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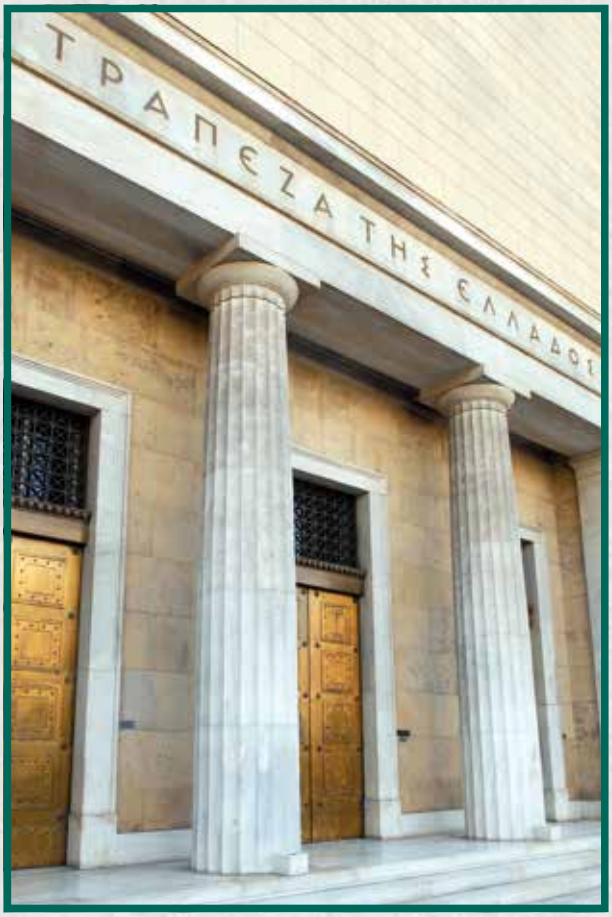

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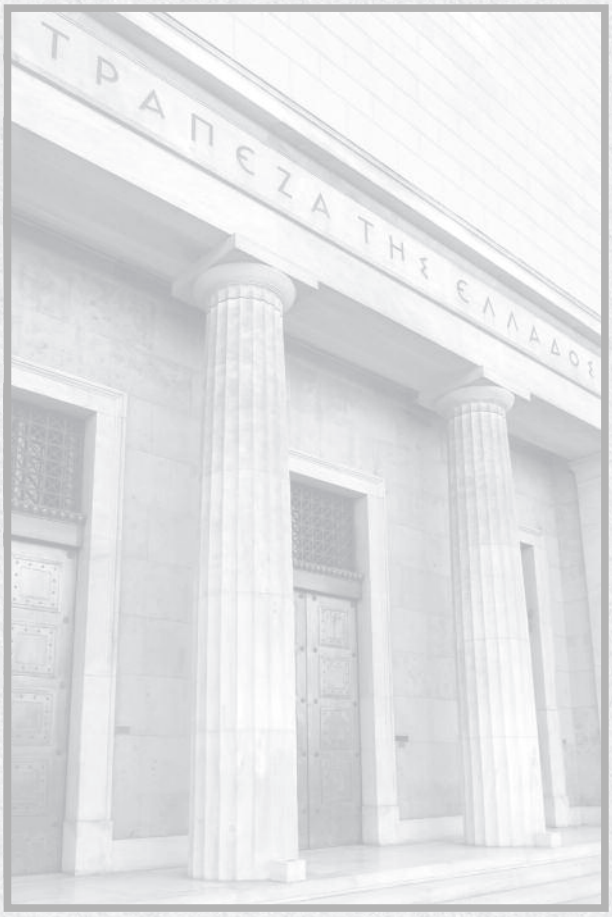

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FISCAL DRAG IN GREECE

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ABSTRACT

This paper uses a microsimulation approach to analyse the phenomenon of "fiscal drag" in Greece, i.e. the increase in tax revenues that arises when nominal tax bases grow, while the parameters of the personal income tax (PIT) system remain unchanged in nominal terms. First, we estimate the phenomenon in terms of the tax-to-base elasticity, which captures the responsiveness of PIT revenue to changes in the tax base under an unchanged legislation. The results suggest an elasticity of almost 1.8 in 2019, implying a built-in progressivity in the PIT system and, therefore, potential for fiscal drag. We further decompose this elasticity to identify its main drivers across income sources (labour, capital, self-employment, pensions and benefits) and tax parameters (tax brackets, tax deductions/credits) as well as across the income distribution. Second, we assess fiscal drag in practice between 2019 and 2023 by comparing actual PIT revenues (incorporating *observed* income growth and legislative changes) against counterfactual 2023 scenarios simulating alternative indexation practices. We quantify the actual impact of fiscal drag, defined as a share of GDP, and the extent to which government policies have managed to offset it. The findings indicate that, although Greece has no formal indexation of tax parameters, the tax policy reforms implemented between 2019 and 2023 more than offset the potential effects of fiscal drag, keeping PIT revenues broadly stable as a share of GDP, while slightly reducing the average effective tax rate. Overall, the results highlight that, during a period of rapid nominal income growth, Greece's PIT reforms improved both the progressivity and the redistributive capacity of the tax system, while safeguarding PIT revenue. These insights are relevant for the design of future tax policy interventions.

Keywords: personal income tax; inflation; indexation; bracket creep

JEL classification: D31; H24; E62

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Η ΦΟΡΟΛΟΓΙΚΗ ΔΙΑΒΡΩΣΗ ΣΤΗΝ ΕΛΛΑΔΑ

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ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη χρησιμοποιεί ένα υπόδειγμα μικροπροσομοίωσης για να εξετάσει το φαινόμενο της "φορολογικής διάβρωσης" (fiscal drag) στην Ελλάδα, δηλαδή την αύξηση των φορολογικών εσόδων που προκύπτει όταν οι φορολογικές βάσεις αυξάνονται σε ονομαστικούς όρους, αλλά οι παράμετροι του συστήματος Φόρου Εισοδήματος Φυσικών Προσώπων (ΦΕΦΠ) παραμένουν αμετάβλητες. Στο πρώτο στάδιο, εκτιμούμε το φαινόμενο σε όρους ελαστικότητας φόρου ως προς τη φορολογητέα βάση (tax-to-base elasticity), η οποία αποτυπώνει τη μεταβολή των εσόδων από τον ΦΕΦΠ σε σχέση με μεταβολές της φορολογητέας βάσης, υπό συνθήκες αμετάβλητης νομοθεσίας. Τα αποτελέσματα υποδηλώνουν ελαστικότητα ύψους 1,8 το 2019, η οποία αντανακλά την προοδευτικότητα που απορρέει από τον ίδιο το σχεδιασμό του συστήματος ΦΕΦΠ και, συνεπώς, υποδηλώνει δυνητικό περιθώριο για φορολογική διάβρωση. Στη συνέχεια, αναλύουμε την ελαστικότητα στα επιμέρους συστατικά της, προκειμένου να εντοπίσουμε τους βασικούς της προσδιοριστικούς παράγοντες ανά πηγή εισοδήματος (μισθωτή εργασία, κεφάλαιο, αυτοαπασχόληση, συντάξεις και επιδόματα), ανά φορολογική παράμετρο (φορολογική κλίμακα, φορολογική έκπτωση/πίστωση) και σε όλο το εύρος της εισοδηματικής κατανομής. Στο δεύτερο στάδιο, εξετάζουμε το φαινόμενο της φορολογικής διάβρωσης στην πράξη την περίοδο μεταξύ 2019 και 2023, συγκρίνοντας τα πραγματικά έσοδα από τον ΦΕΦΠ (τα οποία ενσωματώνουν την *παρατηρούμενη* αύξηση των εισοδημάτων και τις νομοθετικές παρεμβάσεις που υλοποιήθηκαν) με εναλλακτικά σενάρια για το 2023, τα οποία προσομοιώνουν διαφορετικές πρακτικές τιμαριθμικής αναπροσαρμογής. Ποσοτικοποιούμε την πραγματική επίδραση της φορολογικής διάβρωσης, ως ποσοστό του ΑΕΠ, καθώς και το βαθμό στον οποίο οι κυβερνητικές πολιτικές την αντιστάθμισαν. Τα ευρήματα δείχνουν ότι, παρότι η Ελλάδα δεν εφαρμόζει τυπική τιμαριθμική αναπροσαρμογή των φορολογικών παραμέτρων, εφάρμοσε φορολογικές μεταρρυθμίσεις την περίοδο 2019-23 οι οποίες υπεραντιστάθμισαν τις δυνητικές επιδράσεις της φορολογικής διάβρωσης, διατηρώντας τα έσοδα από τον ΦΕΦΠ σχεδόν σταθερά ως ποσοστό του ΑΕΠ και μειώνοντας ελαφρά τον μέσο αποτελεσματικό φορολογικό συντελεστή. Συνολικά, τα αποτελέσματα δείχνουν ότι, σε μια περίοδο ταχείας ανόδου των ονομαστικών εισοδημάτων, οι μεταρρυθμίσεις στον ΦΕΦΠ ενίσχυσαν τόσο την προοδευτικότητα όσο και την αναδιανεμητική ικανότητα του φορολογικού συστήματος, διασφαλίζοντας παράλληλα τη σταθερότητα των εσόδων από τον ΦΕΦΠ. Τα συμπεράσματα αυτά είναι ιδιαίτερα χρήσιμα για το σχεδιασμό μελλοντικών παρεμβάσεων στη φορολογική πολιτική.

ΜΗ ΤΕΧΝΙΚΗ ΣΥΝΟΨΗ

Η φορολογική διάβρωση (fiscal drag) αναφέρεται στην αύξηση των φορολογικών εσόδων που προκύπτει όταν η φορολογητέα βάση (κυρίως το εισόδημα) αυξάνεται σε ονομαστικούς όρους, αλλά οι παράμετροι της φορολογικής νομοθεσίας (π.χ. φορολογικά κλιμάκια, εκπτώσεις/απαλλαγές) δεν αναπροσαρμόζονται αναλόγως. Αυτό οδηγεί σε αύξηση του μέσου αποτελεσματικού φορολογικού συντελεστή. Το φαινόμενο αφορά κυρίως το φόρο εισοδήματος φυσικών προσώπων (ΦΕΦΠ) και έχει ιδιαίτερη σημασία για τη δημοσιονομική πολιτική, καθώς επηρεάζει: (1) τις προβλέψεις των φορολογικών εσόδων, (2) τα μακροοικονομικά υποδείγματα των δημόσιων οικονομικών, (3) την εκτίμηση του διαθέσιμου δημοσιονομικού χώρου στο πλαίσιο των νέων δημοσιονομικών κανόνων, (4) την κατανομή του εισοδήματος και, κατά συνέπεια, (5) το βέλτιστο σχεδιασμό της φορολογίας.

Η φορολογική διάβρωση αποτελεί κρίσιμο ζήτημα για τη δικαιοσύνη και τη βιωσιμότητα της φορολογικής πολιτικής, καθώς οδηγεί σε αύξηση της φορολογικής επιβάρυνσης χωρίς αντίστοιχη ενίσχυση της πραγματικής φοροδοτικής ικανότητας των φορολογουμένων. Ως εκ τούτου, έχει σημαντικές επιπτώσεις στη δίκαιη κατανομή του φορολογικού βάρους, ιδιαίτερα σε περιόδους υψηλού πληθωρισμού και ταχείας ανόδου των ονομαστικών εισοδημάτων.

Η παρούσα μελέτη αναλύει τη φορολογική διάβρωση στο σύστημα του ΦΕΦΠ στην Ελλάδα την περίοδο 2019-23, προκειμένου να αναδειχθεί η σημασία της για το σχεδιασμό δίκαιων και αποτελεσματικών φορολογικών παρεμβάσεων. Ειδικότερα, εξετάζεται σε πρώτο στάδιο η επίδραση της διάβρωσης από θεωρητική σκοπιά, δηλαδή υπό την υπόθεση αύξησης των εισοδημάτων χωρίς αλλαγές στη φορολογική πολιτική ή στην τιμαριθμική αναπροσαρμογή. Στη συνέχεια, γίνεται εκτίμηση της πραγματικής φορολογικής διάβρωσης την περίοδο 2019-23, εξετάζοντας παράλληλα εναλλακτικά σενάρια υπολογισμού των φορολογικών εσόδων. Η ανάλυση εστιάζει στις επιπτώσεις στο διαθέσιμο εισόδημα των φορολογουμένων, στα δημόσια έσοδα, καθώς και στη φορολογική δικαιοσύνη (με έμφαση στην προοδευτικότητα του φορολογικού συστήματος και την ανισότητα). Με αυτό τον τρόπο γίνεται μια αξιολόγηση των εναλλακτικών πολιτικών για την αντιμετώπιση του φαινομένου.

