactions

This Act abolishes the maximum limit per customer (€1.000.000) applicable to credit extended by credit institutions and Athex members in respect of stock market transactions.

The abolition was decided with the concurrent opinion of the Hellenic Capital Market Commission, in view of the institutional changes

introduced by Law 3601/2007 implementing the Capital Adequacy Directive (Basel II) and Law 3606/2007 implementing the MiFID Directive.

This type of financing and the requirement for borrowers to provide a collateral pool were introduced by Law 2843/2000.

The provisions of Bank of Greece Governor's Act 2474/2001 specifying the minimum loan-to-collateral value ratio (currently set at 40% and 30% for the initial and maintenance margin respectively) shall remain in force.



Statistical
section



Tables

<i>I. Prices and economic activity</i>	
1. Consumer price index	109
2. Industrial producer price index (PPI) for the domestic and the external market	110
3. Import price index in industry	111
4. Industrial production index	112
5. Retail sales volume	113
6. Gross value added at constant prices and gross domestic product at market prices	114
<i>II. External transactions</i>	
1. Balance of payments	115
2. Revised nominal exchange rate of the euro, weighted on the basis of Greece's external trade	116
3. Bilateral exchange rates of the euro	117-118
<i>III. Monetary aggregates and interest rates</i>	
1. Monetary aggregates of the euro area	119
2. Greek contribution to the main monetary aggregates of the euro area	120
3. Greece: deposits of domestic firms and households with OMFIs, by currency and type	121
4. Domestic MFI loans to domestic firms and households, by branch of economic activity	122
5. ECB and Bank of Greece interest rates	123
6. Greek government paper yields	124
7. Greece: bank rates on new euro-denominated deposits by euro area residents	125
8. Greece: bank rates on new euro-denominated loans to euro area residents	126
<i>IV. Public finance</i>	
1. Net borrowing requirement of central government on a cash basis	127
2. Financing of the central government borrowing requirement	128
3. State budget results	129



Table I.1

Consumer price index

(Percentage changes over the corresponding period of the previous year)

Period	General index	General index excluding food and fuel	General index excluding fresh fruit/vegetables and fuel	Goods	Services	Sub-indices		
						Food and non-alcoholic beverages	Fresh fruit and vegetables	Fuel
2004	2.9	3.2	3.3	2.3	3.8	0.5	-11.9	7.5
2005	3.5	3.2	3.1	3.4	3.7	0.6	-8.1	18.0
2006	3.2	2.5	2.7	3.4	3.0	3.7	3.3	10.9
2007	2.9	3.0	2.9	2.5	3.5	3.2	5.6	1.3
2006 I	3.3	2.3	2.5	3.3	3.2	1.9	-5.8	19.6
II	3.2	2.3	2.5	3.6	2.7	3.4	1.3	14.8
III	3.4	2.4	2.7	3.9	2.8	5.1	10.8	11.8
IV	2.9	2.8	3.0	2.7	3.1	4.6	9.4	-1.2
2007 I	2.7	3.3	3.2	2.1	3.4	3.1	4.9	-4.9
II	2.6	3.1	2.9	1.9	3.6	2.0	2.9	-1.5
III	2.7	3.0	2.8	2.0	3.6	3.3	11.8	-3.1
IV	3.6	2.5	2.8	3.9	3.2	4.5	3.7	15.8
2008 I	4.3	2.3	2.9	5.0	3.3	6.1	7.1	24.0
2005 Jan.	4.0	4.5	4.2	4.3	3.7	0.6	-8.9	10.3
Feb.	3.1	3.2	3.0	2.8	3.6	-0.9	-12.1	16.4
March ...	2.9	2.9	2.7	2.4	3.6	-1.3	-13.1	18.4
April	3.4	3.1	3.0	3.1	3.8	-0.1	-11.0	19.7
May	3.2	3.3	3.2	2.7	4.0	-0.4	-12.3	14.9
June	3.3	3.0	3.0	3.1	3.7	-0.5	-14.1	19.9
July	3.9	3.5	3.3	4.1	3.7	0.7	-7.9	20.0
Aug.	3.7	3.0	2.9	3.8	3.6	1.4	-3.7	20.8
Sept.	3.9	2.9	2.8	4.2	3.6	2.0	-0.7	24.0
Oct.	3.8	3.1	3.0	3.8	3.9	2.7	2.1	17.1
Nov.	3.5	3.0	3.0	3.4	3.7	2.6	1.2	12.5
Dec.	3.6	2.9	2.9	3.7	3.5	1.0	-8.9	22.1
2006 Jan.	3.2	2.0	2.3	3.3	3.2	1.6	-6.3	24.9
Feb.	3.2	2.3	2.5	3.3	3.2	2.0	-4.5	19.2
March ...	3.3	2.6	2.9	3.3	3.3	2.1	-6.7	15.1
April	3.3	2.3	2.6	3.6	2.9	3.8	3.5	14.0
May	3.1	2.1	2.4	3.6	2.6	2.9	-0.7	16.6
June	3.2	2.3	2.6	3.6	2.7	3.5	0.9	13.8
July	3.8	2.3	2.6	4.6	2.7	5.8	15.9	17.3
Aug.	3.5	2.4	2.7	3.9	2.9	4.7	7.5	14.4
Sept.	2.9	2.5	2.7	3.0	2.8	4.7	9.4	4.0
Oct.	2.8	2.8	3.0	2.7	3.0	5.1	10.1	-2.4
Nov.	2.9	2.8	3.0	2.8	3.2	4.5	8.6	-0.6
Dec.	2.9	2.9	3.0	2.7	3.2	4.3	9.5	-0.6
2007 Jan.	2.7	3.1	3.1	2.3	3.3	4.4	11.4	-6.4
Feb.	2.7	3.5	3.3	2.0	3.4	2.3	-0.4	-4.7
March ...	2.6	3.2	3.1	2.1	3.4	2.7	4.2	-3.6
April	2.5	3.2	3.0	1.8	3.5	1.7	-0.2	-2.6
May	2.6	3.1	2.9	1.9	3.6	2.0	2.9	-1.1
June	2.6	3.0	2.8	1.9	3.6	2.3	6.7	-0.7
July	2.5	3.2	2.9	1.6	3.7	2.7	9.0	-4.7
Aug.	2.5	3.1	2.9	1.7	3.6	3.3	13.0	-5.8
Sept.	2.9	2.8	2.7	2.6	3.4	3.9	13.3	1.6
Oct.	3.1	2.5	2.7	3.0	3.3	3.9	4.8	8.7
Nov.	3.9	2.5	2.9	4.5	3.2	4.8	4.1	20.3
Dec.	3.9	2.5	3.0	4.3	3.3	4.8	2.0	18.6
2008 Jan.	3.9	2.0	2.6	4.3	3.4	5.5	5.1	24.2
Feb.	4.4	2.4	3.0	5.3	3.3	6.6	9.6	24.4
March ...	4.4	2.5	3.1	5.3	3.2	6.1	6.7	23.4
April	4.4	2.6	3.2	5.4	3.2	6.6	7.9	20.0

Source: Calculations based on National Statistical Service of Greece (NSSG) data (CPI 2005=100).



Table 1.2

Industrial producer price index (PPI) for the domestic and the external market

(Percentage changes over the corresponding period of the previous year)

Period	Domestic market									External market	
	General index	Inter-mediate goods	Capital goods	Consumer goods			Energy		General index excl. energy	General index	General index excl. energy
				Total	Durables	Non-durables	Total	Fuel (oil refinery products)			
2004	3.5	3.2	4.5	6.0	2.0	6.2	4.0	4.3	4.7	5.0	1.8
2005	5.9	3.8	2.6	2.5	4.2	2.4	13.2	25.1	3.0	3.7	0.3
2006	6.9	7.5	2.3	5.9	3.5	6.0	8.1	12.9	6.3	4.2	2.7
2007	3.3	6.6	5.1	-0.7	4.2	-1.0	5.3	5.3	2.4	1.8	1.9
2006 I	9.2	4.7	1.5	8.8	3.8	9.0	15.4	30.0	6.8	7.0	2.7
II	8.6	7.6	1.7	7.4	3.4	7.6	12.0	21.6	7.2	5.9	2.9
III	6.8	9.2	3.1	6.2	3.6	6.3	6.1	8.1	7.2	3.2	2.7
IV	3.0	8.6	2.7	1.6	3.2	1.5	0.0	-3.6	4.3	0.8	2.3
2007 I	0.7	6.8	4.8	-2.2	4.6	-2.5	-1.4	-6.9	1.6	-0.8	1.6
II	1.9	6.2	6.3	-2.0	4.2	-2.3	2.4	-1.1	1.6	0.9	2.0
III	2.6	6.1	4.8	-1.2	3.9	-1.4	4.0	3.1	2.0	1.3	1.8
IV	8.0	7.0	4.6	2.4	4.1	2.3	16.7	27.9	4.4	5.9	2.4
2008 I	10.6	10.2	3.5	4.4	2.6	4.5	20.1	32.3	6.7	7.2	2.9
2005 Jan.	3.9	5.3	5.8	0.7	3.3	0.6	7.1	12.5	2.7	2.0	0.1
Feb.	4.6	4.7	5.0	0.8	3.6	0.7	10.0	19.8	2.5	2.9	0.2
March ...	5.3	4.7	3.8	0.9	3.6	0.8	12.6	24.6	2.5	3.1	-0.3
April	5.1	3.8	2.7	1.0	4.3	0.9	12.8	24.9	2.2	2.4	-0.9
May	3.7	3.4	2.3	1.3	4.6	1.1	7.8	13.2	2.1	1.2	-0.6
June	5.7	3.5	1.7	1.8	4.7	1.7	14.3	28.0	2.4	3.3	-0.2
July	5.6	3.5	0.5	1.8	4.7	1.7	13.9	26.9	2.4	3.9	0.2
Aug.	6.0	3.2	1.4	2.1	4.7	2.0	14.9	28.3	2.5	4.4	0.5
Sept.	7.3	3.2	1.3	2.8	5.1	2.7	18.6	34.0	2.8	5.2	0.6
Oct.	7.0	2.9	2.1	4.9	4.4	4.9	14.5	24.3	4.0	4.4	0.8
Nov.	7.0	3.5	2.5	5.1	3.6	5.2	13.6	26.1	4.3	5.3	1.3
Dec.	9.1	4.1	2.5	7.1	3.6	7.2	17.9	36.9	5.7	6.5	1.9
2006 Jan.	9.9	4.3	2.2	9.1	3.4	9.4	17.8	36.2	6.9	7.5	2.5
Feb.	9.5	5.0	1.4	8.7	3.8	8.9	16.2	32.0	6.8	7.2	2.7
March ...	8.3	4.9	0.8	8.5	4.1	8.7	12.3	22.7	6.6	6.4	3.0
April	8.6	6.1	0.7	8.3	3.6	8.5	12.4	22.5	7.0	6.3	3.1
May	9.3	7.9	1.9	7.4	3.2	7.6	14.0	25.9	7.3	6.2	2.8
June	8.0	8.9	2.6	6.5	3.4	6.6	9.7	16.7	7.2	5.2	2.7
July	8.3	9.0	3.2	6.6	3.4	6.8	10.6	18.2	7.3	4.3	2.4
Aug.	7.7	9.3	3.2	6.5	3.9	6.7	8.2	10.9	7.4	4.2	3.0
Sept.	4.5	9.2	3.1	5.5	3.4	5.6	-0.3	-3.8	6.8	1.0	2.9
Oct.	3.0	9.7	2.8	2.6	3.4	2.5	-2.1	-7.4	5.3	0.6	2.8
Nov.	3.4	8.4	2.6	1.6	3.2	1.5	1.3	-1.2	4.3	0.8	2.5
Dec.	2.7	7.8	2.6	0.6	3.0	0.5	1.0	-1.9	3.4	0.9	1.7
2007 Jan.	0.4	7.4	3.1	-2.0	4.7	-2.3	-2.7	-9.4	1.8	-1.3	1.7
Feb.	0.6	6.6	5.1	-2.4	4.7	-2.7	-1.4	-6.8	1.4	-0.6	1.5
March ...	1.1	6.6	6.2	-2.1	4.4	-2.4	-0.2	-4.6	1.7	-0.5	1.7
April	1.7	7.5	7.1	-2.4	4.2	-2.6	1.1	-3.6	1.9	0.7	2.1
May	1.9	6.1	6.4	-2.0	4.4	-2.3	2.6	-0.7	1.6	0.8	1.8
June	2.0	5.1	5.3	-1.6	4.1	-1.9	3.4	1.1	1.4	1.1	2.0
July	1.7	5.7	4.9	-1.7	4.1	-2.0	2.2	-1.1	1.5	1.2	2.1
Aug.	1.7	6.2	4.6	-1.7	3.6	-2.0	1.8	-0.5	1.7	-0.2	1.4
Sept.	4.4	6.6	4.9	-0.1	3.9	-0.3	8.2	11.9	2.8	2.9	1.8
Oct.	6.4	7.2	4.8	1.3	4.3	1.1	12.5	20.8	3.8	4.6	2.3
Nov.	8.7	7.1	4.4	2.9	4.0	2.8	18.3	32.7	4.7	6.5	2.1
Dec.	9.0	6.8	4.5	3.1	4.0	3.1	19.3	30.2	4.7	6.6	2.7
2008 Jan.	10.2	8.2	4.2	3.8	3.2	3.8	21.2	35.1	5.6	7.4	2.7
Feb.	10.8	10.6	3.2	4.7	2.4	4.8	20.0	32.0	7.0	7.1	3.1
March ...	10.9	11.9	3.0	4.6	2.3	4.7	19.1	30.1	7.4	7.0	2.9
April	9.8	9.8	3.2	4.6	2.4	4.7	17.2	27.8	6.6	6.3	2.4

Source: Calculations based on NSSG data.

Table 1.3
Import price index in industry
(Percentage changes over the corresponding period of the previous year)

Period	Import price index in industry								
	General index	Intermediate goods	Capital goods	Consumer goods			Energy*		General index excl. energy
				Total	Durables	Non-durables	Total	Crude oil and gas pumping	
2004	3.1	4.4	-0.1	0.6	-1.1	1.0	40.7	...	0.8
2005	8.8	2.7	-0.3	1.4	-0.8	1.9	51.2	57.1	1.2
2006	4.4	5.7	0.6	2.0	0.4	2.3	10.5	10.8	2.8
2007	3.0	6.3	1.2	1.9	0.4	2.3	2.3	2.5	3.2
2006 I	7.7	2.5	0.7	2.3	0.5	2.7	33.1	35.0	1.8
II	6.8	5.1	0.9	2.1	0.7	2.4	23.1	23.9	2.7
III	2.7	7.0	0.6	1.8	0.4	2.1	1.3	0.9	3.1
IV	0.7	8.2	0.3	1.7	0.0	2.1	-8.4	-8.8	3.4
2007 I	-0.4	8.5	0.7	1.4	0.0	1.7	-13.4	-14.0	3.5
II	1.2	7.3	1.2	1.4	0.2	1.7	-5.8	-6.2	3.3
III	3.3	6.0	1.5	1.8	0.3	2.1	3.9	4.6	3.1
IV	7.8	3.4	1.7	3.1	1.1	3.5	27.2	28.7	2.7
2008 I	8.5	2.7	1.6	3.7	1.3	4.2	31.8	32.8	2.7
2005 Jan.	6.6	4.7	-0.6	0.4	-1.3	0.8	40.0	44.5	1.4
Feb.	9.0	4.3	-1.0	1.4	-1.1	1.9	59.9	67.9	1.5
March	9.1	3.7	-0.6	1.2	-1.0	1.7	58.0	65.2	1.4
April	8.4	2.8	-0.6	1.0	-1.2	1.5	53.8	60.2	1.1
May	6.5	2.3	-0.6	1.1	-1.2	1.6	39.1	43.7	0.9
June	10.3	2.5	-0.3	1.5	-1.1	2.1	63.9	72.5	1.2
July	10.3	2.2	-0.4	1.6	-1.0	2.2	60.8	68.4	1.1
Aug.	10.7	1.9	-0.3	1.7	-0.7	2.2	61.6	68.7	1.1
Sept.	8.5	2.1	-0.1	1.6	-0.5	2.0	44.8	49.0	1.2
Oct.	7.9	1.9	-0.1	1.6	-0.7	2.0	39.4	43.0	1.1
Nov.	9.1	2.1	0.3	1.8	-0.2	2.3	46.6	51.9	1.4
Dec.	9.8	2.0	0.5	2.2	0.6	2.6	51.4	56.0	1.6
2006 Jan.	8.8	2.0	0.3	2.8	0.5	3.3	42.2	45.1	1.7
Feb.	7.4	2.6	0.8	2.0	0.5	2.3	31.6	33.1	1.8
March	6.8	3.0	0.9	2.0	0.4	2.3	26.6	28.1	2.0
April	7.4	3.9	1.1	2.1	0.5	2.5	28.2	29.7	2.4
May	8.1	5.3	0.9	2.1	0.8	2.4	30.3	31.7	2.7
June	5.0	6.2	0.8	2.1	0.7	2.4	12.3	12.1	3.0
July	3.8	6.6	0.7	1.9	0.8	2.2	6.5	5.6	3.0
Aug.	2.3	7.3	0.7	1.8	0.5	2.1	-1.1	-2.2	3.3
Sept.	2.1	7.1	0.4	1.7	0.0	2.1	-1.2	-0.6	3.1
Oct.	1.2	7.9	0.2	1.8	0.0	2.2	-5.9	-5.7	3.3
Nov.	0.6	8.3	0.3	1.6	-0.1	2.0	-8.8	-9.3	3.4
Dec.	0.2	8.4	0.3	1.6	-0.1	2.0	-10.6	-11.3	3.4
2007 Jan.	-1.0	8.9	0.5	1.3	0.0	1.6	-16.3	-16.8	3.6
Feb.	-0.4	8.3	0.6	1.3	0.0	1.5	-13.2	-13.9	3.4
March	0.3	8.3	1.0	1.5	0.1	1.8	-10.7	-11.3	3.6
April	0.8	8.0	0.8	1.3	0.1	1.6	-7.6	-8.1	3.4
May	1.3	7.3	1.2	1.5	0.2	1.8	-5.6	-6.0	3.4
June	1.5	6.8	1.4	1.4	0.3	1.7	-4.2	-4.5	3.3
July	2.6	6.8	1.4	1.4	0.0	1.7	0.6	1.0	3.3
Aug.	2.6	5.8	1.4	1.6	0.1	1.9	1.4	2.3	3.0
Sept.	4.7	5.4	1.5	2.4	0.6	2.8	10.3	10.9	3.2
Oct.	6.4	4.2	1.6	2.7	1.1	3.0	19.9	21.3	2.8
Nov.	8.6	2.9	1.7	3.3	1.1	3.7	31.3	32.7	2.6
Dec.	8.4	3.0	1.8	3.4	1.2	3.8	30.7	32.3	2.7
2008 Jan.	8.9	2.5	1.8	3.5	1.0	4.0	35.3	36.6	2.6
Feb.	8.7	2.8	1.7	4.0	1.3	4.6	31.9	33.0	2.8
March	7.9	2.8	1.3	3.5	1.5	3.9	28.5	29.2	2.6

* "Energy" data for 2004 are not comparable with those for 2003 because of changes in the relevant index coverage, which prior to 2004 did not include "carbon and lignite mining", "crude oil and gas pumping" and "electricity".

Source: Calculations based on NSSG data.



Table I.4
Industrial production index (2000=100)
(Percentage changes over the corresponding period of the previous year)

Period	Industry								
	General index	Manufacturing	Mining - quarrying	Electricity - gas - water supply	Main industrial groupings				
					Energy	Intermediate goods	Capital goods	Consumer durables	Consumer non-durables
2004	1.2	1.2	0.3	1.4	0.3	1.0	-0.5	1.8	2.7
2005	-0.9	-0.8	-6.2	0.6	0.6	-1.7	-5.1	11.4	-0.9
2006	0.5	0.8	-2.2	0.1	1.3	0.7	1.3	2.0	-1.0
2007	2.2	1.8	-0.9	4.7	3.7	0.2	-2.4	1.2	4.1
2006 I	0.9	0.9	-0.5	1.5	3.6	1.1	-6.2	2.0	-0.2
II	0.4	1.1	-4.0	-0.9	3.1	0.0	4.0	-4.6	-2.3
III	0.0	0.2	1.1	-1.0	-0.6	2.7	0.2	6.3	-2.4
IV	0.6	1.0	-5.2	1.0	-0.6	-0.7	6.2	5.0	1.4
2007 I	3.5	4.0	7.3	0.2	-0.9	6.7	1.2	4.9	5.4
II	0.7	0.2	-4.8	5.4	3.8	-2.1	-6.1	4.6	2.7
III	2.4	1.7	-3.3	7.1	5.1	-1.9	-3.4	-3.3	5.8
IV	2.2	1.5	-1.6	6.1	6.8	-1.5	-1.0	-0.8	2.5
2008 I	-2.7	-2.4	-12.3	-1.0	-1.4	-7.3	-2.7	-4.9	1.6
2005 April	-3.2	-3.7	-14.1	3.9	-7.7	-1.8	-5.8	23.1	-1.5
May	-2.1	-3.0	-8.1	5.0	3.4	-5.0	-2.7	2.1	-4.1
June	-2.4	-3.1	-8.5	2.8	1.6	-3.8	-18.7	-2.3	0.6
July	-5.1	-6.4	-9.3	2.0	1.2	-7.7	-15.0	-7.0	-5.4
Aug.	3.5	4.1	4.1	1.5	1.9	5.7	-11.2	18.7	5.8
Sept.	0.5	1.2	3.2	-3.2	1.0	-1.2	-3.6	14.7	2.2
Oct.	3.7	5.5	1.5	-3.1	10.8	0.0	-1.3	18.8	1.7
Nov.	1.4	2.0	-2.0	0.1	3.7	0.8	1.4	30.3	-2.0
Dec.	-1.1	-0.6	-3.0	-2.6	-0.9	-1.8	-0.9	16.0	-2.0
2006 Jan.	1.4	1.4	-3.9	2.7	1.0	1.8	-8.6	2.3	4.0
Feb.	-1.8	-3.2	-1.6	4.4	6.0	-1.7	-12.4	-4.9	-6.3
March ...	3.3	4.7	3.7	-2.8	3.9	3.2	2.3	8.8	2.5
April	-3.4	-1.7	-12.6	-7.7	4.6	-6.6	11.4	-12.8	-10.3
May	1.9	1.0	4.8	4.6	2.3	3.8	-7.0	-1.3	2.1
June	2.7	3.9	-4.6	0.3	2.6	2.5	9.0	0.9	1.4
July	1.3	3.2	8.7	-7.8	-2.1	6.5	-0.9	7.8	-0.2
Aug.	2.3	1.7	-2.1	5.6	2.4	2.7	11.5	20.7	-0.4
Sept.	-3.2	-3.9	-3.2	-0.3	-2.1	-1.0	-4.7	-2.8	-6.4
Oct.	1.9	3.1	-11.0	1.9	1.7	-0.2	12.8	9.5	1.0
Nov.	-2.5	-3.3	2.0	-0.2	-3.1	-3.7	-2.8	1.4	-0.6
Dec.	2.6	3.4	-5.5	1.5	-0.2	2.1	8.9	4.2	4.1
2007 Jan.	5.3	6.4	11.4	0.1	2.4	5.9	15.4	0.5	6.4
Feb.	3.5	4.1	6.8	0.2	-0.9	7.8	-2.4	2.1	5.6
March ...	1.8	2.0	4.2	0.4	-4.2	6.5	-4.3	10.1	4.3
April	0.6	-1.2	6.8	7.4	4.9	-0.5	-19.1	0.7	4.0
May	0.6	1.6	-13.8	1.4	1.1	-4.0	7.0	7.6	3.1
June	1.0	0.1	-5.0	7.4	5.4	-1.5	-5.5	5.2	1.1
July	3.9	1.8	-7.7	17.1	7.7	-4.1	-5.0	0.3	11.7
Aug.	0.5	1.1	-4.5	0.2	2.2	-2.2	-3.4	-20.8	2.8
Sept.	2.5	2.1	2.3	4.2	5.3	0.4	-1.7	4.9	3.0
Oct.	0.3	-0.7	-2.3	5.7	2.2	-0.1	-2.7	-1.0	-0.3
Nov.	4.7	5.2	-4.4	5.1	9.6	2.8	3.6	1.4	2.1
Dec.	1.6	0.1	2.7	7.4	8.7	-7.8	-3.2	-2.7	6.1
2008 Jan.	1.5	1.4	-4.9	3.5	0.2	-2.0	4.5	7.4	6.0
Feb.	-3.7	-4.5	-9.8	1.4	1.5	-9.8	-6.8	-1.6	-1.6
March* ..	-5.4	-3.5	-21.8	-8.4	-6.2	-9.5	-4.3	-14.5	0.8

* Provisional data.

Source: NSSG.

Table 1.5
Retail sales volume (retail trade turnover at constant prices)
(Percentage changes over the corresponding period of the previous year)

Period	General index	Sub-indices			
		Food-beverages-tobacco	Clothing and footwear	Furniture-electrical appliances-household equipment	Books-stationery-other items
2004	4.5	7.1	1.4	3.9	4.7
2005	3.0	5.6	1.3	0.6	-1.1
2006	8.0	9.0	0.8	17.7	3.7
2007	2.3	0.9	1.1	6.7	6.7
2006 I	4.1	8.7	-5.6	2.2	9.0
II	9.0	11.6	0.8	18.4	-1.5
III	11.0	11.8	-2.3	25.4	1.4
IV	7.7	4.4	8.1	23.7	6.7
2007 I	4.3	-0.8	9.5	18.6	12.4
II	2.0	1.9	-1.3	6.7	1.6
III	2.1	0.8	3.3	1.4	3.5
IV	1.0	1.5	-4.4	3.0	9.4
2008 I	-0.1	0.8	-5.2	-2.1	3.0
2005 April	3.6	2.9	0.5	5.0	-4.6
May	4.9	5.1	3.5	9.1	5.5
June	4.0	4.7	0.4	4.6	0.2
July	4.1	9.3	-2.8	0.5	-1.3
Aug.	3.8	9.3	-0.2	-1.9	-2.6
Sept.	2.1	3.6	1.4	2.4	0.3
Oct.	2.4	2.9	6.1	1.3	-1.5
Nov.	1.6	3.5	0.9	1.6	-2.0
Dec.	1.5	2.8	3.7	-0.1	4.4
2006 Jan.	0.3	4.0	0.4	-8.1	4.0
Feb.	5.9	14.3	-9.6	0.0	8.6
March ...	6.0	8.0	-5.8	14.0	14.3
April	9.9	13.3	11.2	11.8	7.2
May	7.0	10.3	-5.9	14.4	-7.7
June	10.1	11.0	-4.6	29.0	-4.0
July	10.7	10.3	-4.8	27.6	-0.3
Aug.	10.5	12.0	-4.1	21.9	0.6
Sept.	11.9	13.1	2.1	26.4	3.5
Oct.	5.1	3.9	5.1	14.6	-5.8
Nov.	6.9	1.2	7.8	27.9	1.5
Dec.	10.6	7.3	10.5	28.1	19.9
2007 Jan.	6.0	-0.5	15.2	28.3	8.4
Feb.	3.9	-0.4	2.1	18.9	17.3
March ...	3.3	-1.5	14.0	11.3	11.4
April	-1.5	-1.3	-9.9	9.3	-5.4
May	3.2	2.2	3.9	8.0	3.3
June	4.5	5.0	5.2	3.4	8.3
July	2.2	-0.7	3.6	5.8	5.3
Aug.	3.8	1.5	8.4	2.0	6.1
Sept.	0.4	1.7	-1.4	-3.6	0.3
Oct.	1.3	-0.7	-4.2	10.1	2.3
Nov.	1.9	3.6	-3.3	0.3	11.5
Dec.	0.0	1.5	-5.4	-0.1	12.4
2008 Jan.	3.8	0.7	8.7	5.8	8.0
Feb.	-4.1	-3.0	-12.0	-4.1	2.8
March* ..	0.5	4.8	-12.0	-6.7	-1.1

* Provisional data

Source: NSSG.