Η ανάλυση χρησιμοποιεί το υπόδειγμα μικροπροσομοίωσης φόρων-παροχών της ΕΕ (EUROMOD), το οποίο για τη συγκεκριμένη μελέτη βασίζεται στα μικροδεδομένα της ΄Ερευνας Εισοδήματος και Συνθηκών Διαβίωσης της Ευρωπαϊκής ΄Ενωσης (EU-SILC 2020), που αφορούν εισοδήματα του 2019.

Η θεωρητική ανάλυση δείχνει ότι το 2019 το ελληνικό σύστημα ΦΕΦΠ εμφάνιζε υψηλό βαθμό προοδευτικότητας, η οποία δημιουργεί δυνητικό περιθώριο για φορολογική διάβρωση όταν οι παράμετροι του συστήματος παραμένουν αμετάβλητες. Η εκτιμώμενη ελαστικότητα φόρου ως προς τη φορολογητέα βάση —περίπου 1,8— υποδηλώνει ότι τα έσοδα από τον ΦΕΦΠ αυξάνονται δυσανάλογα σε σχέση με την άνοδο των ονομαστικών εισοδημάτων. Η εξέταση των επιμέρους προσδιοριστικών παραγόντων της ελαστικότητας δείχνει ότι η σταδιακή συρρίκνωση των εκπτώσεων φόρου εξηγεί το μεγαλύτερο μέρος της φορολογικής διάβρωσης, ενώ η προοδευτικότητα της φορολογικής κλίμακας διαδραματίζει δευτερεύοντα ρόλο. Η ανάλυση αναδεικνύει επίσης σημαντικές διαφοροποιήσεις μεταξύ των πηγών εισοδήματος, με τα εισοδήματα από αυτοαπασχόληση και μισθωτή εργασία να εμφανίζουν τις υψηλότερες ελαστικότητες, ενώ τα εισοδήματα από συντάξεις και επιδόματα να επηρεάζουν σε πολύ μικρότερο βαθμό. Η κατανομή της ελαστικότητας ανά εισοδηματικό κλιμάκιο δείχνει ότι οι ελαστικότητες είναι συστηματικά υψηλότερες στα μεσαία εισοδήματα, γεγονός που υποδηλώνει ότι, ελλείψει μέτρων πολιτικής, η αυτόματη μετάβαση σε ανώτερα φορολογικά κλιμάκια (bracket

creep) θα επιβάρυνε δυσανάλογα αυτούς τους φορολογουμένους. Σε συνάφεια με τα παραπάνω ευρήματα, μια οριζόντια αύξηση των εισοδημάτων μειώνει την προοδευτικότητα του συστήματος ΦΕΦΠ, αλλά οδηγεί σε μικρή μείωση της ανισότητας, κυρίως επειδή πολλοί χαμηλόμισθοι συνεχίζουν να καταβάλλουν μηδενικό φόρο ακόμη και μετά την άνοδο των εισοδημάτων τους. Συνολικά, το σύστημα ΦΕΦΠ του 2019 —δεδομένης της προοδευτικής του δομής και της κατανομής των φορολογητέων εισοδημάτων— ήταν διαρθρωτικά ευάλωτο στη φορολογική διάβρωση, ελλείψει μηχανισμών τιμαριθμικής αναπροσαρμογής ή άλλων παρεμβάσεων πολιτικής.

Η *εμπειρική* ανάλυση δείχνει ότι οι μεταρρυθμίσεις που υλοποιήθηκαν στην Ελλάδα την περίοδο 2019-23 κατόρθωσαν να αντισταθμίσουν πλήρως τις επιδράσεις της φορολογικής διάβρωσης, μειώνοντας τον μέσο αποτελεσματικό φορολογικό συντελεστή, διατηρώντας παράλληλα τη σταθερότητα των εσόδων και περιορίζοντας την εισοδηματική ανισότητα. Τα μέτρα πολιτικής της περιόδου 2019-23 —όπως η αναμόρφωση της φορολογικής κλίμακας, η μείωση των οριακών συντελεστών στα χαμηλά εισοδήματα, η εισαγωγή νέου κλιμακίου με χαμηλότερο συντελεστή και οι εκτεταμένες παρεμβάσεις στις εισφορές κοινωνικής ασφάλισης— διαδραμάτισαν καθοριστικό ρόλο στην εξουδετέρωση μεγάλου μέρους των δυνητικών αυξήσεων εσόδων που υποδηλώνει η δομή του συστήματος ΦΕΦΠ. Μάλιστα, τα αποτελέσματα του βασικού σεναρίου —το οποίο ενσωματώνει τις μεταρρυθμίσεις της εξεταζόμενης περιόδου— καταδεικνύουν χαμηλότερη φορολογική επιβάρυνση σε σύγκριση με τις επιδόσεις των περισσότερων εναλλακτικών σεναρίων, που υποθέτουν τιμαριθμική αναπροσαρμογή των φορολογικών παραμέτρων και οδηγούν σε συγκριτικά υψηλότερη φορολογική επιβάρυνση.

Η εμπειρία της περιόδου 2019-23 δείχνει ότι η πραγματική επίδραση της φορολογικής διάβρωσης εξαρτάται σε μεγάλο βαθμό από τις επιλογές πολιτικής: στην Ελλάδα οι μεταρρυθμιστικές πολιτικές που εφαρμόστηκαν την περίοδο 2019-23 —εν απουσία τιμαριθμικής αναπροσαρμογής— ήταν εκείνες που αντιστάθμισαν την αύξηση των εσόδων που θα μπορούσε να προκύψει από τη δομή του συστήματος ΦΕΦΠ του 2019, συμβάλλοντας έτσι στη μείωση του μέσου φορολογικού βάρους.

Συνολικά, η φορολογική διάβρωση μπορεί να έχει σημαντικές επιπτώσεις στην είσπραξη φορολογικών εσόδων, στους μέσους φορολογικούς συντελεστές και στην εισοδηματική κατανομή, με κρίσιμες συνέπειες για την εισοδηματική ανισότητα και το βέλτιστο σχεδιασμό της φορολογικής πολιτικής. Με δεδομένο τον περιορισμένο δημοσιονομικό χώρο, οι φορείς χάραξης πολιτικής καλούνται να επιτύχουν τη σωστή ισορροπία μεταξύ της ανάγκης για μείωση του φορολογικού βάρους και του στόχου διασφάλισης των δημόσιων εσόδων. Η ποσοτικοποίηση της φορολογικής διάβρωσης και η ενσωμάτωσή της στο σχεδιασμό μεσοπρόθεσμων δημοσιονομικών στρατηγικών μπορούν να βελτιώσουν την ακρίβεια των προβλέψεων εσόδων και να στηρίξουν την κατάρτιση πιο στοχευμένων παρεμβάσεων πολιτικής. Παράλληλα, οι μηχανισμοί μέσω των οποίων η φορολογική διάβρωση επηρεάζει διαφορετικά τμήματα της εισοδηματικής κατανομής απαιτούν την υιοθέτηση στοχευμένων μέτρων πολιτικής. Η διάσταση αυτή είναι καθοριστική για την αξιολόγηση του κατά πόσο είναι σκόπιμη η τιμαριθμική αναπροσαρμογή των φορολογικών παραμέτρων. Η πρόσφατη εμπειρία της Ελλάδος δείχνει ότι η ενίσχυση της προοδευτικότητας του φορολογικού συστήματος μπορεί να αντισταθμίσει τις επιπτώσεις της φορολογικής διάβρωσης, συμβάλλοντας παράλληλα σε δικαιότερη κατανομή του φορολογικού βάρους και σε βελτίωση της φορολογικής συμμόρφωσης.

FISCAL DRAG IN GREECE*

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I INTRODUCTION

Fiscal drag (or "bracket creep") refers to an increase in tax revenues that arises when the tax base (e.g. income) increases in nominal terms, while the parameters of tax legislation (e.g. tax brackets, deductions/exemptions) are not adjusted accordingly. Periods of high inflation and rapid nominal income growth can give rise to fiscal drag, a mechanism through which tax revenues increase automatically as taxpayers move into higher tax brackets or lose access to deductions and credits, whose nominal thresholds remain fixed. This leads to an increase in the average effective tax rate,[1] thereby raising the overall tax burden, even though real incomes —reflecting taxpayers' capacity to pay— remain unchanged.

Fiscal drag mainly concerns personal income tax (PIT), which often displays a high degree of progressivity, and has important implications for fiscal policy. In particular, it affects: (a) tax revenue forecasts;[2] (b) the macroeconomic modelling of public finances;[3] (c) the estimation of the available fiscal space under the new European fiscal rules;[4] (d) income distribution and, consequently, (e) optimal tax design.[5] The global inflation surge that began in 2021, together with the subsequent growth in household incomes, has rekindled analytical and policy interest in fiscal drag as a key factor influencing both revenue developments and income distribution.[6]

This paper provides a comprehensive analysis of fiscal drag in Greece in the recent period. Using harmonised household survey data and detailed information on tax legislation, it offers new evidence on both the potential for fiscal drag embedded in the design of the PIT system and the extent to which it materialised in practice over 2019-23, a period marked by exceptionally high inflation.

The first part of the analysis examines the sensitivity of PIT revenues to income growth, assuming an unchanged tax legislation and homogeneous income growth. This approach captures the degree of progressivity built into the tax system and allows the estimation of the potential fiscal drag through the tax-to-base elasticity.[7] The analysis further explores the underlying drivers of fiscal drag and highlights variations across income sources and income deciles.

The second part of the analysis examines how fiscal drag evolved in practice during the recent period of high inflation.[8] This assessment incorporates not only the progressivity of the PIT system but also the policy measures imple-

* This paper is part of a study covering 21 European countries, including all euro area Member States and Hungary. For more details, see García-Miralles, E., M. Freier, S. Riscado et al. (2025), "Fiscal drag in theory and in practice: A European perspective", ECB, Working Paper No. 3136. Warm thanks are extended to Esteban García-Miralles (Banco de España) for his insightful comments and constructive feedback. The views expressed in this article are of the authors and do not necessarily reflect those of the Bank of Greece. The authors are responsible for any errors or omissions.

1 The average effective tax rate is the share of the tax base paid in taxes (i.e. the ratio of total tax liability to the tax base).

2 See Creedy and Gemmell (2004) as well as Belinga et al. (2014).

3 See Hack (2025).

4 Under the new EU economic governance framework, additional revenues resulting from taxpayers moving into higher tax brackets (bracket creep) are considered as *discretionary revenue measures*. An increase in such revenues raises the upper limit on the growth rate of *net nationally financed primary expenditure*, thereby creating additional fiscal space. For the role of fiscal drag as an automatic stabiliser, see Auerbach and Feenberg (2000); Immervoll (2006); Dolls et al. (2012); and Paulus and Tasseva (2020). For an example of explicit use of fiscal drag as a discretionary measure in the UK, see Waters and Wernham (2022).

5 See Saez (2003); Immervoll (2005); Sutherland et al. (2008) as well as Heer and Süssmuth (2013).

6 See OECD (2023); Balasundharam et al. (2023); Leventi et al. (2024); Waters and Wernham (2022); and Balladares and García-Miralles (2025).

7 A first line of research on fiscal drag has focused on estimating tax-to-base (TTB) elasticities that capture the responsiveness of tax revenues to tax base growth. For more details, see Immervoll (2005); Price et al. (2015) and Boschi and d'Addona (2019).

8 A second line of research concentrates on analysing how fiscal drag operates in practice. For more details, see Paulus et al. (2020); Waters and Wernham (2022) and Moriana-Armendariz (2023).

mented over the period. To do so, actual tax revenues in 2023 are compared against counterfactual scenarios in which tax brackets were either fully indexed or remained unchanged since 2019.

Overall, our analysis aims to contribute to a more comprehensive understanding of the PIT system in Greece, providing relevant information on issues such as its progressivity, the distributional impacts of inflation through its interaction with the tax system, the potential stabilisation properties of the PIT system and its effect on public finances. Our results underline the quantitative importance of fiscal drag, especially in periods of high inflation, and the role of policy design in addressing it.

The paper provides a coherent and comprehensive assessment of fiscal drag in Greece and is structured as follows: Section 2 presents the data and methodology, including the use of the EUROMOD microsimulation model. Section 3 outlines the institutional features of the Greek PIT system that are relevant for the analysis. Section 4 analyses fiscal drag in theory, examining the responsiveness of the PIT revenues to tax base growth under unchanged legislation and exploring the underlying mechanisms across income sources and income groups. Section 5 assesses fiscal drag in practice, comparing actual PIT outcomes for 2023 with counterfactual scenarios that simulate alternative indexation policies. Finally, Section 6 summarises the main findings and discusses their policy implications for the design of optimal tax reforms in Greece.

2 DATA – METHODOLOGY

Our analysis draws on a microsimulation approach, enabling us to study the effects of public policy not only at the aggregate level, but also along the income distribution and across various population segments. This is because microsimulation models operate at the individual level, i.e. they take into account diverse circumstances and characteristics of the population of interest (National Research Council 1991) contained in micro datasets providing information on different sources of income (gross earnings, pensions and social transfers), household composition and individual socioeconomic characteristics.