Table 1.6

Gross value added at constant prices and gross domestic product at market prices

(Previous year's constant prices)

	Annual percentage changes					
	2002	2003	2004	2005	2006	2007
Primary sector (Agriculture)	-5.6	-5.2	6.8	-2.5	-5.6	-4.6
Secondary sector	2.2	7.6	-0.9	4.3	10.6	0.4
Mining and quarrying	26.1	-7.6	5.1	-8.1	-5.4	-3.9
Manufacturing	2.7	5.4	-4.5	10.6	4.0	-1.9
Electricity, natural gas and water supply	1.6	8.6	4.5	1.1	-6.6	1.3
Construction	-0.1	12.2	2.8	-3.1	28.2	3.9
Tertiary sector	5.2	4.9	5.3	3.7	1.7	5.2
Wholesale and retail trade: repair of motor vehicles and household goods	3.2	8.8	0.7	3.3	2.6	3.1
Hotels and restaurants	7.1	-5.6	-0.5	-2.4	1.2	1.0
Transport, logistics and communication	2.8	12.3	22.4	4.7	-1.9	14.4
Intermediary financial institutions	5.4	12.0	11.7	16.2	10.7	11.9
Real estate management, renting and business activities	3.3	2.3	2.1	2.4	0.3	5.5
Public administration and national defence, mandatory social security	4.7	-2.1	10.9	0.3	1.1	2.6
Education	13.0	12.7	1.4	2.4	2.6	6.1
Health and social care	3.5	5.9	-5.3	16.8	5.8	4.6
Other social welfare services	14.4	6.3	12.0	5.1	-1.7	1.0
Private households employing house assistants	6.4	8.7	7.8	2.2	5.3	6.0
Gross value added at basic prices	3.9	4.9	4.0	3.5	3.3	3.7
Private consumption	4.2	5.0	4.7	4.2	4.2	3.2
Public consumption	7.3	-1.0	3.0	1.2	0.3	7.4
Gross fixed capital formation by type of investment:	10.7	15.4	6.0	0.7	14.8	4.4
Residential	3.8	11.0	3.7	-1.1	21.5	-6.8
Other construction	3.4	11.0	3.6	-0.9	21.7	11.4
In equipment	22.0	22.9	8.0	1.7	6.5	7.7
Other	20.3	10.3	15.1	9.7	12.2	5.3
Stocks and statistical discrepancy (% of GDP)	-0.5	0.0	0.2	0.2	-0.4	0.2
Domestic final demand	5.0	6.6	5.0	3.0	5.4	4.6
Exports of goods and services	-7.7	2.5	12.6	2.7	5.1	5.9
Goods	-7.8	7.8	0.5	7.5	12.4	1.6
Services	-7.6	-1.6	22.8	-0.6	-0.2	9.4
Final demand	2.9	5.9	6.1	2.9	5.4	4.8
Imports of goods and services	-0.2	8.7	10.7	0.5	8.7	7.0
Goods	4.2	13.2	10.8	1.0	8.7	6.2
Services	-15.4	-10.7	10.4	-2.3	8.4	11.0
GDP at market prices	3.9	5.0	4.6	3.8	4.2	4.0

Source: NSSG/National Accounts and Ministry of Economy and Finance, March-April 2008.

Table II.1
Balance of payments
(Million euro)

	January–March			March		
	2006	2007	2008*	2006	2007	2008*
I CURRENT ACCOUNT BALANCE (I.A+I.B+I.C+I.D)	-8,087.4	-9,021.5	-8,354.8	-3,310.7	-3,092.0	-3,515.4
I.A TRADE BALANCE (I.A.1–I.A.2)	-9,139.0	-9,469.4	-10,380.8	-3,740.0	-3,418.1	-3,427.6
Oil	-2,539.6	-2,162.5	-2,689.9	-1,046.2	-716.3	-961.1
Non-oil	-6,599.4	-7,306.9	-7,690.9	-2,693.8	-2,701.8	-2,466.5
Ships	-572.4	-1,217.9	-885.8	-234.9	-593.1	-390.1
Trade balance excluding oil and ships	-6,027.0	-6,089.0	-6,805.1	-2,458.9	-2,108.7	-2,076.4
I.A.1 Exports of goods	3,652.3	3,796.9	4,666.7	1,350.6	1,296.9	1,391.0
Oil	634.1	554.0	1,089.6	224.2	186.7	286.7
Ships (receipts)	284.8	396.1	465.6	118.8	85.3	169.2
Other	2,733.4	2,846.8	3,111.5	1,007.6	1,024.9	935.1
I.A.2 Imports of goods	12,791.4	13,266.2	15,047.5	5,090.6	4,715.0	4,818.6
Oil	3,173.7	2,716.5	3,779.5	1,270.4	903.0	1,247.8
Ships (payments)	857.2	1,614.0	1,351.4	353.7	678.4	559.3
Other	8,760.5	8,935.7	9,916.6	3,466.5	3,133.6	3,011.5
I.B SERVICES BALANCE (I.B.1–I.B.2)	1,554.8	1,589.3	2,339.0	617.3	613.3	659.7
I.B.1 Receipts	4,677.9	4,891.2	6,160.2	1,719.6	1,771.0	1,865.8
Travel	519.4	544.0	575.0	212.0	238.7	225.0
Transport	3,548.0	3,659.4	4,829.3	1,275.8	1,308.1	1,417.1
Other	610.5	687.8	755.9	231.8	224.2	223.8
I.B.2 Payments	3,123.0	3,301.9	3,821.3	1,102.3	1,157.7	1,206.1
Travel	526.5	520.6	592.0	156.9	158.3	182.0
Transport	1,697.3	1,772.1	2,139.1	601.1	625.0	710.7
Other	899.3	1,009.2	1,090.2	344.3	374.4	313.4
I.C INCOME BALANCE (I.C.1–I.C.2)	-1,382.0	-1,520.7	-1,778.4	-551.9	-521.3	-686.7
I.C.1 Receipts	764.7	1,132.0	1,273.9	284.5	427.6	477.3
Wages, salaries	70.3	82.7	91.1	27.7	34.6	25.1
Interest, dividends, profits	694.4	1,049.3	1,182.8	256.8	393.0	452.3
I.C.2 Payments	2,146.7	2,652.7	3,052.3	836.4	948.9	1,164.1
Wages, salaries	65.7	82.0	82.3	22.5	31.4	26.4
Interest, dividends, profits	2,080.9	2,570.7	2,969.9	813.9	917.5	1,137.6
I.D. CURRENT TRANSFERS BALANCE (I.D.1–I.D.2)	878.8	379.3	1,465.4	363.9	234.1	-60.8
I.D.1 Receipts	1,921.8	1,724.3	2,587.0	573.8	456.9	196.8
General government (mainly EU transfers)	1,351.6	1,218.2	2,057.6	374.9	279.2	39.7
Other (emigrants' remittances, etc.)	570.2	506.1	529.4	198.9	177.7	157.1
I.D.2 Payments	1,043.0	1,345.0	1,121.7	209.9	222.9	257.6
General government (mainly to the EU)	853.3	1,086.9	819.7	150.8	144.0	180.6
Other	189.7	258.1	302.0	59.1	78.9	77.0
II CAPITAL TRANSFERS BALANCE (II.1–II.2)	737.8	1,917.2	1,561.6	629.4	1,076.2	220.4
II.1 Receipts	805.7	1,992.2	1,655.2	652.1	1,102.2	245.2
General government (EU transfers)	758.3	1,937.4	1,402.2	636.1	1,080.9	214.0
Other	47.5	54.8	253.0	16.0	21.2	31.1
II.2 Payments	68.0	74.9	93.6	22.6	26.0	24.8
General government (mainly to the EU)	7.0	6.8	7.3	2.3	2.0	1.8
Other	60.9	68.1	86.3	20.3	24.0	22.9
III CURRENT ACCOUNT AND CAPITAL TRANSFERS BALANCE (I+II)	-7,349.6	-7,104.3	-6,793.1	-2,681.2	-2,015.8	-3,295.0
IV FINANCIAL ACCOUNT BALANCE (IV.A+IV.B+IV.C+IV.D)	7,526.4	6,882.8	6,254.2	3,120.0	2,422.0	3,069.9
IV.A DIRECT INVESTMENT¹	422.9	-2,051.8	-339.5	59.0	-150.9	-144.8
By residents abroad	-143.4	-2,223.4	-395.4	-78.6	-345.8	-110.1
By non-residents in Greece	566.2	171.6	55.9	137.6	194.8	-34.6
IV.B PORTFOLIO INVESTMENT¹	1,009.0	11,051.9	6,954.7	1,672.2	4,443.9	-4,362.1
Assets	-4,930.5	-3,638.7	-4,230.7	-1,420.7	-876.4	389.9
Liabilities	5,939.6	14,690.6	11,185.4	3,092.9	5,320.3	-4,752.0
IV.C OTHER INVESTMENT¹	6,336.5	-2,049.3	-544.0	1,683.8	-1,765.0	7,651.7
Assets	-2,241.2	-9,709.3	-4,653.3	1,203.4	-2,310.9	-262.7
Liabilities	8,577.7	7,660.0	4,109.3	480.4	545.9	7,914.4
(General government loans)	-117.7	-1,177.4	-39.4	41.0	-258.6	-6.3
IV.D CHANGE IN RESERVE ASSETS²	-242.0	-68.0	183.0	-295.0	-106.0	-75.0
V ERRORS AND OMISSIONS	-176.7	221.4	538.9	-438.7	-406.1	225.1
RESERVE ASSETS³				2,187.0	2,237.0	2,386.0

1 (+) net inflow, (-) net outflow.

2 (+) decrease, (-) increase.

3 Reserve assets, as defined by the European Central Bank, comprise monetary gold, the reserve position in the IMF, special drawing rights and Bank of Greece claims in foreign currency on non-euro area residents. Excluded are euro-denominated claims on non-euro area residents, claims in foreign currency and in euro on euro area residents and the Bank of Greece share in the capital and reserves of the ECB.

* Provisional data.

Source: Bank of Greece.



Table II.2

Revised nominal exchange rate of the euro, weighted on the basis of Greece's external trade*

(Period averages)

Period	Index (1999 Q1=100)	Percentage changes over: ¹	
		Previous period	Previous year
2003	98.9	4.5	4.5
2004	100.3	1.4	1.4
2005	99.6	-0.7	-0.7
2006	99.7	0.1	0.1
2007	101.1	1.4	1.4
2006 I	98.9	-0.1	-1.6
II	99.8	0.9	0.1
III	100.1	0.3	0.9
IV	100.1	0.0	1.1
2007 I	100.4	0.3	1.5
II	100.9	0.6	1.2
III	101.1	0.1	1.0
IV	102.1	1.0	2.0
2008 I	103.0	0.9	2.6
2005 Jan.	100.7	-0.5	-0.1
Feb.	100.3	-0.4	-0.3
March	100.6	0.3	0.6
April	100.3	-0.3	0.9
May	99.8	-0.4	0.0
June	98.9	-0.9	-0.9
July	99.1	0.2	-0.9
Aug.	99.3	0.2	-0.7
Sept.	99.2	-0.1	-1.0
Oct.	99.1	0.0	-1.4
Nov.	98.9	-0.2	-2.0
Dec.	98.9	0.0	-2.3
2006 Jan.	99.0	0.1	-1.7
Feb.	98.7	-0.3	-1.6
March	98.9	0.3	-1.6
April	99.3	0.4	-1.0
May	99.8	0.5	0.0
June	100.1	0.2	1.2
July	100.1	0.0	1.0
Aug.	100.1	0.0	0.8
Sept.	100.0	-0.1	0.9
Oct.	99.8	-0.2	0.7
Nov.	100.0	0.2	1.2
Dec.	100.4	0.4	1.5
2007 Jan.	100.2	-0.2	1.2
Feb.	100.3	0.2	1.7
March	100.6	0.3	1.7
April	101.0	0.3	1.7
May	101.0	0.0	1.2
June	100.9	-0.1	0.8
July	101.0	0.2	0.9
Aug.	100.9	-0.1	0.8
Sept.	101.3	0.4	1.3
Oct.	101.7	0.4	1.9
Nov.	102.3	0.6	2.2
Dec.	102.4	0.1	1.9
2008 Jan.	102.6	0.3	2.5
Feb.	102.6	0.0	2.5
March	103.8	1.1	3.2
April	104.4	0.6	3.4

* The nominal effective exchange rate (NEER) is the value of a representative basket of foreign currencies, each of which is weighted on the basis of its importance in the country's external trade. Up to end-2000, the NEER of the drachma was calculated by weighting the individual bilateral exchange rates of the drachma against the other currencies, as these rates evolved in the foreign exchange market. Since 1 January 2001, when Greece adopted the euro, the revised NEER index comprises Greece's 28 major trading partners (including the other euro area countries, excluding Malta) and the weights are calculated on the basis of imports and exports of manufacturing goods (categories 5-8 of the Standardised International Trade Classification – SITC 5-8) during the period 1999-2001, also taking account of competition in third countries. This index should not be confused with the effective exchange rate of the euro, calculated by the ECB on the basis of the external trade of the euro area as a whole.

¹ Positive values indicate an appreciation of the euro, negative ones a depreciation.

Source: Bank of Greece.

Table II.3

Bilateral exchange rates of the euro*

(Units of national currency per euro, period averages)

Period	US dollar			Japanese yen			Danish krone			Pound sterling		
		Percentage change over:			Percentage change over:			Percentage change over:			Percentage change over:	
		Previous period	Previous year		Previous period	Previous year		Previous period	Previous year		Previous period	Previous year
2003	1.1312	19.6	19.6	130.97	10.9	10.9	7.4307	0.002	0.002	0.69199	10.0	10.0
2004	1.2439	10.0	10.0	134.44	2.7	2.7	7.4399	0.1	0.1	0.67866	-1.9	-1.9
2005	1.2441	0.02	0.02	136.85	1.8	1.8	7.4518	0.2	0.2	0.68380	0.8	0.8
2006	1.2556	0.9	0.9	146.02	6.7	6.7	7.4591	0.1	0.1	0.68173	-0.3	-0.3
2007	1.3705	9.1	9.1	161.25	10.4	10.4	7.4506	-0.1	-0.1	0.68434	0.4	0.4
2006 I	1.2023	1.2	-8.3	140.51	0.8	2.6	7.4621	0.05	0.3	0.68625	0.9	-1.1
II	1.2582	4.7	-0.1	143.81	2.3	6.2	7.4581	-0.1	0.2	0.68778	0.2	1.4
III	1.2743	1.3	4.5	148.09	3.0	9.2	7.4604	0.03	0.02	0.67977	-1.2	-0.5
IV	1.2887	1.1	8.4	151.72	2.5	8.8	7.4557	-0.1	-0.04	0.67314	-1.0	-1.0
2007 I	1.3106	1.7	9.0	156.43	3.1	11.3	7.4524	-0.04	-0.1	0.67062	-0.4	-2.3
II	1.3481	2.9	7.1	162.89	4.1	13.3	7.4500	-0.03	-0.1	0.67880	1.2	-1.3
III	1.3738	1.9	7.8	161.90	-0.6	9.3	7.4446	-0.1	-0.2	0.68001	0.2	0.03
IV	1.4486	5.4	12.4	163.83	1.2	8.0	7.4557	0.1	0.0	0.70782	4.1	5.2
2008 I	1.4976	3.4	14.3	157.80	-3.7	0.9	7.4534	0.03	0.01	0.75698	6.9	12.9
2006 Jan.	1.2103	2.1	-7.7	139.82	-0.5	3.1	7.4613	0.1	0.3	0.68598	1.0	-1.8
Feb.	1.1938	-1.4	-8.3	140.77	0.7	3.1	7.4641	0.04	0.3	0.68297	-0.4	-1.0
March	1.2020	0.7	-8.9	140.96	0.1	1.5	7.4612	-0.04	0.2	0.68935	0.9	-0.4
April	1.2271	2.1	-5.2	143.59	1.9	3.4	7.4618	0.01	0.2	0.69463	0.8	1.7
May	1.2770	4.1	0.6	142.70	-0.6	5.4	7.4565	-0.07	0.2	0.68330	-1.6	-0.1
June	1.2650	-0.9	4.0	145.11	1.7	9.8	7.4566	0.001	0.2	0.68666	0.5	2.6
July	1.2684	0.3	5.4	146.70	1.1	8.9	7.4602	0.05	0.02	0.68782	0.2	0.04
Aug.	1.2811	1.0	4.2	148.53	1.3	9.2	7.4609	0.01	0.02	0.67669	-1.6	-1.3
Sept.	1.2727	-0.7	3.8	148.99	0.3	9.5	7.4601	-0.01	0.02	0.67511	-0.2	-0.4
Oct.	1.2611	-0.9	5.0	149.65	0.4	8.4	7.4555	-0.06	-0.1	0.67254	-0.4	-1.3
Nov.	1.2881	2.1	9.3	151.11	1.0	8.2	7.4564	0.012	-0.04	0.67397	0.2	-0.8
Dec.	1.3213	2.6	11.4	154.82	2.5	10.1	7.4549	-0.02	0.01	0.67286	-0.2	-0.9
2007 Jan.	1.2999	-1.6	7.4	156.56	1.1	12.0	7.4539	-0.01	-0.1	0.66341	-1.4	-3.3
Feb.	1.3074	0.6	9.5	157.60	0.7	12.0	7.4541	0.003	-0.1	0.66800	0.7	-2.2
March	1.3242	1.3	10.2	155.24	-1.5	10.1	7.4494	-0.06	-0.2	0.68021	1.8	-1.3
April	1.3516	2.1	10.1	160.68	3.5	11.9	7.4530	0.05	-0.1	0.67934	-0.1	-2.2
May	1.3511	-0.04	5.8	163.22	1.6	14.4	7.4519	-0.01	-0.1	0.68136	0.3	-0.3
June	1.3419	-0.7	6.1	164.55	0.8	13.4	7.4452	-0.09	-0.2	0.67562	-0.8	-1.6
July	1.3716	2.2	8.1	166.76	1.3	13.7	7.4410	-0.06	-0.3	0.67440	-0.2	-1.95
Aug.	1.3622	-0.7	6.3	159.05	-4.6	7.1	7.4429	0.03	-0.2	0.67766	0.5	0.1
Sept.	1.3896	2.0	9.2	159.82	0.5	7.3	7.4506	0.1	-0.1	0.68887	1.7	2.0
Oct.	1.4227	2.4	12.8	164.95	3.2	10.2	7.4534	0.04	-0.03	0.69614	1.1	3.5
Nov.	1.4684	3.2	14.0	162.89	-1.2	7.8	7.4543	0.01	-0.03	0.70896	1.8	5.2
Dec.	1.4570	-0.8	10.3	163.55	0.4	5.6	7.4599	0.1	0.1	0.72064	1.6	7.1
2008 Jan.	1.4718	1.0	13.2	158.68	-3.0	1.4	7.4505	-0.1	-0.05	0.74725	3.7	12.6
Feb.	1.4748	0.2	12.8	157.97	-0.4	0.2	7.4540	0.05	-0.001	0.75094	0.5	12.4
March	1.5527	5.3	17.3	156.59	-0.9	0.9	7.4561	0.03	0.1	0.77494	3.2	13.9
April	1.5751	1.4	16.5	161.56	3.2	0.5	7.4603	0.1	0.1	0.79487	2.6	17.0

* Positive values indicate an appreciation of the euro, negative ones a depreciation.

Sources: Bank of Greece and European Central Bank (ECB).



Table II.3 (continued)

Bilateral exchange rates of the euro*

(Units of national currency per euro, period averages)

Period	Swedish krona			Swiss franc			Norwegian krone			Australian dollar			Canadian dollar		
		Percentage change over:			Percentage change over:			Percentage change over:			Percentage change over:			Percentage change over:	
		Pre-previous period	Pre-previous year		Pre-previous period	Pre-previous year		Pre-previous period	Pre-previous year		Pre-previous period	Pre-previous year		Pre-previous period	Pre-previous year
2003	9.12	-0.4	-0.4	1.521	3.7	3.7	8.00	6.6	6.6	1.738	0.02	0.02	1.582	6.6	6.6
2004	9.12	0.001	0.001	1.544	1.5	1.5	8.37	4.6	4.6	1.690	-2.7	-2.7	1.617	2.2	2.2
2005	9.28	1.7	1.7	1.548	0.3	0.3	8.01	-4.3	-4.3	1.632	-3.5	-3.5	1.509	-6.7	-6.7
2006	9.25	-0.3	-0.3	1.573	1.6	1.6	8.05	0.5	0.5	1.667	2.1	2.1	1.424	-5.6	-5.6
2007	9.25	0.0	0.0	1.643	4.4	4.4	8.02	-0.4	-0.4	1.635	-1.9	-1.9	1.468	3.1	3.1
2006 I	9.35	-1.3	3.1	1.559	0.8	0.7	8.02	1.8	-2.6	1.627	1.8	-3.6	1.389	-0.4	-13.6
II	9.30	-0.6	1.0	1.563	0.3	1.3	7.83	-2.4	-2.7	1.684	3.5	2.7	1.411	1.5	-10.0
III	9.23	-0.7	-1.4	1.577	0.9	1.5	8.06	2.9	2.3	1.683	-0.04	4.8	1.428	1.2	-2.6
IV	9.14	-1.0	-3.6	1.593	1.0	2.9	8.27	2.6	5.0	1.674	-0.5	4.7	1.467	2.7	5.1
2007 I	9.19	0.6	-1.7	1.616	1.5	3.7	8.17	-1.2	1.8	1.667	-0.4	2.4	1.536	4.7	10.5
II	9.26	0.7	-0.4	1.648	2.0	5.4	8.11	-0.8	3.5	1.621	-2.7	-3.7	1.479	-3.7	4.8
III	9.26	0.1	0.4	1.647	-0.03	4.5	7.92	-2.3	-1.8	1.623	0.1	-3.6	1.437	-2.8	0.6
IV	9.29	0.3	1.7	1.660	0.7	4.2	7.88	-0.5	-4.8	1.628	0.3	-2.8	1.420	-1.2	-3.2
2008 I	9.40	1.2	2.3	1.601	-3.5	-0.9	7.96	1.0	-2.6	1.653	1.6	-0.8	1.502	5.8	-2.2
2006 Jan.	9.31	-1.3	2.9	1.549	0.1	0.2	8.04	0.8	-2.1	1.615	1.1	-5.8	1.402	1.8	-12.7
Feb.	9.34	0.3	2.8	1.558	0.6	0.5	8.06	0.3	-3.1	1.610	-0.3	-3.4	1.372	-2.2	-14.9
March	9.40	0.6	3.4	1.569	0.7	1.3	7.98	-1.0	-2.6	1.654	2.7	-1.6	1.392	1.4	-13.4
April	9.33	-0.7	1.8	1.575	0.4	1.8	7.84	-1.7	-4.1	1.666	0.7	-0.5	1.405	1.0	-12.1
May	9.33	-0.04	1.5	1.556	-1.2	0.7	7.80	-0.5	-3.5	1.671	0.3	0.9	1.417	0.9	-11.1
June	9.23	-1.0	-0.3	1.560	0.2	1.4	7.86	0.7	-0.5	1.710	2.3	7.7	1.409	-0.6	-6.8
July	9.22	-0.2	-2.2	1.569	0.5	0.7	7.94	1.1	0.2	1.687	-1.4	5.4	1.430	1.5	-2.9
Aug.	9.21	-0.1	-1.4	1.578	0.6	1.6	7.99	0.7	1.0	1.679	-0.5	4.0	1.434	0.2	-3.2
Sept.	9.27	0.6	-0.7	1.584	0.4	2.2	8.26	3.3	5.7	1.684	0.3	5.2	1.420	-0.9	-1.7
Oct.	9.25	-0.1	-1.8	1.590	0.4	2.6	8.40	1.7	7.2	1.673	-0.6	5.0	1.424	0.2	0.6
Nov.	9.10	-1.6	-4.8	1.592	0.2	3.1	8.24	-1.8	5.3	1.668	-0.3	4.1	1.463	2.8	5.0
Dec.	9.04	-0.7	-4.2	1.597	0.3	3.2	8.16	-1.1	2.3	1.681	0.8	5.2	1.521	3.9	10.4
2007 Jan.	9.08	0.5	-2.5	1.615	1.2	4.3	8.28	1.5	3.0	1.660	-1.3	2.8	1.528	0.5	9.0
Feb.	9.19	1.2	-1.6	1.621	0.4	4.1	8.09	-2.3	0.4	1.671	0.6	3.8	1.531	0.2	11.6
March	9.30	1.2	-1.1	1.612	-0.5	2.8	8.13	0.6	2.0	1.670	-0.02	1.0	1.547	1.1	11.2
April	9.24	-0.7	-1.0	1.637	1.6	4.0	8.12	-0.2	3.5	1.634	-2.2	-2.0	1.533	-0.9	9.1
May	9.21	-0.34	-1.3	1.651	0.8	6.1	8.14	0.2	4.4	1.638	0.3	-2.0	1.480	-3.5	4.4
June	9.33	1.3	1.0	1.654	0.2	6.0	8.06	-1.0	2.6	1.593	-2.7	-6.9	1.429	-3.4	1.4
July	9.18	-1.6	-0.4	1.657	0.1	5.6	7.94	-1.5	-0.01	1.581	-0.8	-6.3	1.442	0.9	0.8
Aug.	9.32	1.5	1.2	1.638	-1.1	3.9	7.97	0.4	-0.2	1.644	4.0	-2.1	1.442	0.02	0.6
Sept.	9.28	-0.4	0.2	1.647	0.6	4.0	7.83	-1.8	-5.2	1.644	0.01	-2.3	1.427	-1.0	0.5
Oct.	9.17	-1.2	-0.9	1.671	1.4	5.1	7.70	-1.7	-8.3	1.584	-3.7	-5.4	1.389	-2.7	-2.4
Nov.	9.29	1.3	2.1	1.649	-1.3	3.5	7.95	3.3	-3.5	1.637	3.4	-1.9	1.416	2.0	-3.2
Dec.	9.43	1.5	4.4	1.659	0.6	3.9	8.01	0.8	-1.8	1.670	2.0	-0.7	1.462	3.2	-3.9
2008 Jan.	9.43	-0.01	3.9	1.620	-2.3	0.3	7.96	-0.7	-3.9	1.669	-0.1	0.6	1.486	1.7	-2.8
Feb.	9.36	-0.7	1.9	1.608	-0.8	-0.8	7.95	-0.1	-1.7	1.616	-3.2	-3.3	1.474	-0.8	-3.7
March	9.40	0.4	1.1	1.572	-2.2	-2.5	7.97	0.3	-2.0	1.676	3.8	0.4	1.552	5.3	0.3
April	9.37	-0.3	1.4	1.596	1.5	-2.5	7.96	-0.1	-1.9	1.693	1.0	3.7	1.596	2.9	4.1

* Positive values indicate an appreciation of the euro, negative ones a depreciation.

Sources: Bank of Greece and European Central Bank (ECB).