For our analysis, we employ EUROMOD,[9] the tax-benefit microsimulation model of the European Union, currently developed and maintained by the Joint Research Centre of the European Commission. The model embeds the legislation on direct taxes and benefits of all 27 EU Member States, allowing for the simulation of tax liabilities and benefit entitlements at both the individual and household level. Effectively, EUROMOD enables the analysis, in a comparable manner, of the effects of taxes and benefits on household incomes for individual countries and the EU as a whole. EUROMOD may, nonetheless, generate small biases due to features of the tax code that cannot be modelled given the available information or that are simplified in the calculations.

EUROMOD not only allows us to simulate baseline scenarios under actual legislation and given the income observed in the microdata, but, equally importantly, it can accommodate the simulation of counterfactual scenarios under changes in the tax-benefit legislation or in the underlying data. This is highly relevant for the purposes of our analysis. Our theoretical (or potential) fiscal drag measure, drawing on estimated tax-to-base elasticities, is obtained following a simulation of a 1% increase in all sources of income that enter the tax base of all individuals and then calculating the resulting tax liability (see Section 4.1). Fiscal drag in practice, over the period 2019-23, is analysed in the light of full and no indexation scenarios allowing to quantify how much of the potential revenue associated with fiscal drag is effectively offset by policy measures (see Section 5.1).

9 Version I.6.0+. For more information on the EUROMOD model, see https://euromod-web.jrc.ec.europa.eu/ as well as Sutherland and Figari (2013).

EUROMOD by default uses the EU statistics on income and living conditions (EU-SILC)[10] survey as input data. EU-SILC provides a yearly cross-sectional survey of households with regard to income, poverty, social exclusion and living conditions that is standardised across all EU Member States. Yet, as is the case for all survey data, it most likely fails to capture the very top earners who have a large impact on revenue collection. Our analysis employs the EU-SILC 2020 wave, with 2019 as the income reference period. For Greece, this is effectively a representative sample of the population containing information on 32,832 individuals in 15,086 households.

Since the income reference period of EU-SILC 2020 is the year 2019, all monetary variables had to be adjusted to reflect their nominal levels in 2023 in order to conduct the corresponding simulations. This so-called "uprating exercise" is implemented by income source per simulated year within EUROMOD, based on information obtained from other data sources. The data are typically taken from Eurostat or provided by the statistical offices of the Member States, government authorities or National Central Banks. Table A.1 in the Appendix sets out the assumptions underlying the uprating mechanism from 2019 to 2023 in the case of Greece,[11] breaking down household disposable income into its basic sub-components. As a result of this process, individual income growth differs as long as there are individual differences in income composition. It should be noted that the uprating of the 2019 microdata described above is based only on the nominal growth of individuals' tax base and, therefore, fails to incorporate the observed growth (e.g. through a change in the number of taxpayers), which may induce a growing divergence with respect to official statistics.

Finally, it should be made explicit that EUROMOD is a static microsimulation model. Static microsimulation models typically impute income tax or other liabilities and the receipt of social security and other benefits by applying the rules for eligibility or liability to individuals and households (Harding 1996). In replicating current or hypothetical institutional frameworks, static models assume away behavioural responses on the part of micro agents. Therefore, their key purpose has traditionally been to show the "morning after" impact of a policy change.

3 THE PERSONAL INCOME TAX SYSTEM IN GREECE

A clear understanding of the institutional framework of the Greek personal income tax (PIT) system is essential for interpreting the mechanisms through which fiscal drag operates. This section provides an overview of the main features of the PIT system and the composition of the tax base. It describes how taxable income is defined, outlines key tax parameters, such as deductions and credits, and summarises the major policy changes introduced during the period 2019-23. It also examines the distributional characteristics of the PIT base and the tax liabilities across income groups, which are central to understanding both the system's progressivity and its sensitivity to changes in nominal incomes.

3.1 DESCRIPTION OF THE PIT

The Greek PIT system features a relatively broad tax base that encompasses most sources of earned and replacement income, subject to limited deductions. The tax base includes reported earnings from employment and self-employment, other market income, income from rent, private transfers received, education allowances, family benefits for civil servants, sickness benefits, disability pensions, main and supplementary old-age pensions, minor old-age pensions, as well as widows' and orphans' pensions. Unemployment benefits are also part of the tax base for individuals whose

10 For more details on EU-SILC, see Eurostat's EU statistics on income and living conditions.

11 The Joint Research Centre (JRC) publishes annual country reports that describe in more detail the uprating exercise, policy changes and the institutional set-up of each EU country (EUROMOD Country Reports).

(other) total taxable income exceeds €10,000. Taxable income is defined as gross taxable income minus tax allowances,[12] which in Greece are very limited. Throughout the period 2019-23, the only allowance concerned social security contributions, which were fully deductible from the tax base. Income from interest and dividends is excluded from the PIT base and taxed separately at flat rates.

The PIT system in Greece combines individual-based taxation with a progressive rate structure and a limited set of exemptions and credits. More specifically, tax liability is assessed at the individual level, although spouses have the option to file a joint income tax return; in such cases, incomes are entered separately and taxed individually.[13] Income taxation is graduated, with progressively higher marginal tax rates applying to higher income brackets. Some forms of income are exempted from taxation, including unemployment benefits, social assistance and some family benefits, while employment and pension income received by persons with a disability above 80% is also tax-exempt.[14] Tax credits, which directly reduce the amount of tax payable, include the following:

(i) *employment and pension income tax credit,* which applies to the sum of employment, pensions and farming income (EPF income) and is capped to the amount of people's actual tax liability. In 2019 it was equal to €1,900/€1,950/€2,000/€2,100 for taxpayers with zero/one/two/three or more dependent children and EPF income up to €20,000 per year; it declined by €10 for each additional €1,000 of EPF incomes over €20,000. In 2020-23 the tax credit was equal to €777/€810/€900/€1,120/€1,340 for taxpayers with zero/one/two/three/four dependent children and EPF income up to €12,000 per year, while for each additional dependent child after the fourth it increased by €220. The tax credit declined by €20 for each additional €1,000 of EFP income over €12,000.

(ii) *disability tax credit*, amounting to €200 annually per eligible taxpayer (i.e. a person with disability of at least 67%).

(iii) *tax credit for charitable donations*, calculated at 10% of donations greater than €100 per annum but less than 5% of taxable income.

Greece does not apply an automatic indexation of PIT brackets or income thresholds; instead, tax parameters are adjusted on a discretionary basis through legislative changes.

3.2 PIT REFORMS 2019-23

During the 2019-23 period, significant reforms in the PIT system were implemented in Greece aiming at reducing the tax burden on labour and improving progressivity.[15] The reform package included a revision of the PIT schedule, adjustments to tax credits and successive reductions in social security contribution rates. These measures were introduced against a backdrop of strong nominal income growth and high inflation, yet without the application of automatic indexation to tax parameters. In parallel, the government implemented broader labour-market measures —such as increases in the statutory minimum wage— that indirectly influenced the tax and contribution base. In more detail:

– *PIT tax schedule:* In 2020, the PIT tax schedule was reformed with the introduction of an additional tax band featuring a lower tax rate (for incomes up to €10,000) and with marginal reductions in tax rates for higher income brackets. The tax schedules applicable from 2019 to 2023 are presented in Table 1 (for employment, pension and farming income) and Table 2 (for property income).

– *Social security contributions:* On a cumulative basis over the 2019-23 period, social security contribution rates for the private sector were reduced for both employees and employers,

12 Note that tax allowances are usually shared between the main taxpayer and his/her spouse.
13 However, there is a partial exception to this rule: some tax allowances and/or tax credits are jointly assessed.
14 Unemployment benefits, large family benefits and disability benefits are taxed for individuals with (other) taxable income over €10,000.
15 For more details, see Bank of Greece, *Annual Reports 2019* (pp. 158-159 and 186-187) and *2020* (pp. 202-203), as well as Ministerial Decisions No. 107675/29.12.2021, 38866/21.4.2022 and 31986/24.3.2023 (in Greek).

Table 1 Tax schedule: Employment, pension, self-employment and farming income

Income bracket (EUR)	Tax Rate 2019	Tax Rate 2020-23*
0 - 10,000	22%	9%
10,001 - 20,000		22%
20,001 - 30,000	29%	28%
30,001 - 40,000	37%	36%
40,000 -	45%	44%

Source: EUROMOD Country Reports Greece 2019-2022, 2020-2023.
* Applied separately to farming income.

Table 2 Tax schedule: Property income (2019-23)

	Income bracket (EUR per year)		
Tax band	Lower limit	Upper limit	Tax rate (%)
1	0	12,000	15
2	12,001	35,000	35
3	35,001	...	45

Source: EUROMOD Country Reports Greece 2019-2022, 2020-2023.

by 1.88 and 2.52 percentage points (pps), respectively (see Table 3). Moreover, in 2020, the self-employed and farmers' social security contributions changed into a schedule of social security classes (i.e. lump sum amounts irrespective of self-employment/ farming income, as opposed to a rate-based schedule in 2019; see Tables 4-6). In 2023, the self-employed social security contributions were increased in line with inflation.

Table 3 Private sector social security contributions

(%)

	Employees	Employers
2019	15.75	24.81
2020	15.33	24.33
2021	14.12	22.54
2022-23	13.87	22.29
change (cum.)	-1.88	-2.52

Source: EUROMOD Country Reports Greece 2019-2022, 2020-2023.

Table 4 Own account workers' social security contributions (2019)

Primary pension	13.33%
Sickness insurance	6.95%
Unemployment insurance	EUR 10/month

Source: EUROMOD Country Report Greece 2019-2022.

Table 5 Self-employed liberal professions' social security contributions (2019)

Primary pension	13.33%
Supplementary pension	7.00%
Lump sum pension	4.00%
Sickness insurance	6.95%
Unemployment insurance	EUR 10/month

Source: EUROMOD Country Report Greece 2019-2022.

Table 6 Own account workers' and self-employed liberal professions' social security contributions 2020-23

(EUR per month)

Insurance class	2020-22	2023
up to 5 years of history	126	138
1	210	230
2	252	276
3	302	331
4	363	398
5	435	477
6	566	621

Source: EUROMOD Country Report Greece 2020-2023.

– *Minimum wage:* In January 2019, the minimum wage —payable 14 times a year— stood at €586. In February 2019, it was raised to €650. In 2022 and 2023, the minimum wage was further increased, thereby affecting the level of the unemployment insurance benefit, which is connected to it[16], as well as the upper and lower earnings lim-

16 For the period of analysis, the unemployment benefit was calculated as 55% of the minimum daily wage paid for 25 days.

Table 7 Employment, pension and farming income tax credit

(EUR per year)

	No children		One child		Two children		Three children		Four children	
Income	2019	2020-23	2019	2020-23	2019	2020-23	2019	2020-23	2019	2020-23*
0 - 12,000	1,900	777	1,950	810	2,000	900	2,100	1,120	2,100	1,340
20,000		617		650		740		960		1,180
30,000	1,800	417	1,850	450	1,900	540	2,000	760	2,000	980
40,000	1,700	217	1,750	250	1,800	340	1,900	560	1,900	780
50,850	1,592	0	1,173	33	1,223	123	1,323	343	1,323	563
52,500	1,575	0	1,140	0	1,190	90	1,290	310	1,290	530
57,000	1,530	0	1,050	0	1,100	0	1,200	220	1,200	440
68,000	1,420	0	830	0	880	0	980	0	980	220
79,000	1,310	0	610	0	660	0	760	0	760	0
210,000	0	0	50	0	100	0	200	0	200	0
215,000	0	0	0	0	50	0	150	0	150	0
220,000	0	0	0	0	0	0	100	0	100	0
230,000	0	0	0	0	0	0	0	0	0	0

Source: Bank of Greece calculations.
* From 2020 onwards, the tax credit for each child after the third is increased by EUR 220.

its for the social security contribution base.[17] More specifically, the minimum wage was increased by 2% in January 2022 and by another 7.7% in May 2022, reaching €713 per month. In April 2023 it was raised by 9.4%, reaching €780 per month.

– *Employment and pension tax credit:* In 2020, this tax credit became less generous, as described in Section 3.1 and illustrated in Table 7.

3.3 SPECIAL FEATURES OF THE GREEK PIT SYSTEM

The composition of the PIT base in Greece is distinctive compared to other euro area countries, reflecting the structure of household income and labour market characteristics.[18] In all other euro area countries, labour income constitutes the dominant component of the PIT base, but Greece stands out for having the lowest share of labour income (45%) and the highest shares of self-employment income (19%) and pensions and social-benefit income (33%) within the euro area. This structure reflects the country's labour market and demographic composition, characterised by a large number of self-employed workers and a relatively high share of retirees receiving taxable pensions.