Table III.1

Monetary aggregates of the euro area¹

(Outstanding balances in billion euro, not seasonally adjusted)

End of period	Currency in circulation (1)	Overnight deposits (2)	M1 (3)=(1)+(2)	Deposits with agreed maturity up to 2 years (4)	Deposits redeemable at notice up to 3 months (5)	M2 (6)=(3)+(4)+ + (5)	Repurchase agreements (repos) (7)	Money market fund units (8)	Money market paper and debt securities with initial maturity up to 2 years (9)	M3 ² (10)=(6)+(7)+ +(8)+(9)
2003	397.9	2,329.2	2,727.1	1,039.2	1,529.6	5,295.8	208.7	581.5	92.7	6,178.7
2004	468.4	2,480.5	2,948.9	1,040.5	1,642.9	5,632.2	229.7	604.9	102.3	6,568.2
2005	532.8	2,946.8	3,479.6	1,123.7	1,549.6	6,152.9	221.9	615.8	126.2	7,116.8
2006	592.2	3,164.3	3,756.5	1,414.8	1,557.1	6,728.4	248.0	614.1	198.7	7,789.3
2007	638.5	3,262.0	3,900.5	1,985.0	1,539.6	7,425.2	283.0	660.6	316.8	8,685.6
2005 Jan.	459.9	2,506.1	2,966.0	1,015.4	1,655.9	5,637.3	228.7	616.4	99.2	6,581.6
Feb.	463.6	2,506.6	2,970.7	1,013.0	1,660.3	5,643.4	227.0	615.4	114.1	6,599.9
March ...	471.8	2,525.8	2,997.6	1,017.7	1,665.2	5,680.4	227.0	614.5	106.0	6,627.8
April	481.1	2,550.0	3,031.1	1,034.8	1,672.5	5,738.4	226.3	627.8	121.0	6,713.4
May	485.8	2,578.3	3,064.1	1,035.7	1,678.7	5,778.4	239.2	634.8	113.5	6,766.0
June	496.6	2,807.8	3,304.4	1,027.4	1,520.2	5,851.9	238.8	621.1	118.8	6,830.7
July	506.4	2,815.3	3,321.8	1,042.5	1,525.7	5,890.0	238.6	635.1	119.2	6,882.9
Aug.	500.9	2,767.7	3,268.6	1,054.3	1,530.0	5,852.9	249.2	639.7	121.0	6,862.8
Sept.	507.1	2,815.4	3,322.5	1,078.4	1,532.0	5,933.0	234.4	631.5	119.9	6,918.7
Oct.	510.5	2,838.8	3,349.3	1,088.7	1,532.2	5,970.3	241.4	629.0	121.4	6,962.0
Nov.	514.5	2,864.0	3,378.5	1,085.9	1,531.3	5,995.7	239.3	629.6	130.0	6,994.7
Dec.	532.8	2,946.8	3,479.6	1,123.6	1,549.6	6,152.9	221.9	615.8	126.2	7,116.8
2006 Jan.	520.8	2,922.2	3,443.1	1,113.7	1,565.7	6,122.5	237.0	608.4	143.4	7,111.3
Feb.	524.8	2,917.2	3,442.0	1,134.8	1,569.2	6,146.1	235.0	610.2	152.7	7,143.9
March ...	532.3	2,936.0	3,468.2	1,162.0	1,570.9	6,201.2	235.9	603.1	163.1	7,203.3
April	540.3	2,992.0	3,532.3	1,201.5	1,569.3	6,303.1	249.7	613.1	163.9	7,329.7
May	543.6	3,006.5	3,550.1	1,189.1	1,568.5	6,307.7	258.2	621.6	173.7	7,361.2
June	553.7	3,044.4	3,598.1	1,208.7	1,565.7	6,372.5	245.1	616.5	161.8	7,395.9
July	562.7	3,009.8	3,572.5	1,232.9	1,562.6	6,368.0	250.5	627.4	160.3	7,406.2
Aug.	559.0	2,956.9	3,515.9	1,267.8	1,562.6	6,346.3	264.9	639.7	179.1	7,430.0
Sept.	563.2	3,018.2	3,581.4	1,304.8	1,558.9	6,445.1	263.8	645.6	178.7	7,533.2
Oct.	567.1	2,996.5	3,563.5	1,341.7	1,551.8	6,457.1	261.2	644.7	194.3	7,557.3
Nov.	571.5	3,038.2	3,609.7	1,367.3	1,543.5	6,520.5	260.8	636.9	199.4	7,617.6
Dec.	592.2	3,164.3	3,756.5	1,414.8	1,557.1	6,728.4	248.0	614.1	198.7	7,789.3
2007 Jan.	575.6	3,106.1	3,681.8	1,446.4	1,558.4	6,686.5	262.3	641.5	220.7	7,811.1
Feb.	578.7	3,095.3	3,674.0	1,469.6	1,547.0	6,690.6	268.8	652.5	231.8	7,843.7
March ...	588.3	3,146.9	3,735.3	1,534.1	1,544.8	6,814.2	282.0	666.3	239.9	8,002.5
April	594.7	3,157.9	3,752.7	1,572.7	1,537.2	6,862.5	281.6	681.9	242.4	8,068.4
May	597.6	3,179.3	3,776.9	1,599.7	1,533.4	6,910.0	285.2	702.5	255.0	8,152.7
June	604.9	3,240.2	3,845.1	1,634.3	1,526.3	7,005.7	282.2	699.1	242.8	8,229.8
July	612.9	3,217.9	3,830.8	1,694.8	1,516.1	7,041.7	287.1	712.6	240.2	8,281.6
Aug.	610.5	3,137.8	3,748.3	1,765.5	1,508.1	7,021.9	297.6	706.1	260.8	8,286.6
Sept.	610.4	3,212.7	3,823.1	1,795.6	1,501.6	7,120.3	293.7	680.7	282.4	8,377.2
Oct.	613.5	3,176.6	3,790.1	1,890.9	1,525.1	7,206.1	291.9	684.1	299.8	8,482.0
Nov.	618.6	3,211.9	3,830.5	1,916.0	1,518.8	7,265.3	300.2	696.7	312.4	8,574.6
Dec.	638.5	3,262.0	3,900.5	1,985.0	1,539.6	7,425.2	283.0	660.6	316.8	8,685.6
2007 Jan.	623.1	3,227.4	3,850.6	2,044.9	1,545.7	7,441.2	307.4	737.3	298.9	8,784.7
Feb.	628.7	3,171.2	3,799.9	2,121.2	1,542.9	7,464.1	314.4	750.1	271.5	8,800.5
March ...	632.9	3,220.1	3,853.0	2,136.5	1,548.3	7,536.8	313.0	742.5	287.5	8,886.3
April* ...	641.3	3,197.2	3,838.5	2,239.7	1,546.4	7,624.7	328.8	750.7	268.5	8,972.7

1 Monetary aggregates comprise monetary liabilities of MFIs and central government (Postal Savings Bank, Ministry of Finance) vis-à-vis non-MFI euro area residents excluding central government.

2 M3 and its components exclude non-euro area residents' holdings of money market fund units, money market paper and debt securities with initial maturity up to 2 years.

* Provisional data.

Source: ECB.



Table III.2

Greek contribution to the main monetary aggregates of the euro area

(Outstanding balances in billion euro, not seasonally adjusted)

End of period	Overnight deposits		Deposits with agreed maturity up to 2 years	Deposits redeemable at notice up to 3 months ¹	Repurchase agreements (repos)	Money market fund units	Debt securities with maturity up to 2 years ²	Total ³ (M3 excluding currency in circulation)	
	Sight and current account	Savings							
(1)	(1.1)	(1.2)	(2)	(3)	(4)	(5)	(6)	(7)=(1)+(2)+ +(3)+(4)+ +(5)+(6)	
2003	79.5	17.6	61.9	32.3	2.0	10.8	15.7	0.5	140.8
2004	91.7	20.7	71.0	33.4	1.9	9.5	15.2	0.5	152.3
2005	99.2	24.8	74.4	51.8	4.4	2.7	4.9	0.4	163.4
2006	100.1	26.0	74.1	69.3	2.9	1.6	5.8	0.5	180.2
2007	98.8	28.2	70.6	97.6	2.3	0.7	7.9	-1.6	205.7
2005 Jan.	90.4	19.8	70.6	37.8	2.0	5.6	14.9	0.5	151.2
Feb.	91.9	20.8	71.1	39.4	2.0	4.4	14.6	0.5	152.8
March ...	90.9	20.4	70.6	41.0	2.0	4.2	14.2	0.4	152.6
April	91.1	20.2	70.9	42.3	2.6	3.8	13.0	0.5	153.4
May	91.5	20.2	71.2	42.6	2.8	4.1	12.5	0.5	153.9
June	96.8	23.9	72.9	42.2	3.1	3.7	10.9	0.4	157.2
July	93.8	21.8	72.0	44.4	3.3	3.3	10.7	0.4	155.9
Aug.	93.5	21.2	72.3	45.6	3.6	3.3	10.1	0.3	156.4
Sept.	94.8	22.5	72.3	46.2	3.9	3.3	7.3	0.4	155.9
Oct.	95.5	23.2	72.3	49.2	4.1	2.6	6.2	0.4	158.0
Nov.	94.9	23.1	71.8	50.6	4.5	2.7	5.5	0.4	158.6
Dec.	99.2	24.8	74.4	51.8	4.4	2.7	4.9	0.4	163.4
2006 Jan.	95.8	22.7	73.1	53.8	4.4	2.6	4.7	0.4	161.7
Feb.	95.3	22.6	72.7	55.1	4.5	2.5	4.7	0.4	162.5
March ...	95.3	22.7	72.6	56.8	4.1	2.5	4.6	0.5	163.9
April	95.6	22.3	73.3	57.9	4.0	2.4	4.6	0.6	165.1
May	95.8	22.6	73.2	59.0	3.7	2.4	4.9	0.6	166.5
June	99.2	25.1	74.0	60.4	3.6	2.5	5.2	0.6	171.5
July	98.0	24.2	73.8	61.7	3.5	2.1	5.3	0.6	171.1
Aug.	97.0	23.4	73.6	63.3	3.4	2.0	5.4	0.6	171.7
Sept.	96.8	23.4	73.3	63.7	3.3	2.1	5.5	0.5	171.9
Oct.	95.3	23.1	72.3	65.4	3.2	1.9	5.6	0.5	171.9
Nov.	95.3	23.4	71.9	66.8	3.0	1.6	5.7	0.5	173.0
Dec.	100.1	26.0	74.1	69.3	2.9	1.6	5.8	0.5	180.2
2007 Jan.	95.5	23.9	71.7	72.9	2.9	1.5	5.9	0.4	179.1
Feb.	95.0	24.0	71.0	73.7	2.8	1.4	6.2	0.3	179.5
March ...	96.7	25.3	71.4	76.0	2.7	1.2	6.5	0.3	183.4
April	96.2	24.4	71.8	77.3	2.7	1.1	6.7	0.2	184.2
May	94.3	24.4	69.8	79.4	2.7	1.3	7.0	-0.5	184.2
June	99.8	27.6	72.2	80.8	2.7	1.4	7.5	-1.1	191.0
July	96.7	25.3	71.4	87.8	2.6	1.0	7.6	-1.8	194.0
Aug.	96.5	25.4	71.1	88.4	2.6	0.9	7.8	-1.9	194.3
Sept.	96.1	25.3	70.8	89.1	2.5	0.8	7.8	-1.7	194.6
Oct.	94.3	25.3	69.0	92.0	2.4	0.9	8.0	-1.8	195.8
Nov.	94.6	26.5	68.1	94.9	2.3	0.8	8.1	-1.6	199.0
Dec.	98.8	28.2	70.6	97.6	2.3	0.7	7.9	-1.6	205.7
2008 Jan.	93.7	25.7	68.0	102.9	2.1	0.7	7.7	-1.1	206.1
Feb.	91.1	24.7	66.4	106.3	2.2	0.6	7.8	-0.5	207.6
March ...	93.3	27.2	66.2	107.1	2.1	0.6	7.8	0.2	211.2
April	92.2	25.4	66.8	110.6	2.1	0.5	7.6	0.4	213.4

1 Including savings deposits in currencies other than the euro.

2 This aggregate is calculated on a consolidated basis with the other euro area countries and thus does not include domestic MFIs' holdings of debt securities with maturity up to two years issued by euro area MFIs.

3 The Greek M3 (as any other euro area national M3) can no longer be accurately calculated, since part of the quantity of the euro banknotes and coins that have been put into circulation in a euro area country is held by residents of other euro area countries and/or by non-residents. Due to these technical problems, the compilation of the Greek M0, M1, M2 and M3 was interrupted in January 2003.

Source: Bank of Greece.

Table III.3

Greece: deposits of domestic firms and households with OMFIs,¹ by currency and type*(Outstanding balances in million euro, not seasonally adjusted)*

End of period	Total deposits	By currency		By type		
		Deposits in euro	Deposits in other currencies	Sight deposits	Savings deposits	Time deposits ²
2003	115,750.1	98,119.3	17,630.8	15,395.8	65,141.1	35,213.2
2004	128,424.6	110,206.7	18,217.9	18,274.2	73,954.2	36,196.1
2005	156,857.7	135,797.3	21,060.4	22,180.2	79,800.8	54,876.1
2006	173,370.4	151,321.5	22,048.9	23,525.0	77,858.2	71,987.2
2007	197,233.6	173,494.0	23,739.7	25,014.1	73,561.9	98,657.6
2005 Jan.	131,749.7	114,232.0	17,517.7	17,586.6	73,515.5	40,647.6
Feb.	134,088.9	116,771.1	17,317.8	17,866.2	74,096.0	42,126.7
March	134,801.8	116,303.2	18,498.7	17,521.9	73,527.1	43,752.9
April	136,854.8	118,087.9	18,766.9	17,333.7	74,453.1	45,068.0
May	137,472.3	118,223.8	19,248.5	17,189.9	75,046.6	45,235.8
June	142,951.8	123,548.2	19,403.6	20,868.4	77,036.6	45,046.9
July	142,705.3	122,700.2	20,005.1	19,144.9	76,318.4	47,241.9
Aug.	143,733.0	123,239.3	20,493.7	18,436.6	76,764.9	48,531.5
Sept.	146,180.7	125,211.8	20,968.9	19,789.0	77,143.1	49,248.6
Oct.	150,136.2	129,055.6	21,080.6	20,542.2	77,351.8	52,242.2
Nov.	151,140.9	129,736.1	21,404.8	20,228.8	77,297.6	53,614.4
Dec.	156,857.7	135,797.3	21,060.4	22,180.2	79,800.8	54,876.7
2006 Jan.	155,334.6	134,509.7	20,824.9	20,097.8	78,361.8	56,875.1
Feb.	156,125.0	134,733.6	21,391.4	19,797.5	78,114.4	58,213.2
March	157,740.9	136,352.9	21,388.0	20,229.3	77,611.2	59,900.5
April	158,730.2	137,689.9	21,040.3	19,707.4	78,160.7	60,862.1
May	159,942.6	138,812.0	21,130.6	20,063.9	77,829.2	62,049.5
June	164,328.2	143,200.2	21,128.0	22,398.2	78,543.2	63,386.8
July	164,473.3	143,231.3	21,242.0	21,667.6	78,137.8	64,667.9
Aug.	164,706.1	143,088.1	21,618.0	20,710.5	77,844.8	66,150.8
Sept.	164,750.2	143,309.9	21,440.3	20,693.0	77,479.1	66,578.1
Oct.	164,848.2	143,096.0	21,752.2	20,410.6	76,266.5	68,171.1
Nov.	166,195.3	144,335.6	21,859.7	21,116.2	75,520.4	69,558.6
Dec.	173,370.4	151,321.5	22,048.9	23,525.0	77,858.2	71,987.2
2007 Jan.	171,937.9	149,321.7	22,616.2	20,943.4	75,322.8	75,671.7
Feb.	172,166.2	150,424.2	21,742.0	21,109.9	74,619.3	76,437.1
March	176,068.3	154,217.8	21,850.5	22,393.5	74,931.5	78,743.4
April	177,261.9	155,599.4	21,662.5	21,878.6	75,236.8	80,146.5
May	177,486.2	154,859.0	22,627.2	21,160.9	73,954.4	82,370.9
June	184,148.2	161,027.9	23,120.2	24,695.0	75,647.6	83,805.6
July	188,181.4	164,079.4	24,102.0	22,986.3	74,519.2	90,675.9
Aug.	188,054.4	163,993.2	24,061.2	22,398.6	74,358.8	91,297.0
Sept.	188,469.8	164,667.0	23,802.8	22,697.5	73,977.4	91,794.9
Oct.	187,503.6	163,407.0	24,096.6	22,480.6	72,098.4	92,924.6
Nov.	190,515.3	166,375.1	24,140.2	23,484.5	71,094.5	95,936.3
Dec.	197,233.6	173,494.0	23,739.7	25,014.1	73,561.9	98,657.6
2008 Jan.	196,029.3	171,471.0	24,558.4	21,730.7	70,740.5	103,558.2
Feb.	197,402.8	172,633.7	24,769.0	21,120.5	69,152.9	107,129.4
March	200,449.3	176,402.8	24,046.5	23,638.8	68,859.6	107,950.9
April	202,570.1	177,766.0	24,804.1	22,180.9	69,469.6	110,919.6

1 Other Monetary Financial Institutions (OMFIs) comprise credit institutions (other than the Bank of Greece) and money market funds.

2 Including blocked deposits.

Source: Bank of Greece.



Table III.4

Domestic MFI loans to domestic firms and households, by branch of economic activity

(Outstanding balances in million euro)

End of period	Grand total	Enterprises						Households			
		Total	Agri-culture	Industry ¹	Trade	Tourism	Other	Total	Housing	Consumer	Other
2000	59,330.0	42,360.3	3,884.9	11,823.7	12,374.2	1,814.3	12,463.2	16,969.7	11,271.9	5,511.3	186.5
2001	74,027.4	50,198.7	3,724.2	12,614.9	15,524.3	2,171.3	16,164.0	23,828.7	15,652.2	7,852.0	324.5
2002	86,510.5	55,012.2	3,224.7	14,364.0	15,670.8	2,903.2	18,849.5	31,498.3	21,224.7	9,755.4	518.2
2003	101,178.1	60,979.3	3,082.7	15,865.1	16,514.4	3,488.2	22,028.9	40,198.8	26,534.2	12,409.6	1,255.0
2004	117,201.7	65,566.3	3,248.0	15,675.6	18,821.6	4,040.0	23,781.1	51,635.4	33,126.8	17,053.8	1,454.8
2005	136,981.1	71,282.9	2,954.0	15,753.8	19,958.4	4,189.8	28,426.9	65,698.2	43,199.4	20,850.0	1,648.8
2006	156,896.4	76,659.8	3,051.0	16,371.4	20,572.0	4,194.1	32,471.3	80,236.6	52,502.5	25,599.2	2,134.9
2007	183,722.2	89,755.1	3,228.1	17,347.0	23,603.7	4,637.7	40,938.6	93,967.1	63,613.1	27,543.3	2,810.7
2006 Jan.	137,731.3	70,999.2	2,948.7	15,690.0	19,672.8	4,205.7	28,482.0	66,732.1	44,010.6	21,047.7	1,673.8
Feb.	139,714.7	71,491.8	2,957.3	15,747.6	19,389.1	4,248.8	29,149.0	68,222.9	44,873.8	21,637.5	1,711.6
March	142,633.3	72,960.5	3,086.1	15,955.2	19,843.2	4,356.4	29,719.6	69,672.8	45,919.6	22,045.2	1,708.0
April	144,593.1	73,944.8	3,098.7	16,399.3	20,160.3	4,352.3	29,934.2	70,648.3	46,612.7	22,344.3	1,691.3
May	145,477.5	74,372.3	3,105.7	16,661.9	19,876.8	4,377.7	30,350.2	71,105.2	46,539.9	22,815.5	1,749.8
June.	148,322.9	76,259.8	3,192.4	16,900.2	20,531.4	4,416.8	31,219.0	72,063.1	46,929.0	23,275.7	1,858.4
July	150,012.0	76,374.7	3,203.6	16,706.6	20,573.2	4,350.0	31,541.3	73,637.3	48,165.4	23,610.7	1,861.2
Aug.	150,031.2	76,033.8	3,204.1	16,658.0	20,371.5	4,301.8	31,498.4	73,997.4	48,138.4	23,956.0	1,903.0
Sept.	152,943.1	77,450.6	3,239.2	16,769.4	20,916.6	4,337.6	32,187.8	75,492.5	49,140.0	24,394.4	1,958.1
Oct.	153,584.8	76,893.8	3,226.8	16,627.6	20,662.5	4,346.0	32,030.9	76,691.0	49,923.5	24,709.6	2,057.9
Nov.	152,551.9	74,519.8	3,141.2	16,223.8	19,823.8	4,213.5	31,117.5	78,032.1	50,672.3	25,283.7	2,076.1
Dec.	156,896.4	76,659.8	3,051.0	16,371.4	20,572.0	4,194.1	32,471.3	80,236.6	52,502.5	25,599.2	2,134.9
2007 Jan.	157,445.6	75,917.1	3,021.6	16,099.9	20,119.0	4,218.6	32,458.0	81,528.5	53,517.4	25,881.3	2,129.8
Feb.	159,987.8	77,080.3	3,039.1	16,168.8	20,500.8	4,327.7	33,043.9	82,907.5	54,619.9	26,114.4	2,173.2
March	164,281.1	79,285.9	3,049.5	16,366.8	21,120.2	4,355.7	34,393.7	84,995.2	56,200.1	26,572.7	2,222.4
April	165,479.2	79,008.3	3,005.9	16,364.7	21,008.8	4,361.1	34,267.8	86,470.9	57,218.4	27,071.9	2,180.6
May	168,128.9	79,941.2	3,034.2	16,706.6	21,238.3	4,380.6	34,581.5	88,187.7	58,277.3	27,714.2	2,196.2
June.	173,093.9	84,391.7	3,206.8	17,077.7	22,083.4	4,439.4	37,584.4	88,702.2	58,156.5	28,101.5	2,444.2
July	173,441.0	84,073.0	3,216.2	16,876.8	22,117.2	4,388.6	37,474.2	89,368.0	58,169.6	28,596.5	2,601.9
Aug.	175,889.4	85,133.8	3,276.4	16,979.5	22,211.6	4,346.8	38,319.5	90,755.6	59,067.4	29,055.8	2,632.4
Sept.	179,091.2	86,801.4	3,287.6	17,211.2	22,677.0	4,386.2	39,239.4	92,289.8	60,119.2	29,466.4	2,704.2
Oct.	180,197.8	86,146.6	3,310.4	17,098.1	22,685.0	4,420.3	38,632.8	94,051.2	61,052.5	30,101.9	2,896.8
Nov.	179,873.5	87,830.9	3,320.9	17,420.5	22,932.6	4,466.7	39,690.2	92,042.6	62,158.7	27,128.2	2,755.7
Dec.	183,722.2	89,755.1	3,228.1	17,347.0	23,603.7	4,637.7	40,938.6	93,967.1	63,613.1	27,543.3	2,810.7
2008 Jan.	185,746.7	90,623.4	3,300.7	17,447.4	23,749.0	4,673.8	41,452.5	95,123.3	64,361.2	27,995.2	2,766.9
Feb.	187,446.5	91,656.1	3,464.6	17,708.8	23,917.3	4,772.6	41,792.8	95,790.4	64,142.7	28,835.5	2,812.2
March	191,179.8	94,055.5	3,496.6	17,955.6	24,688.4	4,890.2	43,024.7	97,124.3	65,042.9	29,193.5	2,887.9
April	191,848.4	94,548.9	3,560.3	18,030.0	24,968.9	4,935.9	43,053.8	97,299.5	64,928.0	29,597.8	2,773.7

¹ Comprising manufacturing and mining.

Source: Bank of Greece.

Table III.5
ECB and Bank of Greece interest rates
(Percentages per annum)

1. ECB interest rates				2. Bank of Greece interest rates						
With effect from: ¹	Deposit facility	Main refinancing operations ³	Marginal lending facility	With effect from:	Overnight deposit facility, first tier ⁴	Overnight deposit facility, second tier ⁴	14-day intervention rate	Lombard rate		
1999	1 Jan.	2.00	3.00	4.50	1999	14 Jan.	11.50	9.75	12.00	13.50
	4 Jan. ²	2.75	3.00	3.25		21 Oct.	11.00	9.75	11.50	13.00
	22 Jan.	2.00	3.00	4.50		16 Dec.	10.25	9.25	10.75	12.25
	9 April	1.50	2.50	3.50		27 Dec.	10.25	9.00	10.75	11.50
	5 Nov.	2.00	3.00	4.00						
2000	4 Feb.	2.25	3.25	4.25	2000	27 Jan.	9.50	8.50	9.75	11.00
	17 March	2.50	3.50	4.50		9 March	8.75	8.00	9.25	10.25
	28 April	2.75	3.75	4.75		20 April	8.00	7.50	8.75	9.50
	9 June	3.25	4.25	5.25		29 June	7.25	–	8.25	9.00
	28 June ³	3.25	4.25	5.25		6 Sept.	6.50	–	7.50	8.25
	1 Sept.	3.50	4.50	5.50		15 Nov.	6.00	–	7.00	7.75
	6 Oct.	3.75	4.75	5.75		29 Nov.	5.50	–	6.50	7.25
						13 Dec.	4.75	–	5.75	6.50
						27 Dec.	3.75	–	4.75	5.75
2001	11 May	3.50	4.50	5.50						
	31 Aug.	3.25	4.25	5.25						
	18 Sept.	2.75	3.75	4.75						
	9 Nov.	2.25	3.25	4.25						
2002	6 Dec.	1.75	2.75	3.75						
2003	7 March	1.50	2.50	3.50						
	6 June	1.00	2.00	3.00						
2005	6 Dec.	1.25	2.25	3.25						
2006	8 March	1.50	2.50	3.50						
	15 June	1.75	2.75	3.75						
	9 Aug.	2.00	3.00	4.00						
	11 Oct.	2.25	3.25	4.25						
	13 Dec.	2.50	3.50	4.50						
2007	14 March	2.75	3.75	4.75						
	13 June	3.00	4.00	5.00						

1 From 1 January 1999 to 9 March 2004, the date refers to the deposit and marginal lending facilities. For main refinancing operations, changes in the rate are effective from the first operation following the date indicated. The change on 18 September 2001 was effective on that same day. From 10 March 2004 onwards, the date refers to the deposit and marginal lending facilities and to the main refinancing operations (changes effective from the first main refinancing operation following the Governing Council decision), unless otherwise indicated.

2 On 22 December 1998 the ECB announced that, as an exceptional measure between 4 and 21 January 1999, a narrow corridor of 50 basis points would be applied between the interest rate for the marginal lending facility and that for the deposit facility, aimed at facilitating the transition of market participants to the new monetary regime.

3 On 8 June 2000, the ECB announced that, starting from the operation to be settled on 28 June 2000, the main refinancing operations of the Eurosystem would be conducted as variable rate tenders. The minimum bid rate refers to the minimum interest rate at which counterparties may place their bids.

4 On 29 June 2000 the second tier of the deposit facility was abolished; the interest rate thereafter applies to the unified deposit acceptance account.

Sources: ECB and Bank of Greece.