From a distributional perspective, the composition of income sources varies markedly across the income distribution (Chart 1).[19] In Greece, self-employment income is most prevalent in the lowest income deciles, whereas labour income dominates the upper half of the distribution. This asymmetry supports the stylised observation that "wage earners are rich and the self-employed are poor".[20] In other words, employees contribute disproportionately to the higher segments of the tax base, whereas a substantial part of the reported self-employment income is concentrated among lower-income taxpayers. Pension income is heavily concentrated in the middle of the income distribution, reflecting the fact that

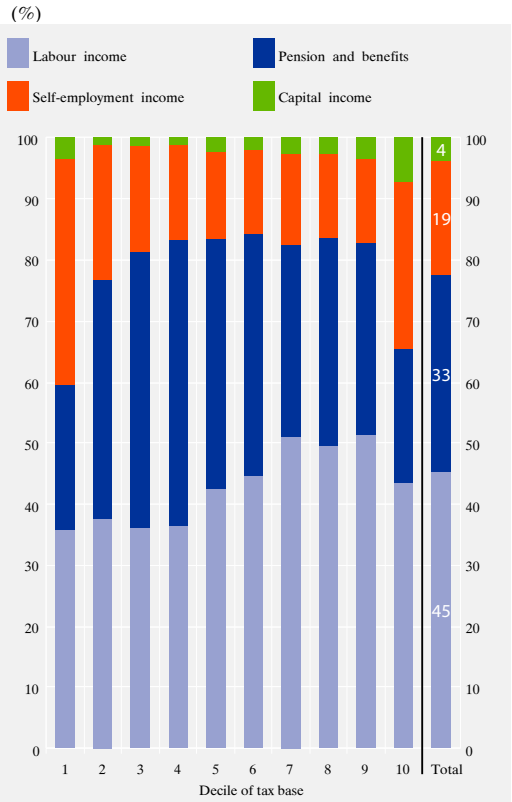
17 In 2019-22, the lower limit for the contribution base was equal to the 2019 minimum wage (i.e. €650), while the upper earnings threshold was 10 times the 2019 minimum wage (i.e. €6,500). Since 2022, these thresholds are uprated by the rate of inflation.
18 For comparison with other EU countries, see Figure 2(b) in García-Miralles et al. (2025).
19 For detailed data, see Tables A.2.1 and A.2.2 in the Appendix.
20 However, it could also be interpreted as highlighting the substantial extent of income under-reporting among the self-employed.

pensions are generally lower than earnings from employment but more stable and widespread. This composition has important implications for both the progressivity of the PIT system and the incidence of fiscal drag across income groups.

The PIT burden in Greece is highly concentrated among high-income taxpayers, reflecting not only the progressivity of the tax system but also the structure of the tax base, which is effectively very narrow (Chart 2).[21] This pattern has remained broadly unchanged between 2019 and 2023. In particular, the richest 10% of taxpayers accounts for over 50% of total PIT revenues, while the bottom half of the income distribution contributes less than 10%. This concentration largely reflects the underlying distribution of the tax base, as the top decile represents roughly 28% of the total tax base, whereas the bottom half of taxpayers earns only about 24%. At the same time, a large share of individuals either pay no tax or contribute relatively little to total revenues. The share of zero taxpayers —i.e. individuals with no PIT liability due to low income or available credits— declined slightly from 32% in 2019 to 30% in 2023, mainly due to a reduction among middle-income households. This structure underlines both the strong progressivity of the Greek PIT system and its narrow effective tax base, with a relatively small segment of high-income taxpayers bearing the bulk of the tax burden.

By focusing on the top of the income distribution, it becomes evident that the Greek PIT system exhibits one of the highest concentrations of both the tax base and tax liabilities in the euro area[22] and that this concentration has increased in recent years, reflecting both structural and policy factors. In 2023, the top 20% of taxpayers accounted for about 44% of the total tax base, a share that has remained broadly unchanged since 2019. However, their share of total PIT revenues rose from 67% in 2019 to 73% in 2023, indicating a growing contribution of high-income earners to overall tax collection (Chart 3). The widening gap between the share of income earned and the share of tax paid, points to a rise in the progressivity of the PIT system. This is consistent with the increase in the Kakwani index[23] (from 0.274 in 2019 (Table 8, Baseline Scenario) to 0.321 in 2023 (Table 10, Baseline Scenario)), which quantifies the progressivity of the tax system and confirms that personal income taxation in Greece became more redistributive

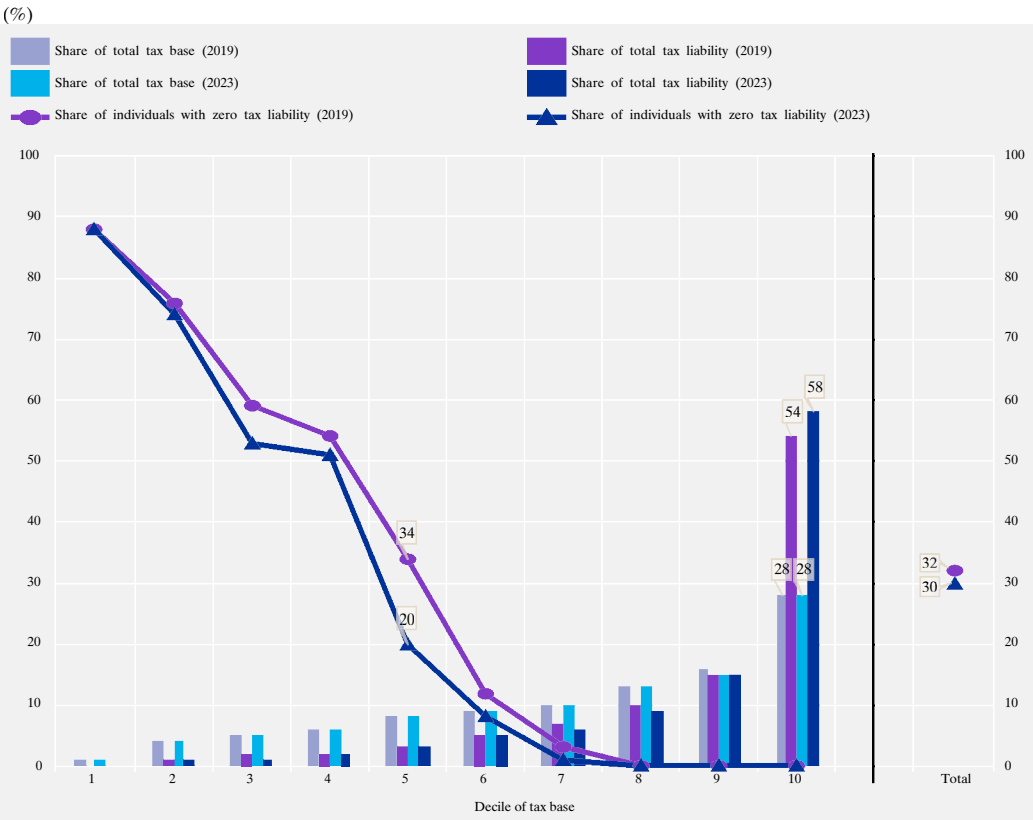
Chart 1 Share of tax base by income source – Distributional analysis



Sources: EUROMOD and Bank of Greece calculations.
Note: The chart is based on 2019 data; however, the composition of the tax base and the corresponding distributional patterns remain broadly unchanged in 2023.

21 For detailed data, see Table A.3 in the Appendix.
22 For a comparison with other EU countries, see Figure A.2(a) and (b) in García-Miralles et al. (2025).
23 The Kakwani index (Kakwani 1977) is a standard measure of the progressivity of a tax system, defined as the difference between the concentration coefficient of taxes and the Gini coefficient of pre-tax income: $K = C_T - G_Y$, where C_T denotes the concentration of tax payments (ranking individuals by pre-tax income) and G_Y represents the Gini coefficient of the pre-tax income distribution. The index takes values between -1 and 1. $K>0$ indicates a progressive tax (the average tax rate increases with income). $K=0$ denotes a proportional tax. $K<0$ corresponds to a regressive tax (the average tax rate decreases with income). The larger the Kakwani index, the greater the redistributive potential of the tax system.

Chart 2 Distribution of tax base and PIT liabilities across income deciles (2019 and 2023)



Sources: EUROMOD and Bank of Greece calculations.

over time. This development reflects both the impact of the 2019-23 PIT and other structural reforms —which reduced rates primarily for lower and middle incomes— as well as the stronger nominal income growth experienced by higher earners.

4 FISCAL DRAG IN "THEORY"

The descriptive analysis above provides the necessary context for quantifying fiscal drag within the Greek PIT system. This section turns to the estimation of tax-to-base elasticities, which measure the responsiveness of PIT revenues to income growth under unchanged legislation. This "theoretical" assessment allows us to isolate the mechanical progressivity and estimate the potential fiscal drag inherent in a given tax system.

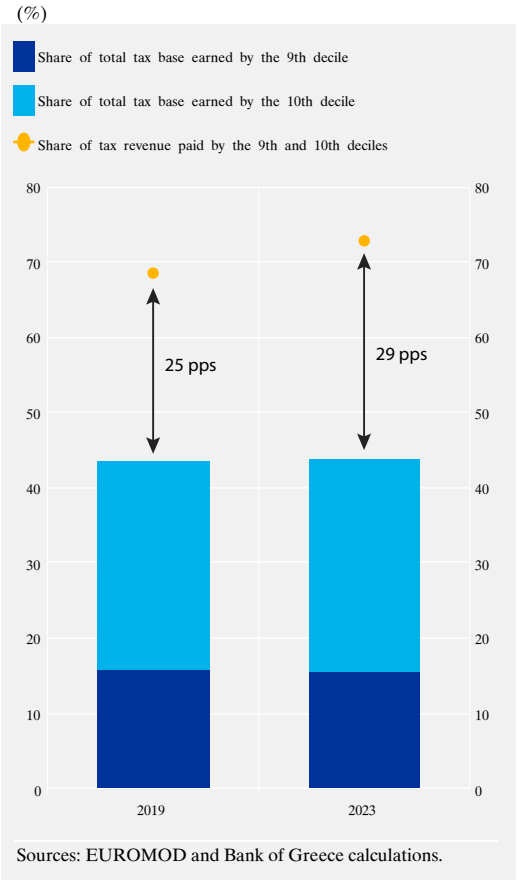
4.1 METHODOLOGY: ESTIMATING TAX-TO-BASE ELASTICITIES

Tax-to-base elasticity (TTB) is defined as the percentage change in PIT revenues resulting from a homogeneous 1% increase in taxpayers' income. Formally, we define the TTB elasticity for each taxpayer as:

$$\frac{\partial t/_t}{\partial y/_y} = \frac{y}{t} \times \frac{\partial t}{\partial y} = \frac{\partial t/_{\partial y}}{t/_y} = \frac{MTR}{ATR}$$

where y denotes the tax base and t represents PIT revenue. Note that TTB elasticity is equivalent to the ratio of the average Marginal Tax Rate (MTR) and the Average Tax Rate (ATR). In a progressive system, marginal rates are generally higher than the average tax rates across the income distribution, resulting in TTB elasticities greater than one. *Fiscal drag*

Chart 3 Share of tax base earned and tax revenue paid by the top 20% of the tax base distribution (2019, 2023)



Sources: EUROMOD and Bank of Greece calculations.

is defined as the disproportionate (i.e. greater than 1%) increase in tax revenues resulting from a 1% nominal increase in income. Note also that these elasticities are a *static* measure because they are calculated under a *ceteris paribus* assumption at a given point in time under the prevailing tax regime, where all tax parameters remain fixed and there are no behavioural responses. Therefore, the size of the elasticity depends both on the design of the PIT legislation (such as tax brackets, deductions and credits) and on the income distribution and demographic characteristics of taxpayers, which affect their final tax liability.

We estimate the TTB elasticity by simulating a 1% increase in all income sources included in the tax base for all individuals and then calculating the resulting tax liability, keeping the PIT legislation constant (including the value of nominal tax parameters). The TTB elasticity is then computed as the percentage change in PIT revenue divided by the 1% increase in the tax base.

The progressive nature of PIT implies a relatively high tax-to-base elasticity, indicating significant potential for fiscal drag when tax parameters are not adjusted.

Estimating TTB elasticities requires methodological choices on how the PIT system interacts with other elements of the tax-benefit framework, particularly social security contributions and income-linked parameters. Our approach focuses on isolating the effect of keeping PIT parameters fixed, while allowing other features of the tax-benefit system to adjust freely in response to the simulated income growth. For example, when labour income increases, social security contributions (SSCs) paid by employees also rise – and since these are tax-deductible in the PIT, this effect is allowed in the simulation. Likewise, where SSC schemes include nominal minimum or maximum contribution thresholds, these are also increased by 1%, to reflect the usual practice of their update in line with income growth. Finally, since the PIT legislation includes references to nominal values of the statutory minimum wage, this parameter is also indexed to income growth, which tends to moderate TTB elasticities.

4.1.1 DECOMPOSING TAX-TO-BASE ELASTICITIES

The microsimulation framework allows us to disentangle the mechanisms that drive the responsiveness of PIT revenues to tax base growth. We decompose the TTB elasticity by isolating the contribution of key tax parameters, distinguishing between tax brackets and the most important tax credits and deductions. The exercise proceeds in two steps. First, we simulate a 1% increase in all components of the tax base, while proportionally adjusting all PIT parameters – representing a scenario close

to full indexation to income growth. Second, we sequentially remove this adjustment for each parameter to identify how much each component (bracket thresholds, credits or deductions) contributes to the overall elasticity. This approach reveals the specific design features that amplify or dampen the mechanical effect of income growth on PIT revenues.

We further examine how elasticities vary across different sources of income, capturing the heterogeneity of fiscal drag within the PIT base. Separate simulations are conducted for labour income, self-employment income, capital income and pensions and benefits, by increasing each source individually by 1% and observing the resulting change in tax revenues. The corresponding elasticity is then calculated as the percentage change in PIT revenue relative to the 1% change in the tax base driven by that specific income source. This breakdown highlights how differences in tax treatment and exemptions across income categories shape the overall responsiveness of the PIT system.

4.1.2 DISTRIBUTIONAL ANALYSIS – IMPACT ON PROGRESSIVITY AND INEQUALITY

We further calculate separate TTB elasticities for each decile group across the individual tax base distribution. Estimating TTB elasticities across income deciles provides a detailed picture of how fiscal drag operates along the income distribution. This non-parametric approach captures how the built-in progressivity of the PIT system affects individuals at different income levels, revealing the impact of potential fiscal drag on redistribution and inequality. We further document, for each decile group, the mechanisms driving the elasticities.

Elasticities are computed separately for each decile as the ratio of the change in total taxes paid by individuals in that group to the change in their tax base. The resulting decile-specific elasticities represent a weighted average of individual elasticities within each group, using tax liabilities as weights. As a result, zero-taxpayers, whose elasticity is undefined (because a 1% income increase does not usually alter their tax liability), receive a zero weight and do not affect the estimated elasticity. This weighting approach ensures internal consistency with the aggregate TTB elasticity, as taxpayers with higher liabilities exert a proportionally greater influence on the overall measure.

4.2 RESULTS: TTB ELASTICITIES IN GREECE

The 2019 results show that Greece exhibited a tax-to-base (TTB) elasticity broadly in line with the euro area average, indicating potential for large fiscal drag effects embedded in its PIT system. More specifically, the aggregate TTB elasticity is estimated at around 1.8, placing it within the euro area range of 1.7-2.[24] An elasticity of this magnitude implies that, even under uniform nominal income growth and unchanged legislation, PIT revenues in Greece increase more than proportionally relative to the tax base, reflecting the built-in progressivity of the system.

The results of the analysis show that the key determinant of fiscal drag (i.e. the portion of the TTB elasticity that is above 1) was the effect of tax credits,[25] which accounted for approximately 80% of fiscal drag, while the progressivity of the tax schedule contributed the remaining 20% (Chart 4).[26] This pattern differs from many other euro area countries where bracket creep plays a more prominent role. These findings highlight the fact that Greece's theoretical fiscal drag stems primarily from the structure and phase-out of key tax credits, making their design central to understanding the responsiveness of PIT revenues.

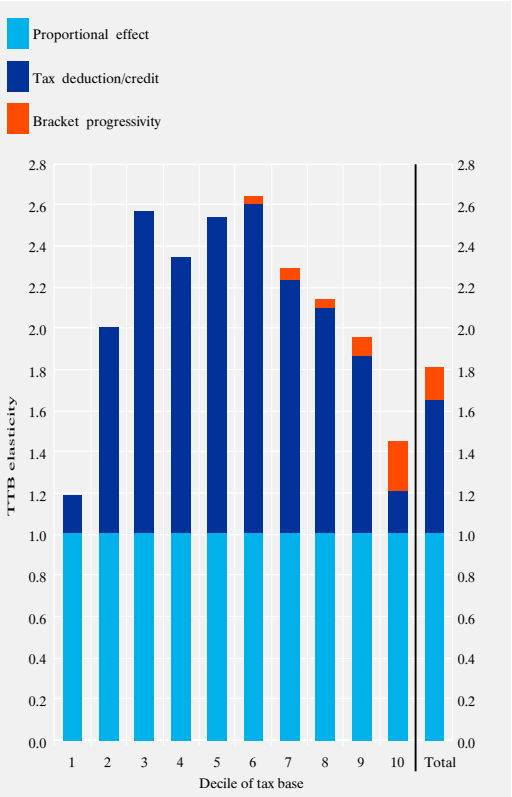
In Chart 4 we also report the estimates of TTB elasticities by decile groups of the tax base distribution, as well as their underlying mecha-

24 For more details, see García-Miralles, E., M. Freier, S. Riscado et al. (2025), "Fiscal drag in theory and in practice: a European perspective", ECB, Working Paper No. 3136.
25 Among these, the tax credit for income from employment and pensions has the greatest impact on elasticity, as it is dependent on income.
26 For detailed data, see Table A.4 in the Appendix.

nisms. This decile-based, non-parametric analysis provides a detailed view of how fiscal drag varies across the income distribution. Unlike aggregate indicators of volatility or dispersion, examining elasticities by decile helps detect sharp differences or "kinks" in the distribution, which are crucial for evaluating the progressivity and design of the tax system with greater precision. The results show that elasticities can be particularly high in certain parts of the income distribution, indicating very steep marginal tax rates for those taxpayers. In the absence of policy measures, such features imply that fiscal drag could have a significant impact on these groups. This, in turn, raises concerns about potential inefficiencies, as excessively high marginal rates may distort work incentives and undermine the fairness of the tax system. By decomposing elasticities by decile, we can identify the specific tax parameters that generate these concentration points and inefficiencies.

The decomposition shows that the drivers of TTB elasticities vary significantly across the income distribution, with tax credits dominating in the lower deciles and bracket progressivity becoming increasingly important for higher-income taxpayers (Chart 5).[27] In particular, in the bottom half of the distribution (deciles 1-5), almost the entire elasticity above one is driven by the employment-pension tax credit, which accounts for close to 100% of the fiscal drag mechanism in these groups. As income rises, the relative contribution of bracket progressivity gradually increases: in deciles 6-8, bracket effects explain 2-4% of the fiscal drag, while in the top deciles they become more substantial – around 10.5% in decile 9 and over 50% in decile 10. This pattern reflects the interaction between the credit's phase-out —most relevant at low and middle incomes— and the PIT schedule's increasing marginal tax rates at the top. Overall, the 2019 results indicate that fiscal drag for most taxpayers is primarily driven by the erosion of tax credits, while bracket creep becomes the dominant mechanism only in the upper end of the income distribution.

Chart 4 Decomposition of tax-to-base (TTB) elasticities across the income distribution (2019)

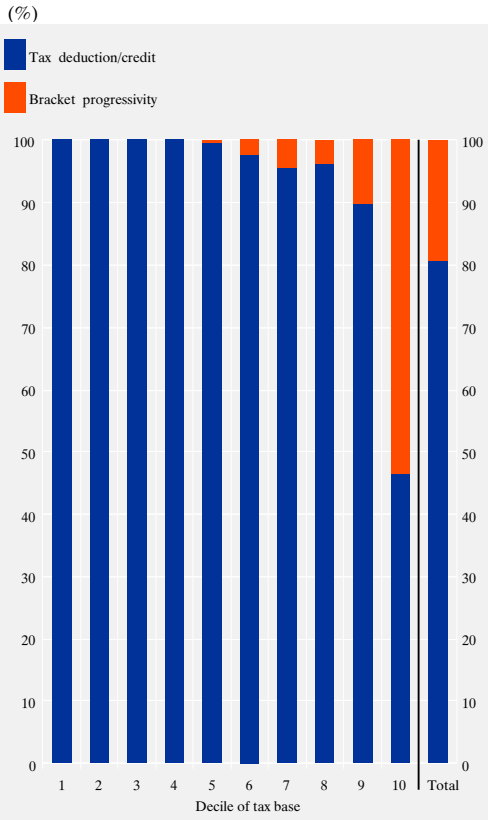


Sources: EUROMOD and Bank of Greece calculations.

Moreover, our simulation results indicate that the level of TTB elasticity varies across income deciles (Chart 4). More specifically, at the bottom of the distribution, the elasticity is relatively low reflecting the limited tax liability of low-income taxpayers. Beginning in decile 2, elasticities increase sharply, driven largely by the erosion of the employment-pension tax credit. Elasticities remain elevated in the middle of the distribution, with values around 2.55-2.64 in deciles 5 and 6, before gradually declining toward the top. This profile shows that the theoretical fiscal drag in 2019 was most pronounced among low to middle-income tax-

27 Chart 5 shows the decomposition of the portion of the elasticity that is above one, normalising its size to 100. This allows comparing the relative contribution of each mechanism across income deciles, irrespective of the size of the elasticity. For detailed data, see Table A.5 in the Appendix.

Chart 5 Composition of theoretical fiscal drag by income decile (2019)



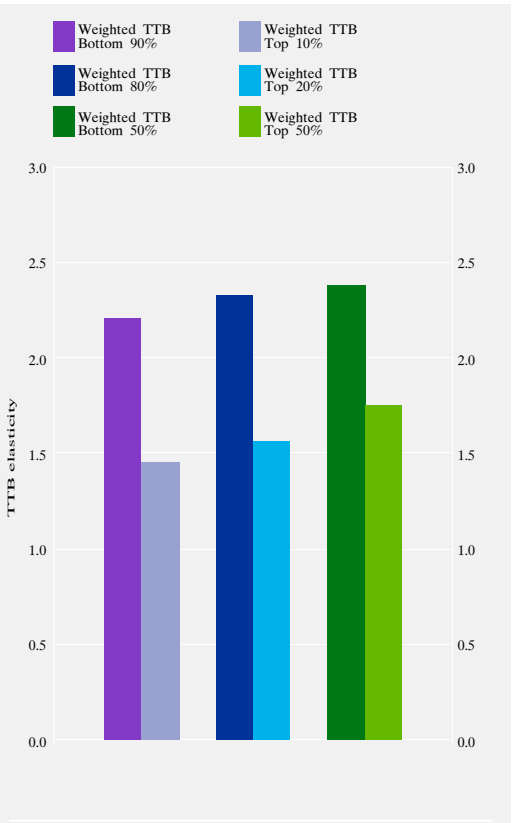
Sources: EUROMOD and Bank of Greece calculations.

payers, where credit erosion is strongest, while remaining more moderate at the very bottom (due to many zero-liability taxpayers) and at the very top, where bracket effects dominate but credits play a limited role.

The distribution of TTB elasticities across income groups reveals a systematic asymmetry, with lower segments of the income distribution exhibiting higher elasticities than higher ones (Chart 6). The bottom 90% of taxpayers display significantly higher weighted elasticities than the top 10%, while a similar pattern holds when comparing the bottom 80% with the top 20% and the bottom half with the top half of the distribution. This indicates that, in theory, fiscal drag is stronger among lower to middle-income groups, as these taxpayers are more likely to lose access to tax credits or shift into higher brackets when nominal incomes rise. From a macroeconomic perspective, these distributional differences matter because lower-income households tend to have higher marginal propensities to consume, while higher-income households save a larger share of their income. As a result, when fiscal drag falls more heavily on lower to middle-income taxpayers, it can dampen aggregate consumption and reduce the strength of the PIT system as an automatic stabiliser during periods of rising nominal incomes.

The distribution of TTB elasticities suggests that, *in theory*, fiscal drag reduces the progressivity of the PIT system when incomes rise and tax parameters remain unchanged. A progressive tax implies that effective tax rates increase with income. However, under unchanged legislation, our results show that PIT progressiv-

Chart 6 Distribution of TTB elasticities (2019)



Sources: EUROMOD and Bank of Greece calculations.

Table 8 Distribution of TTB elasticities (2019): Impact on progressivity and inequality

	2019	
	Baseline scenario	1% increase simulation scenario
Progressivity:		
Kakwani index	0.274	0.272
Difference in Kakwani index after 1% income increase	*-0.001*	
Inequality:		
Gini: tax base (post-tax) (%)	0.351	0.351
Δ (Gini: tax base (post-tax)) (in basis points)	*-0.009*	
Inequality reduction capacity:		
Gini: tax base (pre-tax) (%)	0.378	0.378
Gini: tax base (post-tax) (%)	0.351	0.351
Δ (Gini) (in percentage points)	-0.026	-0.026
Δ (Δ (Gini)) (in basis points)	*-0.010*	

Source: EUROMOD.
Note: The simulation scenario assumes a homogenous 1% increase in the tax base.

ity decreases following a 1% increase in nominal income. In other words, effective tax rates grow more for low- and middle-income taxpayers than for top-income earners, while they remain unchanged for individuals with no tax liability. To quantify this effect, we compute the Kakwani index,[28] which quantifies the degree of progressivity of the tax system, before and after a uniform 1% income increase. As shown in Table 8, the index declines following the income increase, confirming that progressivity weakens when tax parameters are fixed. This outcome is consistent with the distribution of TTB elasticities presented in Charts 4 and 6, where elasticities are systematically higher among lower-income groups. The main driver is the phase-out of tax credits as incomes rise (for low income groups) and the transition into higher tax brackets (for higher income taxpayers). Together, these mechanisms imply that, in the absence of policy measures, fiscal drag erodes the progressivity of the PIT system and shifts the tax burden disproportionately toward the lower and middle segments of the income distribution.