Table III.6
Greek government paper yields
(Percentages per annum, period averages)

Period	Yield on one-year Treasury bills	Yield on government bonds						
		3-year	5-year	7-year	10-year	15-year	20-year	32-year
2003	2.34	2.82	3.37	3.83	4.27	4.32	4.91	, , ,
2004	2.27	2.87	3.37	3.81	4.26	4.53	4.77	, , ,
2005	2.33	2.65	2.92	3.22	3.59	3.80	3.92	4.14
2006	3.44	3.58	3.72	3.87	4.07	4.16	4.23	4.42
2007	4.45	4.21	4.30	4.34	4.50	4.67	–	4.81
2005 Jan.	2.31	2.72	2.96	3.29	3.69	3.99	4.12	, , ,
Feb.	2.31	2.80	2.97	3.34	3.69	3.94	4.04	, , ,
March	2.34	2.88	3.06	3.56	3.92	4.12	4.24	4.49
April	2.27	2.70	3.06	3.37	3.76	3.98	4.11	4.38
May	2.19	2.55	2.89	3.21	3.60	3.82	3.95	4.21
June	2.10	2.35	2.70	3.02	3.44	3.66	3.79	4.05
July	2.17	2.42	2.75	3.06	3.46	3.71	3.84	4.10
Aug.	2.22	2.49	2.79	3.07	3.47	3.69	3.82	4.08
Sept.	2.22	2.42	2.66	2.92	3.30	3.52	3.64	3.91
Oct.	2.41	2.66	2.88	3.11	3.45	3.64	3.75	4.00
Nov.	2.69	2.91	3.15	3.36	3.67	3.84	3.94	4.14
Dec.	2.78	2.95	3.14	3.31	3.57	3.73	3.82	4.02
2006 Jan.	2.84	2.99	3.17	3.32	3.60	3.71	3.79	3.98
Feb.	2.91	3.09	3.30	3.50	3.77	3.86	3.94	4.14
March	3.11	3.38	3.50	3.74	3.95	4.02	4.11	4.29
April	3.22	3.61	3.72	4.01	4.23	4.32	4.41	4.60
May	3.31	3.63	3.80	4.05	4.30	4.38	4.48	4.69
June	3.41	3.70	3.93	4.07	4.31	4.41	4.50	4.72
July	3.54	3.78	3.98	4.10	4.33	4.42	4.50	4.72
Aug.	3.61	3.72	3.88	3.98	4.19	4.29	4.37	4.58
Sept.	3.72	3.71	3.81	3.89	4.06	4.15	4.21	4.39
Oct.	3.80	3.77	3.87	3.93	4.08	4.15	4.21	4.35
Nov.	3.87	3.77	3.82	3.86	3.98	4.05	4.09	4.23
Dec.	3.92	3.84	3.89	3.93	4.04	4.12	4.17	4.30
2007 Jan.	4.06	4.01	4.08	4.13	4.28	4.33	4.38	4.51
Feb.	4.09	4.03	4.09	4.14	4.30	4.35	4.40	4.54
March	4.11	4.00	4.04	4.08	4.20	4.27	4.33	4.49
April	4.25	4.17	4.24	4.28	4.40	4.46	4.52	4.70
May ¹	4.37	4.31	4.37	4.40	4.51	4.59	–	4.77
June	4.51	4.52	4.65	4.68	4.80	4.97	–	5.05
July	4.56	4.54	4.64	4.67	4.79	4.96	–	5.02
Aug.	4.67	4.28	4.41	4.47	4.62	4.85	–	4.91
Sept.	4.72	4.20	4.34	4.39	4.56	4.82	–	4.92
Oct.	4.65	4.19	4.34	4.39	4.58	4.82	–	4.92
Nov.	4.61	4.08	4.16	4.20	4.43	4.73	–	4.88
Dec.	4.80	4.16	4.28	4.30	4.53	4.83	–	4.97
2008 Jan.	4.50	3.88	4.02	4.17	4.40	4.76	–	4.95
Feb.	4.35	3.68	3.83	4.09	4.36	4.79	–	4.99
March	4.67	3.92	4.10	4.24	4.42	4.95	–	5.16
April	4.67	4.15	4.31	4.32	4.54	5.05	–	5.20

¹ Since May 2007, there is no bond with a residual maturity close to 20 years in the market.

Source: Bank of Greece.

Table III.7

Greece: bank rates on new euro-denominated deposits by euro area residents

(Percentages per annum, period averages, unless otherwise indicated)

Period	Deposits by households			Deposits by non-financial corporations		Repurchase agreements (repos)
	Overnight ^{1,2}	Savings ²	With agreed maturity up to 1 year	Overnight ²	With agreed maturity up to 1 year	
2003	0.93	0.92	2.48	0.63	2.49	2.24
2004	0.91	0.90	2.29	0.55	2.17	1.98
2005	0.91	0.88	2.23	0.60	2.09	2.00
2006	1.02	0.98	2.86	0.79	2.81	2.67
2007	1.22	1.14	3.95	1.03	3.94	3.70
2005 Jan.	0.96	0.95	2.25	0.56	2.08	1.97
Feb.	0.95	0.94	2.19	0.55	2.07	1.97
March	0.93	0.91	2.22	0.55	2.02	1.97
April	0.89	0.86	2.22	0.55	2.07	1.98
May	0.89	0.87	2.20	0.56	2.04	1.99
June	0.89	0.86	2.21	0.58	2.07	1.99
July	0.88	0.86	2.20	0.60	2.07	1.98
Aug.	0.89	0.86	2.19	0.59	2.08	1.98
Sept.	0.89	0.87	2.19	0.70	2.09	1.98
Oct.	0.89	0.87	2.22	0.65	2.10	1.97
Nov.	0.90	0.87	2.27	0.65	2.11	1.99
Dec.	0.91	0.88	2.39	0.71	2.32	2.18
2006 Jan.	0.93	0.90	2.44	0.69	2.33	2.23
Feb.	0.93	0.90	2.45	0.65	2.35	2.25
March	0.99	0.95	2.58	0.73	2.57	2.42
April	0.98	0.95	2.63	0.73	2.61	2.50
May	0.98	0.95	2.66	0.73	2.57	2.47
June	1.02	0.98	2.76	0.75	2.70	2.60
July	1.02	0.98	2.84	0.74	2.79	2.60
Aug.	1.04	1.00	2.95	0.83	2.96	2.74
Sept.	1.05	1.00	3.03	0.83	2.97	2.85
Oct.	1.11	1.06	3.24	0.93	3.15	3.02
Nov.	1.09	1.04	3.26	0.89	3.24	3.09
Dec.	1.14	1.09	3.47	0.92	3.48	3.30
2007 Jan.	1.16	1.10	3.50	0.91	3.49	3.32
Feb.	1.16	1.10	3.51	0.87	3.54	3.35
March	1.18	1.11	3.64	0.99	3.73	3.53
April	1.20	1.13	3.74	0.98	3.81	3.60
May	1.20	1.13	3.74	1.05	3.81	3.63
June	1.24	1.15	3.95	1.05	4.01	3.80
July	1.24	1.16	4.00	1.15	4.03	3.86
Aug.	1.24	1.16	4.09	1.12	4.10	3.87
Sept.	1.25	1.17	4.24	1.08	4.20	3.93
Oct.	1.25	1.17	4.26	1.01	4.04	3.88
Nov.	1.25	1.17	4.25	1.07	4.20	3.91
Dec.	1.23	1.16	4.52	1.05	4.33	3.76
2008 Jan.	1.24	1.16	4.35	1.09	4.13	3.87
Feb.	1.25	1.16	4.30	1.12	4.19	3.88
March	1.25	1.17	4.42	1.06	4.44	4.01

1 Weighted average of the current account rate and the savings deposit rate.

2 End-of-month rate.

Source: Bank of Greece.



Table III.8

Greece: bank rates on new euro-denominated loans to euro area residents

(Percentages per annum, period averages, unless otherwise indicated)

Period	Loans to households ¹					Loans to non-financial corporations ¹		
	Loans without defined maturity ^{2,3}	Consumer loans		Housing loans		Loans without defined maturity ^{3,4}	With a floating rate or an initial rate fixation of up to 1 year	
		With a floating rate or an initial rate fixation of up to 1 year	Average rate on total consumer loans	With a floating rate or an initial rate fixation of up to 1 year	Average rate on total housing loans		Up to €1 million	Over €1 million
2003	14.41	10.57	10.47	4.51	4.78	6.86	5.29	3.98
2004	13.81	9.55	9.86	4.30	4.51	7.01	4.98	3.67
2005	13.36	8.47	9.06	4.06	4.15	6.90	5.08	3.62
2006	13.45	7.89	8.58	4.24	4.30	7.18	5.76	4.37
2007	14.09	7.71	8.47	4.57	4.45	7.54	6.57	5.32
2005 Jan.	13.42	8.85	9.39	4.23	4.39	6.95	4.89	3.54
Feb.	13.72	8.99	9.62	4.20	4.34	6.95	5.08	3.53
March	13.51	8.53	9.43	4.15	4.27	6.94	5.00	3.70
April	13.74	8.58	9.37	4.13	4.23	6.94	5.09	3.58
May	13.63	8.88	9.13	4.12	4.21	6.89	4.96	3.47
June	13.48	8.16	8.78	4.07	4.18	6.87	4.82	3.46
July	13.14	8.45	9.35	4.06	4.14	6.82	5.01	3.50
Aug.	13.16	8.48	9.39	4.11	4.18	6.84	5.12	3.50
Sept.	13.23	8.36	8.79	3.99	4.05	6.82	5.06	3.57
Oct.	13.07	8.32	8.68	3.94	4.01	6.85	5.06	3.79
Nov.	13.09	8.28	8.56	3.88	3.93	6.93	5.41	3.84
Dec.	13.07	7.78	8.26	3.86	3.91	7.00	5.41	3.93
2006 Jan.	13.18	7.77	8.30	3.92	4.00	6.94	5.26	3.70
Feb.	13.18	8.06	8.51	3.89	3.97	6.99	5.44	3.74
March	13.22	8.09	8.44	3.92	4.02	7.13	5.50	4.15
April	13.24	7.82	8.48	3.93	4.08	7.09	5.57	3.92
May	13.22	7.84	8.66	4.00	4.15	7.10	5.61	4.17
June	13.45	8.09	8.75	4.22	4.32	7.18	5.65	4.41
July	13.41	7.85	8.59	4.28	4.36	7.19	5.70	4.40
Aug.	13.60	7.99	8.77	4.51	4.53	7.26	5.88	4.27
Sept.	13.58	8.03	8.85	4.50	4.54	7.26	5.91	4.72
Oct.	13.72	8.15	8.87	4.66	4.62	7.37	6.14	4.83
Nov.	13.81	8.19	8.86	4.69	4.52	7.25	6.15	4.94
Dec.	13.80	6.82	7.82	4.36	4.26	7.35	6.30	5.16
2007 Jan.	13.87	7.35	8.30	3.92	4.19	7.32	6.27	5.22
Feb.	13.85	7.53	8.40	3.80	4.09	7.34	6.36	5.01
March	13.88	7.60	8.23	4.00	4.09	7.45	6.38	5.08
April	13.97	7.72	8.36	4.45	4.23	7.50	6.45	5.12
May	13.92	8.18	8.74	4.46	4.25	7.47	6.51	5.06
June	14.09	7.82	8.61	4.90	4.52	7.56	6.48	5.32
July	14.12	8.00	8.70	5.01	4.53	7.56	6.44	5.12
Aug.	14.15	8.38	8.78	5.00	4.58	7.74	6.76	5.48
Sept.	14.14	7.50	8.54	4.93	4.64	7.68	6.78	5.68
Oct.	14.13	7.22	8.08	4.96	4.63	7.62	6.75	5.50
Nov.	14.50	7.54	8.47	4.68	4.53	7.65	6.81	5.50
Dec.	14.47	7.66	8.40	4.76	4.45	7.56	6.83	5.79
2008 Jan.	14.48	8.15	8.52	4.61	4.39	7.50	6.66	5.48
Feb.	14.48	8.36	8.63	4.67	4.40	7.50	6.62	5.32
March	14.46	8.64	8.62	4.77	4.47	7.55	6.65	5.68

1 Charges are not included.

2 Weighted average of interest rates on loans to households through credit cards, open loans and current account overdrafts.

3 End-of-month rate.

4 Weighted average of interest rates on corporate loans through credit lines and sight deposit overdrafts.

Source: Bank of Greece.

Table IV.1

Net borrowing requirement of central government on a cash basis^{1,2}

(Million euro)

	Annual data		January - April		
	2006	2007*	2006	2007	2008*
Central government	10,467	13,592	4,732	4,022	2,898
– State budget	11,500 ⁵	12,432 ⁷	5,828	3,910	4,695
(Ordinary budget) ³	7,020	8,512	5,842	4,731	4,504
(Public investment budget)	4,480	3,920	–14	–821	191
– OPEKEPE ⁴	–1,033 ⁶	1,160 ⁸	–1,096	112	–1,797
Percentage of GDP	4.9	5.9	2.2	1.8	1.2

1 This table shows the borrowing requirement of central government on a cash basis. The borrowing requirements of public entities are now calculated by the NSSG on the basis of a quarterly survey among these entities regarding their financial results (revenue-expenditure) and financial situation (borrowing, investment in securities, deposits, etc.), a method considered more reliable than the bank statistics used previously.

2 As shown by the respective accounts with the Bank of Greece and other credit institutions.

3 Including movements in public debt management accounts.

4 Payment and Control Agency for Guidance and Guarantee Community Aid. It replaced DIDAGEP (Agricultural Markets Management Service) from 3 September 2001.

5 Including the following revenue: €149.7 million from EETT revenue settlement, €299.3 million from the decrease in the capital of the Postal Savings Bank, €34 million from the decrease in the capital of the Agricultural Bank, €290 million from additional dividends of the Deposits and Loans Fund, €323 million from the sale of Agricultural Bank shares, €597.4 million from the sale of Postal Savings Bank shares, €364.4 million from the sale of Emporiki Bank shares, as well as expenditure of €422.9 million for a grant to OGA.

6 The OPEKEPE balance for 2006 is high, because the Ministry of Rural Development and Food concluded a loan of approximately €600 million in December and made advance payments to farmers. This amount would be offset within 2007 by OPEKEPE, once final payment orders to beneficiaries were prepared.

7 Including privatisation proceeds of €1,107.5 million and €502.8 million from the sale, respectively, of OTE and Postal Savings Bank shares, as well as expenditure of €264.9 million and €465.7 million for aid to the fire-stricken and a grant to OGA, respectively.

8 In December 2007, farmers received the "single support", which totalled €1,600 million.

* Provisional data.

Source: Bank of Greece.