The analysis of TTB elasticities across income groups indicates that fiscal drag tends to reduce income inequality when tax parameters remain unchanged. To assess this effect, we calculate the Gini coefficient —which places more weight on disparities in the middle of the income distribution— for net-of-tax income before and after a uniform 1% increase in income, keeping legislation constant. The negative value reported in Table 8 indicates that, when incomes rise homogeneously, inequality declines slightly (by 0.009 basis points). This reflects the fact that low-income individuals, many of whom have a zero-tax liability, are unaffected by the income increase, while middle- and higher-income taxpayers face higher effective tax rates. It is worth noting that inequality tends to marginally decrease, despite the reduction in progressivity; this is because the tax liability of very low-income individuals remains zero even as their incomes rise,[29] outweighing the negative impact of progressivity. To distinguish the impact of income growth from that of fiscal drag, we also compute the change in the inequality reduction capacity of the tax system —measured as the difference between gross and net income

28 For the definition of the Kakwani index, see footnote 23.
29 TTB elasticity is very low for individuals in the lowest income decile, nearly 90% of whom pay no personal income tax.

Gini – before and after income growth. This change is marginally negative (by 0.010 basis points), suggesting that the PIT system's inequality-reduction capacity improves slightly when incomes rise and tax parameters remain fixed. The inequality-reduction effect of fiscal drag is a common result in the literature (Immervoll 2005; Paulus et al. 2020).

TTB elasticities also differ substantially across income sources, reflecting differences in tax treatment, the contribution of each income group to the total PIT revenue and the degree of progressivity embedded in the PIT system (Chart 7).[30]

- *Labour income* exhibits an elasticity close to the overall PIT elasticity (and other EU countries) – around 1.9 in 2019 – since it represents the dominant component of household income and the main driver of the tax base.

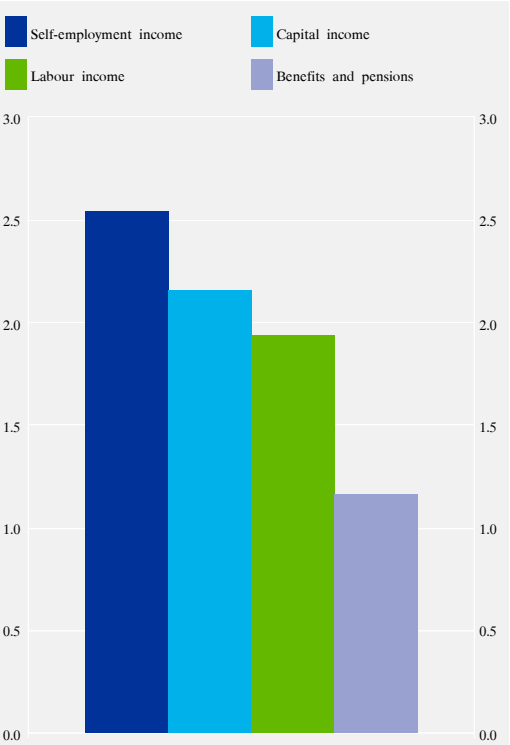
- *Self-employment income* shows the highest elasticity (estimated around 2.5 in 2019, the highest in the euro area), reflecting both labour market characteristics and specific features of the tax system. Although Greece has one of the largest shares of self-employed in the EU, their reported incomes are on average lower than those of wage earners and this group contributes disproportionally little to PIT revenues. The high elasticity arises from several interacting factors: a progressive effective tax structure, limited access to deductions and credits, and social security contributions that increase with the declared income (in 2019). Crucially, however, it also reflects the under-reporting of taxable income by many self-employed individuals. Since self-employed taxpayers are concentrated in the lower and middle parts of the income distribution, upward shifts in reported income can generate a significant fiscal drag, leading to a more than proportional increase in PIT revenues.

- *Capital income* in Greece displays a relatively higher TTB elasticity than typically observed in other EU countries (estimated around 2.2). This outcome reflects the progressive treatment applied to rental income, despite the fact that most capital gains, dividends and interest are taxed separately at flat rates.

- In contrast, *pensions and social benefits* display much lower elasticities (around 1.2, which places them among the lowest across EU countries) and are less vulnerable to fiscal drag.

These differences have important implications for revenue forecasting, since relying on a single aggregate elasticity may underestimate or overestimate tax responsiveness when income sources grow at different rates. Moreover, the

Chart 7 TTB elasticities by income source (2019)



Sources: EUROMOD and Bank of Greece calculations.

30 For detailed data, see Table A.6 in the Appendix.

variation in TTB elasticities by income source has distributional consequences, as the stronger responsiveness of labour and self-employment income implies that fiscal drag will be more concentrated among working-age taxpayers, while pensioners and recipients of benefits are relatively less affected.

5 FISCAL DRAG IN PRACTICE THROUGH COUNTERFACTUAL MICROSIMULATIONS

The second part of the study evaluates how fiscal drag evolved in practice during the recent period of high inflation. In this analysis, we account not only for the progressivity of the tax design but also for the policy actions taken during the period, such as the updating of nominal tax parameters. To do so, we compare the actual tax collection in 2023 with counterfactual scenarios in which tax parameters are either fully indexed or not updated at all since 2019.

5.1 METHODOLOGY: DEFINING COUNTERFACTUAL SCENARIOS

Actual fiscal drag can be quantified by isolating how much of the observed increase in PIT revenues between 2019 and 2023 was attributable *solely* to bracket creep, as opposed to income growth or policy changes. To do so, we disentangle the various drivers of tax revenue dynamics: the progressivity in the PIT system, nominal income growth, indexation practices and discretionary tax policy reforms. In this framework, *potential fiscal drag* is defined as the increase in PIT revenues that would have occurred in the period 2019-23 in the absence of any legislation changes or indexation practices since 2019. By contrast, *actual fiscal drag* corresponds to the portion of revenue growth that remains after accounting for any indexation practices and/or structural reform policies that may have mitigated the effect of bracket creep.

We implement this framework by simulating a set of counterfactual PIT systems for 2023 that differ only in the degree of indexation applied to the 2019 tax parameters. PIT revenues for 2019-23 are estimated based on the applicable legislation during each year (Baseline Scenario), using uprated incomes. For 2023 incomes, four alternative counterfactual scenarios are examined, applying the 2019 legislation under different indexation rules: (a) Scenario 1: No indexation, where all PIT parameters remain at their 2019 nominal values; and (b) Scenarios 2,3 and 4: Indexed systems, in which the 2019 PIT parameters are updated using different indexation metrics (namely, the HICP of the previous year, the HICP of the current year and tax base growth respectively). Since simulated tax revenues may differ from those reported in official statistics for 2019-23 for several reasons (as discussed in Section 2), we correct for these discrepancies by rescaling our results. Specifically, for each year of analysis we adjust our simulations by the ratio of the simulated tax revenues to the official ones.

We quantify actual and potential fiscal drag by comparing PIT revenues under the various simulation scenarios. "*Actual fiscal drag*" is calculated as the difference in PIT revenue (as a percentage of GDP) between the 2023 Baseline Scenario and the average of the three indexation scenarios (Scenarios 2, 3 and 4). "*Potential fiscal drag*" is estimated as the difference in PIT revenue between Scenario 1 (No indexation) and the average of the three indexation scenarios (Scenarios 2, 3 and 4). By comparing these two figures, it is possible to assess the extent to which discretionary tax policy changes have fully or partially offset the mechanical increase in revenue resulting from the erosion of the tax base. In particular, we define the *Offset Fiscal Drag Ratio* as:[31]

$$\text{Offset Fiscal Drag Ratio} = \frac{\text{offset fiscal drag}}{\text{potential fiscal drag}} = \frac{\text{potential fiscal drag} - \text{actual fiscal drag}}{\text{potential fiscal drag}} = 1 - \frac{(\text{Baseline Scenario}) - (\text{Average of Scenarios 2, 3 and 4})}{(\text{Scenario 1}) - (\text{Average of Scenarios 2, 3 and 4})}$$

31 The methodology is based on the analysis of Balladares and García-Miralles (2025).

Table 9 Counterfactual scenarios for the year 2023

	Baseline	Counterfactual scenarios			
		No indexation	Full indexation		
		(1)	(2)	(3)	(4)
PIT legislation	2023	2019	2019		
Nominal PIT parameters	2023	2019	2019 indexed		
Indexation practice	-	None	Lagged HCIP	Current HCIP	Tax-base growth

This measure abstracts from the magnitude of potential fiscal drag (which is closely linked to the progressivity of a country's tax system) and focuses on the impact of government action through tax reforms and indexation. A characterisation of the scenarios considered may be found in Table 9.

5.2 RESULTS: ACTUAL AND OFFSET FISCAL DRAG

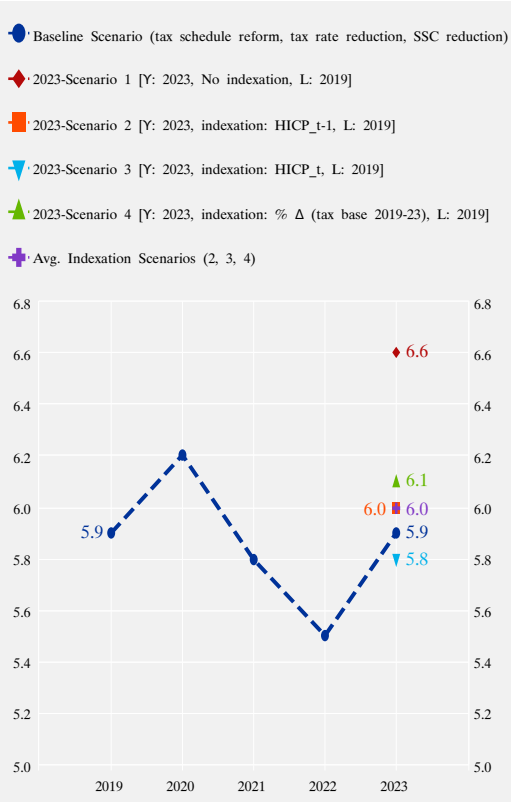
The tax policy pursued during 2019-23 fully compensated for the effects of fiscal drag, keeping PIT revenues (as a percentage of GDP) broadly constant. Chart 8[32] displays the evolution of PIT revenue as a percentage of GDP in Greece for each baseline system in the period 2019-23, rescaled as described earlier, as well as for each of the 2023 counterfactual scenarios considered. Compared to 2019, PIT revenues remained broadly unchanged in 2023, standing at 5.9% of GDP. In the absence of statutory indexation of tax parameters in Greece over that period, this development reflects the impact of structural tax reforms in the PIT system and social security contributions. In fact, maintaining the 2019 tax legislation without indexation (Scenario 1) would have increased PIT revenues in 2023 by 0.7 pps of GDP. Indexation Scenarios 2 and 4 would have resulted in smaller increases (0.2 and 0.1 pps of GDP, respectively), while Scenario 3 would have slightly reduced revenues compared to the baseline scenario (by 0.1 pps of GDP).

The simulation results show that the structural reforms during the examined period have not only fully offset potential fiscal drag, but have in fact overcompensated for it (by approximately 10%). In more detail, *potential fiscal drag*, measured as the difference in the PIT revenue to GDP ratio between Scenario 1 (No indexation) and the Average of the Indexation Scenarios, was estimated at 0.6 pps of GDP. *Offset fiscal drag*, measured as the difference in the PIT revenue to GDP ratio between Scenario 1 (No indexation) and the Baseline 2023 Scenario was estimated at 0.7 pps of GDP. This implies that the effect of potential fiscal drag was more than fully offset by government policies, keeping tax revenue (as a percentage of GDP) constant in an environment of strong inflationary pressures and rising nominal incomes.

In parallel, the tax reforms adopted in 2019-23 led to a modest reduction in the average effective tax rate (AETR), reflecting a decrease in the real tax burden on individuals, without losses in tax revenue (Chart 9).[33] In particular, the AETR marginally declined from 8.8% in 2019 to 8.7% in 2023 as the tax base grew faster (7.8%) than tax revenues (6.1%). Hence, the overcompensation of potential fiscal drag —through the aforementioned reforms— resulted in a reduction in the tax burden, without undermining the revenue performance of the system, which benefited from rising real incomes. It should be highlighted that, in the case of Greece, the offsetting of fiscal drag was driven entirely by the restructuring of the tax schedule and by the reductions in tax rates and social security contributions, with no contribution from indexation practices.

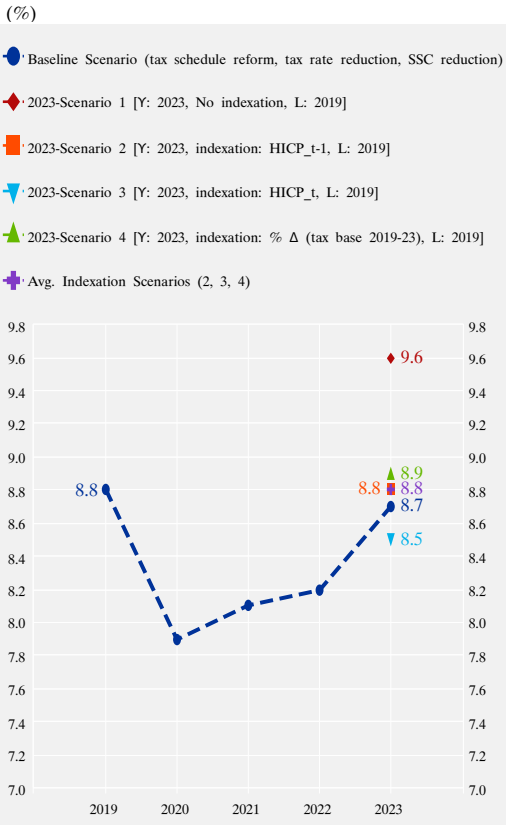
32 For detailed data, see Table A.7 in the Appendix.
33 For detailed data, see Table A.8 in the Appendix.

Chart 8 PIT revenues (as % of GDP) – Simulation scenarios



Sources: EUROMOD and Bank of Greece calculations.
Notes: Y: income, L: tax legislation, SSC: social security contributions.

Chart 9 Average effective tax rate – Simulation scenarios



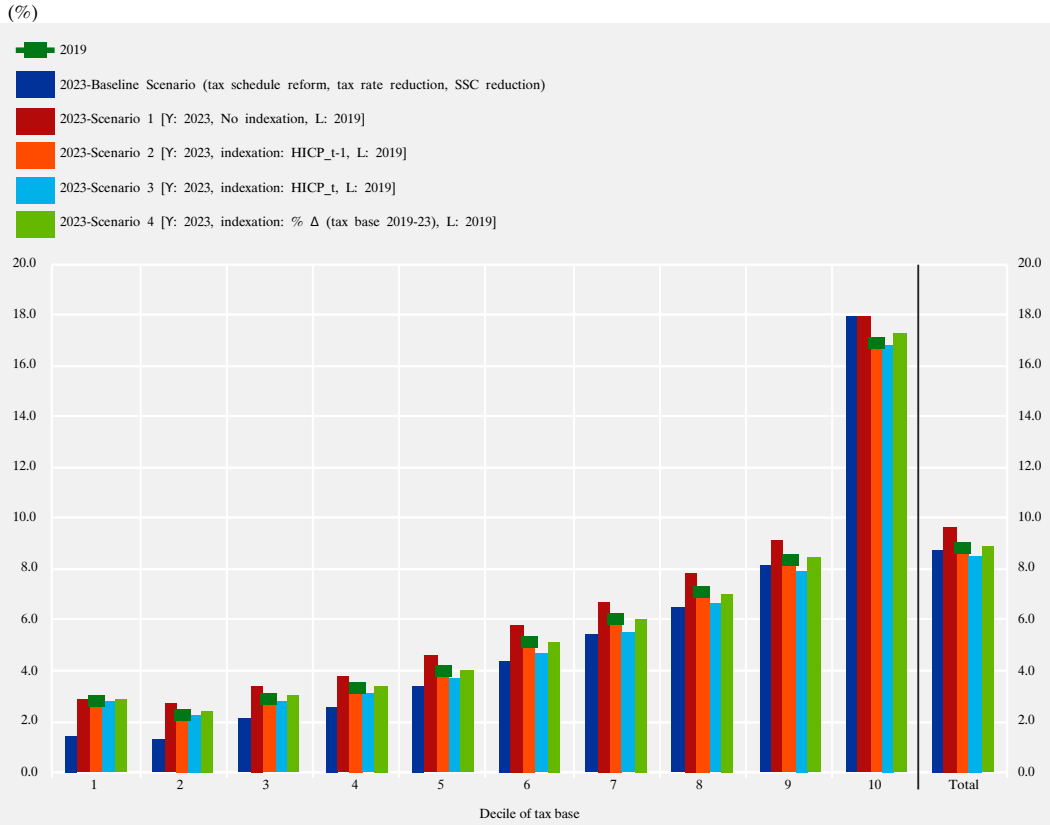
Sources: EUROMOD and Bank of Greece calculations.
Notes: Y: income, L: tax legislation, SSC: social security contributions.

The comparison of counterfactuals shows that the full indexation of PIT parameters with nominal tax base growth would almost entirely eliminate fiscal drag, whereas keeping legislation unchanged without indexation would have sharply raised the effective tax rates. Under Scenario 1 (No indexation, 2019 legislation), PIT revenues in 2023 would be 0.7 pps of GDP higher than in the Baseline Scenario, and the AETR would have been 0.9 pps higher, illustrating the full force of fiscal drag. On the other hand, Chart 9 shows that under Scenario 4 (full indexation based on nominal tax base growth), the AETR would be 8.9%, almost at the observed 2019 level (8.8%). This is consistent with the idea that keeping the legislation constant over time and updating parameters at the same rate as the growth of the nominal tax base achieves close to full offsetting of fiscal drag and keeps the effective tax rate constant.

The distributional analysis clearly indicates that, across all scenarios, the personal income tax burden (as measured by the average effective tax rate) is strongly concentrated at the top of the income distribution (Chart 10).[34] In every scenario, the average effective PIT rate increases with income decile, remaining very low for low-income households and rising progressively through the middle of the distribution, before peaking in the highest decile. This pattern confirms the progressivity of the PIT system and shows that, irrespective of the pol-

34 For detailed data, see Table A.9 in the Appendix.

Chart 10 Average effective tax rate by income decile – Simulation scenarios



Sources: EUROMOD and Bank of Greece calculations.
Notes: Y: income, L: tax legislation, SSC: social security contributions.

icy configuration, higher-income earners consistently contribute a disproportionately larger share of their income in taxes. Moreover, the alternative indexation or reform assumptions mainly affect the relative tax burden of low- and middle-income groups, while the overall contribution of top-income households remains structurally high.

Relative to 2019, the 2023 Baseline Scenario (which represents the actual PIT policy reforms implemented over 2019-23) redistributes the tax burden away from low- and middle-income households and towards the top of the income distribution, as it leads to lower average effective tax rates for all income deciles except the highest, with the strongest relief concentrated in the bottom part of the distribution,[35] while the top decile experiences a noticeable increase in its effective tax rate.[36] This pattern points to a policy choice to enhance progressivity and mitigate fiscal drag for most taxpayers, while relying more heavily on high-income earners. By contrast, the counterfactual with no indexation (Scenario 1) results in higher effective tax rates across all deciles, illustrating the pervasive impact of fiscal drag through bracket creep and the erosion of tax credits in a high-inflation environment. The indexation scenarios are much more "distribution-preserving" relative to 2019. In particular, Scenario 3 (indexation with concurrent HICP) would imply broadly lower effective tax rates from the middle of the income distribution upwards, including for top earners, suggesting a substantially stronger

35 The AETR declines by 1.4 pps and 1 pp for deciles 1 and 2 respectively.
36 The AETR increased by 1 pp for decile 10.

Table 10 Inequality, redistributive capacity and progressivity of the tax system – Simulation scenarios (2023)

	Baseline Scenario	Scenario 2	Scenario 3	Scenario 4
Gini index: tax base (pre-tax) (%)	0.3778	0.3766	0.3766	0.3766
Gini index: tax base (post-tax) (%)	0.3474	0.3500	0.3504	0.3499
Δ (Gini) (in percentage points)	*-0.0304*	*-0.0266*	*-0.0261*	*-0.0267*
Kakwani index	0.3211	0.2817	0.2876	0.2796

Sources: EUROMOD and Bank of Greece calculations.
Notes: Y: income, L: tax legislation, SSC: social security contributions.
Baseline Scenario (tax schedule reform, tax rate reduction, SSC reduction) ¦ Scenario 2 [Y: 2023, indexation: HICP_t-1, L: 2019] ¦ Scenario 3 [Y: 2023, indexation: HICP_t, L: 2019] ¦ Scenario 4 [Y: 2023, indexation: % Δ (tax base 2019-23), L: 2019].

reduction in the overall tax burden compared with the Baseline Scenario.

Against the background of the distributional evidence presented above, we explore the progressivity and inequality impact of the implemented reforms in 2019-23. The tax reforms implemented during the examined period —primarily the restructuring of the tax schedule and the reductions in rates— combined with social security contributions reforms, are estimated to have improved the redistributive capacity of the tax system more effectively than the counterfactual scenarios considered, thereby enhancing the system's progressivity and reducing inequality. The findings of the analysis (Table 10) show that the tax policies embedded in the 2023 Baseline Scenario lead to a greater reduction in the Gini index (based on taxable income) compared to all tax parameter indexation scenarios. At the same time, the Kakwani index is comparatively higher in the Baseline Scenario, pointing to the enhanced progressivity of the PIT against alternatives.[37] Increased progressivity translates into a fairer distribution of the tax burden, as the burden rises proportionally more for higher incomes, thereby enhancing the redistributive function of the tax system and contributing substantially to post-tax inequality reduction.

6 CONCLUSIONS

Fiscal drag is a critical issue for the fairness and sustainability of tax policy, as it leads to an increase in the tax burden without a corresponding improvement in taxpayers' ability to pay. As such, fiscal drag has significant implications for the equitable distribution of the tax burden – especially when incomes rise in nominal terms due to inflation, without a matching increase in purchasing power.[38]

The theoretical analysis shows that in 2019 the Greek PIT system embedded a strong degree of built-in progressivity, generating a notable potential for fiscal drag when tax parameters remain unchanged. The estimated tax-to-base elasticity —around 1.8— is broadly in line with the euro area range and implies that PIT revenues rise more than proportionally when nominal incomes increase. The decomposition of this elasticity reveals that the erosion of tax credits accounts for the overwhelming share of fiscal drag, while bracket progressivity plays a secondary role. The analysis also highlights substantial variation across income sources, with self-employment and labour income exhibiting the highest elasticities, while pensions and benefits are far less affected. The distributional analysis further reveals that elasticities are systematically higher among middle-income groups, indicating that bracket creep would disproportionately raise the tax burden for these taxpayers in the absence of policy action. Consistent with these patterns,

37 Note that the relevant index for 2019 was 0.274 (see Table 8).
38 Due to the widespread under-reporting of income in Greece, the observed income distribution is subject to significant uncertainty, hampering the design and evaluation of effective policy responses.

a uniform rise in incomes reduces the progressivity of the PIT system but leads to a slight decline in inequality, largely because many low-income individuals continue to have zero tax liabilities even after income increases. Overall, the 2019 Greek PIT system —given its progressive structure and the distribution of the tax base— was structurally susceptible to fiscal drag in the absence of indexation or policy intervention.

The empirical counterfactual analysis shows that the policy reforms implemented in Greece during the 2019-23 period managed to fully compensate for the effects of fiscal drag, lowering the average effective tax rate while maintaining revenue stability and reducing income inequality, outperforming alternative counterfactual scenarios (involving an indexation of tax parameters). Policy measures —such as the restructuring of the tax schedule, including lower marginal rates at the bottom, the introduction of a new low-rate bracket and the substantial reforms in social security contributions— played a decisive role in offsetting a large part of the potential revenue gains implied by the structure of the PIT system. The experience of 2019-23 demonstrates that the actual impact of fiscal drag depends crucially on policy choices: discretionary reforms —rather than indexation— were responsible for offsetting most of the revenue gains that could be realised as a result of the structure of the 2019 PIT system, thereby reducing the average tax burden.

Overall, fiscal drag can have significant effects on tax revenue collection, average tax rates and income distribution, with crucial implications for inequality and optimal tax design. Given the limited fiscal space, policymakers are called upon to strike the right balance between the need to ease the tax burden on taxpayers and the goal of safeguarding tax revenues. Quantifying fiscal drag and incorporating it into the formulation of medium-term fiscal strategies can enhance the accuracy of revenue forecasts and support the design of better-targeted policy interventions. At the same time, the mechanisms through which fiscal drag operates across the income distribution require the adoption of tailored policy responses. This insight is key to determining whether indexation of tax parameters should be pursued or not. Recent experience in Greece shows that enhancing the progressivity of tax policy can offset fiscal drag, while also contributing to a fairer distribution of the tax burden and improved tax compliance.