Table IV.2
Financing of the central government borrowing requirement
(Million euro)

	Annual data				January - April					
	2006		2007		2006		2007		2008*	
	Amount	Percentage of total	Amount	Percentage of total	Amount	Percentage of total	Amount	Percentage of total	Amount	Percentage of total
Greek Treasury bills and government bonds ¹	11,342	108.4	15,310	122.6	7,731	163.4	7,542	187.5	5,477	189.0
Change in balances of central government accounts with the banking system ²	-1,145	-10.9	418	3.1	-1,225	-25.9	-3,410	-84.8	-4,034	-139.2
External borrowing ³	270	2.6	-2,136	-15.7	-1,774	-37.5	-110	-2.7	1,455	50.2
Total	10,467	100.0	13,592	100.0	4,732	100.0	4,022	100.0	2,898	100.0

1 Comprising Treasury bills and government bonds issued in Greece, as well as bonds convertible into shares.

2 Central government's accounts with the Bank of Greece and credit institutions, as well as OPEKEPE's account.

3 Comprising borrowing abroad and securities issuance abroad, as well as the change in government deposits with foreign banks. Excluding non-residents' holdings of bonds issued in Greece.

* Provisional data.

Source: Bank of Greece.

Table IV.3
State budget results
(Million euro)

	Year			Percentage changes		January - February			Percentage changes	
	2006	2007*	Budget for 2008	2007*/2006	Budget for 2008/07*	2006	2007	2008*	2007/2006	2008*/2007
I. REVENUE¹	52,460	56,647⁴	62,602	8.0	10.5	7,365	8,593	10,023	16.7	16.6
1. Ordinary budget (of which: extraordinary revenue)	48,685 773 ³	51,775 ⁴	58,070	6.3	12.2	7,243 110	7,783	8,660	7.5	11.3
2. Public investment budget	3,775	4,872	4,532	29.1	-7.0	122	810	1,363	563.9	68.3
– Own revenue	212	...	240				
– Revenue from the EU	3,563	...	4,292				
II. EXPENDITURE¹	60,692	67,168⁵	70,908	10.7	5.6	7,605	8,636	9,501	13.6	10.0
1.1 Ordinary budget (Interest payments) ²	52,508 9,589	58,365 9,791	61,608 10,500	11.2 2.1	5.6 7.2	7,331 1253	8,147 966	8,717 600	11.1 -22.9	7.0 -37.9
1.2 Ordinary budget primary expenditure (of which: tax refunds)	42,919 2,392	48,574 ⁵ 2,623	51,108 2,550	13.2 9.7	5.2 -2.8	6,078 191	7,181 457	8,117 587.0	18.1 139.3	13.0 28.4
2. Public investment budget	8,184	8,803	9,300	7.6	5.6	274	489	784	78.5	60.3
III. STATE BUDGET RESULTS	-8,232	-10,521	-8,306			-240	-43	522		
Percentage of GDP	-3.8	-4.6	-3.4			-0.1	0.0	0.2		
1. Ordinary budget	-3,823	-6,590	-3,538			-88	-364	-57		
2. Public investment budget	-4,409	-3,931	-4,768			-152	321	579		
IV. PRIMARY DEFICIT (-)/ SURPLUS (+)	1,357	-730	2,194			1,013	923	1,122		
Percentage of GDP	0.6	-0.3	0.9			0.5	0.4	0.5		
AMORTISATION PAYMENTS ²	16,954	22,544	26,211	33.0	16.3	6,681	2,939	573	-56.0	-80.5
MINISTRY OF NATIONAL DEFENCE PROGRAMMES FOR THE PROCUREMENT OF MILITARY EQUIPMENT ²	2,075	2,129	1,800	2.6	-15.5	150	0.001	0.001		

1 For comparability purposes, tax refunds are included in expenditure and have not been deducted from revenue. This practice has been adopted by the Ministry of Economy and Finance in recent years.

2 From 2003 onwards, interest and amortisation payments are recorded in the off-budget item "Ministry of National Defence Programmes for the procurement of military equipment".

3 Including the following revenue: €149.7 million from EETT revenue settlement, €299.3 million (unbudgeted in 2006) from the decrease in the capital of the Postal Savings Bank, €34 million from the decrease in the capital of the Agricultural Bank, and €290 million from additional dividends of the Deposits and Loans Fund.

4 Including notional revenue of €437 million from the settlement of pending issues with Olympic Airlines.

5 Including notional expenditure of €840 million from the settlement of pending issues with Olympic Airlines, and retroactive payments to the Community Budget (€1,108 million) as a result of GDP adjustment.

* Provisional data.

Source: General Accounting Office.



Articles published in previous issues of the *Economic Bulletin*

Boutos Yannis, "Economic stabilisation and growth prospects", No. 3, February 1994.

Papademos Lucas, "Growth with stability: the role of monetary policy", No. 5, March 1995.

Voridis Hercules, "The special nature of banks and the transmission mechanism of monetary policy: A review of recent literature", No. 5, March 1995.

Filippides Anastasios, Kyriakopoulos Panayotis and Moschos Dimitrios, "Bank of Greece monetary policy instruments", No. 6, November 1995.

Haralabides Michael, Hardouvelis Gikas and Papageorgiou George, "Changeover to the single currency: Prospects and challenges for credit institutions in Greece", No. 6, November 1995.

Karabalis Nikos, "Harmonisation of Consumer Price Indices in EU countries", No. 7, March 1996.

Public Sector Accounts Department, Studies, Planning and Operations Development Office, "Government Securities Markets", No. 7, March 1996.

Saccomanni Fabrizio, "Opportunities and challenges in the process of European monetary integration", No. 7, March 1996.

Papademos Lucas, "Challenges facing monetary policy on the road to EMU", No. 8, November 1996.

Information Systems and Organisation Department, "Developments in EU Payment Systems: TARGET and the Hellenic system Hermes", No. 8, November 1996.

Brissimis Sophocles and Gibson Heather, "Monetary policy, capital flows and Greek disinflation", No. 9, March 1997.

Sabethai Isaac, "From contractual earnings to labour costs: incomes policy, collective bargaining and inflation (1991-1996)", No. 9, March 1997.

Hall S. G. and Zonzilos Nicholas, "The output gap and inflation in Greece", No. 9, March 1997.



Pantelidis Evangelos, "The methodology of the new balance of payments compilation system of the Bank of Greece", No. 9, March 1997.

Papademos Lucas, "The globalisation of financial markets and the conduct of economic and monetary policy", No. 10, December 1997.

Brissimis Sophocles and Kastrisianakis Efstratios, "Is there a credit channel in the Greek economy?", No. 10, December 1997.

Gibson Heather, "The relationship between the financial system and the real economy", No. 10, December 1997.

Hondroyiannis George and Papapetrou Evangelia, "The causal relationship between consumer and wholesale prices in Greece", No. 10, December 1997.

Hardy Daniel and Simigiannis George, "Competition and efficiency of the Greek banking system", No. 11, June 1998.

Brissimis Sophocles and Gibson Heather, "What can the yield curve tell us about inflation?", No. 11, June 1998.

Pantazidis Stelios, "Inflation, investment and economic growth in Greece", No. 11, June 1998.

Mitrakos Theodoros, "The contribution of income sources to overall inequality", No. 11, June 1998.

Garganas C. Nicholas, "Greece and EMU: prospects and challenges", No. 12, December 1998.

Brissimis Sophocles, Sideris Dimitris and Voumvaki Fragiska, "Purchasing power parity as a long-run relationship: an empirical investigation of the Greek case", No. 12, December 1998.

Manassaki Anna, "European Union transfers to Greece: historical background and prospects", No. 12, December 1998.

Lazaretou Sophia, "The drachma on the metallic monetary standards: lessons from the past", No. 13, July 1999.

Hondroyiannis George, "The causality between government spending and government revenue in Greece", No. 13, July 1999.

Mitrakos Theodoros and Tsakloglou Panos, "The distributional impact of excise duties", No. 13, July 1999.

Dellas Harris, "ECB monetary policy strategy and macroeconomic volatility in Greece", No. 13, July 1999.

Papazoglou Christos, "The real exchange rate and economic activity: is the hard-drachma policy necessarily contractionary?", No. 14, December 1999.

Gibson Heather and Lazaretou Sophia, "Leading inflation indicators for Greece: an evaluation of their predictive power", No. 14, December 1999.

Karapappas Andreas and Milionis Alexandros, "Estimation and analysis of external debt in the private sector", No. 14, December 1999.

Papademos Lucas, "From the drachma to the euro", No. 15, July 2000.

Zonzilos Nicholas, "The Greek Phillips curve and alternative measures of the NAIRU", No. 15, July 2000.

Pantazidis Stelios, "The sustainability of the current account deficit", No. 15, July 2000.

Hondroyiannis George, "Investigating causality between prices and wages in Greece", No. 15, July 2000.

Sabethai Isaac, "The Greek labour market: features, problems and policies (with emphasis on labour market flexibility and on combatting unemployment in the context of non-inflationary growth)", No. 16, December 2000.

Brissimi Dimitra and Brissimis Sophocles, "The problem of unemployment in the European Union", No. 16, December 2000.

Bardakas Joanna, "Financial deregulation, liquidity constraints and private consumption in Greece", No. 16, December 2000.

Lazaretou Sophia and Brissimis Sophocles, "Fiscal rules and stabilisation policy in the euro area", No. 17, July 2001.

Lolos Sarantis-Evangelos, "The role of European structural resources in the development of the Greek economy", No. 17, July 2001.

Papazoglou Christos, "Regional economic integration and inflows of foreign direct investment: the European experience", No. 17, July 2001.



Garganas C. Nicholas, "The future of Europe and EMU", No. 18, December 2001.

Brissimis Sophocles and Papadopoulou Dafni-Marina, "The physical introduction of euro banknotes and coins in Greece", No. 18, December 2001.

Zonzilos Nicholas, "The monetary transmission mechanism – the ECB experiment: results for Greece", No. 18, December 2001.

Brissimis Sophocles, Kamberoglou Nicos and Simigiannis George, "Bank-specific characteristics and their relevance to monetary policy transmission", No. 18, December 2001.

Tsaveas Nicholas, "Exchange rate regimes and exchange rate policy in South Eastern Europe", No. 18, December 2001.

Demenas Nicholas and Gibson Heather, "Competition in Greek banking: an empirical study for the period 1993-1999", No. 19, July 2002.

Hondroyiannis George, "Economic and demographic determinants of private savings in Greece", No. 19, July 2002.

Gatzonas Efthymios and Nonika Kalliopi, "Eligible assets and management of collateral in the context of central bank monetary policy operations", No. 19, July 2002.

Voridis Hercules, Angelopoulou Eleni and Skotida Ifigeneia, "Monetary policy in Greece 1990-2000 through the publications of the Bank of Greece", No. 20, January 2003.

Kaplanoglou Georgia and Newbery David, "The distributional impact of indirect taxation in Greece", No. 21, July 2003.

Papapetrou Evangelia, "Wage differentials between the public and the private sector in Greece", No. 21, July 2003.

Athanasoglou Panayiotis and Brissimis Sophocles, "The effect of mergers and acquisitions on bank efficiency in Greece", No. 22, January 2004.

Lazaretou Sophia, "Monetary system and macroeconomic policy in Greece: 1833-2003", No. 22, January 2004.

Karabalis Nikos and Kondelis Euripides, "Alternative measures of inflation", No. 22, January 2004.

Papaspyrou Theodoros, "EMU strategies for new Member States: the role of Exchange Rate Mechanism II", No. 23, July 2004.

Mitrakos Theodore, "Education and economic inequalities", No. 23, July 2004.

Papapetrou Evangelia, "Gender wage differentials in Greece", No. 23, July 2004.

Gibson Heather, "Greek banking profitability: recent developments", No. 24, January 2005.

Athanasoglou Panayiotis, Asimakopoulos Ioannis and Georgiou Evangelia, "The effect of merger and acquisition announcement on Greek bank stock returns", No. 24, January 2005.

Mitrakos Theodore and Zografakis Stavros, "The redistributive impact of inflation in Greece", No. 24, January 2005.

Theodossiou Ioannis and Pouliakas Konstantinos, "Socio-economic differences in the job satisfaction of high-paid and low-paid workers in Greece", No. 24, January 2005.

Garganas C. Nicholas, "Adjusting to the single monetary policy of the ECB", No. 25, August 2005.

Mitrakos Theodore, Simigiannis Georgios and Tzamourani Panagiota, "Indebtedness of Greek households: evidence from a survey", No. 25, August 2005.

Nicolitsas Daphne, "Per capita income, productivity and labour market participation: recent developments in Greece", No. 25, August 2005.

Nicolitsas Daphne, "Female labour force participation in Greece: developments and determining factors", No. 26, January 2006.

Mitrakos Theodore and Zonzilos Nicholas, "The impact of exogenous shocks on the dynamics and persistence of inflation: a macroeconomic model-based approach for Greece", No. 26, January 2006.

Athanasoglou Panayiotis, Asimakopoulos Ioannis and Siriopoulos Konstantinos, "External financing, growth and capital structure of the firms listed on the Athens Exchange", No. 26, January 2006.

Mitrakos Theodoros and Nicolitsas Daphne, "Long-term unemployment in Greece: developments, incidence and composition", No. 27, July 2006.

Kalfaoglou Faidon, "Stress testing of the Greek banking system", No. 27, July 2006.



Pantelidis Th. Evangelos and Kouvatseas A. Georgios, "Frontier survey on travel expenditure: methodology, presentation and output assessment (2003-2005)", No. 27, July 2006.

Brissimis N. Sophocles and Vlassopoulos Thomas, "Determinants of bank interest rates and comparisons between Greece and the euro area", No. 28, February 2007.

Simigiannis T. George and Tzamourani G. Panagiota, "Borrowing and socio-economic characteristics of households: results of sample surveys carried out by the Bank of Greece", No. 28, February 2007.

Papapetrou Evangelia, "Education, labour market and wage differentials in Greece", No. 28, February 2007.

Christodoulakis A. George, "The evolution of credit risk: phenomena, methods and management", No. 28, February 2007.

Karabalis P. Nikos and Kondelis K. Euripides, "Inflation measurement in Greece", No. 28, February 2007.

Panayotis Kapopoulos and Sophia Lazaretou, "Foreign bank presence: the experience of South-East European countries during the transition process", No. 29, October 2007.

Daphne Nicolitsas, "Youth participation in the Greek labour market: developments and obstacles", No. 29, October 2007.

Maria K. Albani, Nicholas G. Zonzilos and Zacharias G. Bragoudakis, "An operational framework for the short-term forecasting of inflation", No. 29, October 2007.