REFERENCES

Auerbach, A.J. and D.R. Feenberg (2000), "The significance of federal taxes as automatic stabilizers", *Journal of Economic Perspectives*, 14(3), 37-56.

Balasundharam, V., A. Kayastha and M. Poplawski-Ribeiro (2023), "Inflation indexation in public finances: a global dataset on current practices", IMF, Working Paper No. WP/23/264.

Balladares, S. and E. García-Miralles (2025), "Fiscal drag with microsimulation: evidence from Spanish tax records", Institut d'Economia de Barcelona (IEB), Working Paper No. 2025/08.

Belinga, V., D. Benedek, R. de Mooij and J. Norregaard (2014), "Tax buoyancy in OECD countries", IMF, Working Paper No. WP/14/110.

Boschi, M. and S. d'Addona (2019), "The stability of tax elasticities over the business cycle in European countries", *Fiscal Studies*, 40(2), 175-210, June.

Creedy, J. and N. Gemmell (2004), "The income elasticity of tax revenue: estimates for income and consumption taxes in the United Kingdom", *Fiscal Studies*, 25(1), 55-77, March.

Dolls, M., C. Fuest and A. Peichl (2012), "Automatic stabilizers and economic crisis: US vs. Europe", *Journal of Public Economics*, 96(3-4), 279-294, April.

García-Miralles, E., M. Freier, S. Riscado et al. (2025), "Fiscal drag in theory and in practice: a European perspective", ECB, Working Paper No. 3136.

Hack, L. (2025), "Progressive income taxation and inflation: the macroeconomic effects of bracket creep", SSRN, http://dx.doi.org/10.2139/ssrn.5268667.

Harding, A. (ed.) (1996), *Microsimulation and public policy*, Contributions to Economic Analysis Vol. 232, North Holland, Amsterdam.

Heer, B. and B. Süssmuth (2013), "Tax bracket creep and its effects on income distribution", *Journal of Macroeconomics*, 38(B), 393-408, December.

Immervoll, H. (2005), "Falling up the stairs: the effects of 'bracket creep' on household incomes", *Review of Income and Wealth*, 51(1), 37-62, March.

Immervoll, H. (2006), "Fiscal drag – an automatic stabiliser?", in Bargain, O. (ed.), *Micro-Simulation in action: policy analysis in Europe using EUROMOD*, Research in Labor Economics Vol. 25, Emerald Group Publishing Limited, Leeds, 141-163.

Kakwani, N.C. (1977), "Measurement of tax progressivity: an international comparison", *The Economic Journal*, 87(345), 71-80, March.

Leventi, C., A. Mazzon and F. Orlandi (2024), "Indexing wages to inflation in the EU: fiscal drag and benefit erosion effects", European Commission, JRC Working Paper on Taxation and Structural Reforms No. 8/2024.

Moriana-Armendariz, X. (2023), "The hidden effects of inflation - An examination of bracket creep and its implications for the income tax: evidence for Spain (1979-1987)", Master's thesis, Lund University, School of Economics and Management, Lund.

National Research Council (1991), "Improving information for social policy decisions - - the uses of microsimulation modeling: vol. I, review and recommendations", The National Academies Press, Washington, D.C.

OECD (2023), "Special feature: indexation of labour taxation and benefits in OECD countries", in *Taxing wages 2023: indexation of labour taxation and benefits in OECD countries*, OECD Publishing, Paris, 41-59.

Paulus, A., H. Sutherland and I. Tasseva (2020), "Indexing out of poverty? Fiscal drag and benefit erosion in cross-national perspective", *Review of Income and Wealth*, 66(2), 311-333, June.

Paulus, A. and I.V. Tasseva (2020), "Europe through the crisis: discretionary policy changes and automatic stabilizers", *Oxford Bulletin of Economics and Statistics*, 82(4), 864-888, August.

Price, R., T.T. Dang and J. Botev (2015), "Adjusting fiscal balances for the business cycle: new tax and expenditure elasticity estimates for OECD countries", OECD Economics Department Working Paper No. 1275.

Saez, E. (2003), "The effect of marginal tax rates on income: a panel study of 'bracket creep' ", *Journal of Public Economics*, 87(5-6), 1231-1258, May.
Sutherland, H. and F. Figari (2013), "EUROMOD: the European Union tax-benefit microsimulation model", *International Journal of Microsimulation*, 6(1), 4-26.
Sutherland, H., R. Hancock, J. Hills and F. Zantomio (2008), "Keeping up or falling behind? The impact of benefit and tax uprating on incomes and poverty", *Fiscal Studies*, 29(4), 467-498, December.
Waters, T. and T. Wernham (2022), "Reforms, roll-outs and freezes in the tax and benefit system", Institute for Fiscal Studies, R218 IFS Green Budget 2022 – Chapter 5.

APPENDIX

Table A1 Income uprating 2019-23

(1)+(2)-(3)-(4)	Disposable income	Uprating per year	Cumulative change 2019-23
1	*Original income*		
+	Earnings		
	Employment: civil servants	Wages and salaries per employee national accounts data	0%
	Employment: public enterprises	Wages and salaries per employee national accounts data	11.40%
	Employment: private sector	Wages and salaries per employee national accounts data	11.40%
	Self-employment	Wages and salaries per person employed and gross value added by sector national accounts data	14.70%
+	Income of children under 16	Wages and salaries per employee national accounts data	11.40%
+	Income from rent	0.75 * CPI	4.80%
+	Private pension	CPI	14.20%
+	Investment income	Based on housing costs	15.90%
+	Private transfers received	Wages and salaries per employee national accounts data	11.40%
-	Alimony payments	GDP deflator	13.50%
-	Other maintenance payments	GDP deflator	13.50%
2	*Benefits*		
2a	*Pensions*	Frozen up to 2022 uprated by the average of inflation and real income growth thereafter	7.80%
2b	*Means-tested benefits*		
+	Heating allowance	As announced by the government	198%
+	Minor social assistance benefits	Frozen	0%
+	Housing benefits	Based on Social Housing Organisation (OEK) subsidy rates	0%
+	Child benefit, long-term unemployment benefit, birth grant, lump-sum benefit for low-paid pensioners, guaranteed minimum income, housing allowance	Simulated	n/a
2c	*Non-means-tested benefits*		
+	Non-contributory disability benefits	Based on the severe disability benefit frozen until 2022, 8% increase in 2023	8%
+	Education allowances for students	Based on the scholarships provided by the State Scholarships Foundation (IKY)	0%
+	Minor family benefits	Frozen	0%
+	Sickness benefits	Wages and salaries per employee national accounts data	11.40%
+	Minor unemployment benefits	On the basis of unemployment assistance to the long-term unemployed	0%
+	Maternity benefits	Wages and salaries per employee national accounts data	11.40%
+	Unemployment insurance benefit, maternity benefit, parental benefit, lump sum support to vulnerable population groups	Simulated	n/a
3	*Taxes*	Simulated	n/a
4	*Social security contributions*	Simulated	n/a

Source: EUROMOD.

Table A2.1 Share of tax base by income source – Distributional analysis (2019)

Decile of tax base	Labour income	Pension and benefits	Self-employment income	Capital income
1	35.7	23.8	36.8	3.6
2	37.5	39.0	22.3	1.2
3	35.8	45.2	17.4	1.6
4	36.2	47.0	15.5	1.3
5	42.3	41.0	14.3	2.4
6	44.5	39.8	13.8	2.0
7	50.9	31.5	15.0	2.6
8	49.2	34.4	13.9	2.5
9	51.3	31.4	13.7	3.6
10	43.3	21.9	27.4	7.4
Total	***45.0***	***32.5***	***18.7***	***3.8***

Sources: EUROMOD and Bank of Greece calculations.

Table A2.2 Share of tax base by income source – Distributional analysis (2023)

Decile of tax base	Labour income	Pension and benefits	Self-employment income	Capital income
1	33.2	27.9	35.4	3.5
2	34.6	42.2	21.5	1.6
3	33.4	48.3	17.2	1.1
4	38.8	45.6	14.2	1.4
5	42.1	39.0	16.6	2.4
6	45.4	39.1	13.5	2.0
7	51.2	30.4	15.9	2.5
8	50.6	33.3	13.5	2.6
9	51.8	30.0	14.7	3.5
10	43.6	20.3	29.2	7.0
Total	***45.3***	***31.6***	***19.4***	***3.7***

Sources: EUROMOD and Bank of Greece calculations.

Table A3 Distribution of tax base and PIT liabilities across income deciles

Income decile	Share of total tax base		Share of total tax liability		Share with zero tax liability	
	2019	2023	2019	2023	2019	2023
1	1.2	1.3	0.4	0.2	87.6	88.2
2	3.8	3.9	1.0	0.6	76.0	73.8
3	5.2	5.3	1.7	1.2	58.7	53.4
4	6.5	6.4	2.4	1.8	54.4	51.2
5	7.6	7.5	3.5	3.1	33.5	19.6
6	8.9	8.9	5.1	4.5	11.8	7.9
7	10.4	10.5	7.1	6.4	2.7	1.0
8	12.7	12.7	10.2	9.5	0.0	0.1
9	15.6	15.5	15.0	14.5	0.0	0.0
10	27.9	28.1	53.6	58.2	0.0	0.0
Total	-	-	-	-	*32.3*	*29.7*

Sources: EUROMOD and Bank of Greece calculations.

Table A4 Composition of tax-to-base (TTB) elasticity by income decile (2019)

Income decile	Proportional effect	Tax deduction/ credit	Bracket progressivity	Total TTB
1	1.00	0.19	0.00	1.19
2	1.00	1.00	0.00	2.00
3	1.00	1.56	0.00	2.56
4	1.00	1.34	0.00	2.34
5	1.00	1.53	0.01	2.55
6	1.00	1.60	0.04	2.64
7	1.00	1.23	0.06	2.29
8	1.00	1.09	0.05	2.14
9	1.00	0.86	0.10	1.96
10	1.00	0.21	0.24	1.45
Total	*1.00*	*0.65*	*0.16*	*1.80*

Sources: EUROMOD and Bank of Greece calculations.

Table A5 Composition of theoretical fiscal drag by income decile (2019)

(%)

Decile	Tax deduction/ credit	Bracket progressivity
1	100.0	0.0
2	100.0	0.0
3	100.0	0.0
4	100.0	0.0
5	99.2	0.8
6	97.5	2.5
7	95.2	4.8
8	95.9	4.1
9	89.5	10.5
10	46.2	53.8
Total	***80.3***	***19.7***

Sources: EUROMOD and Bank of Greece calculations.

Table A6 TTB elasticities by income source

	2019	2023
Labour income	1.93	2.17
Benefits and pensions	1.16	1.04
Self-employment income	2.54	3.07
Capital income	2.15	2.21

Sources: EUROMOD and Bank of Greece calculations.

Table A7 PIT revenues (as % of GDP) – Simulation scenarios

Year	Baseline Scenario (tax schedule reform, tax rate reduction, SSC reduction)	Scenario 1 [Y: 2023, No indexation, L: 2019]	Scenario 2 [Y: 2023, indexation: HICP_t-1, L: 2019]	Scenario 3 [Y: 2023, indexation: HICP_t, L: 2019]	Scenario 4 [Y: 2023, indexation: % Δ (tax base 2019-23), L: 2019]	Avg. Indexation Scenarios (2, 3, 4)
2019	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%
2020	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%
2021	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%
2022	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
2023	5.9%	6.6%	6.0%	5.8%	6.1%	6.1%

Sources: EUROMOD and Bank of Greece calculations.
Note: Y: income, L: tax legislation, SSC: social security contributions.

Table A8 Average effective tax rate – Simulation scenarios

(%)

Year	Baseline Scenario (tax schedule reform, tax rate reduction, SSC reduction)	Scenario 1 [Y: 2023, No indexation, L: 2019]	Scenario 2 [Y: 2023, indexation: HICP_t-1, L: 2019]	Scenario 3 [Y: 2023, indexation: HICP_t, L: 2019]	Scenario 4 [Y: 2023, indexation: % Δ (tax base 2019-23), L: 2019]	Avg. Indexation Scenarios (2, 3, 4)
2019	8.8	8.8	8.8	8.8	8.8	8.8
2020	7.9	7.9	7.9	7.9	7.9	7.9
2021	8.1	8.1	8.1	8.1	8.1	8.1
2022	8.2	8.2	8.2	8.2	8.2	8.2
2023	8.7	9.6	8.8	8.5	8.9	8.9

Sources: EUROMOD and Bank of Greece calculations.
Note: Y: income, L: tax legislation, SSC: social security contributions.

Table A9 Average effective tax rate by income decile – Simulation scenarios

(%)

Decile	2019	2023-Baseline Scenario (tax schedule reform, tax rate reduction, SSC reduction)	2023-Scenario 1 [Y: 2023, No indexation, L: 2019]	2023-Scenario 2 [Y:2023, indexation: HICP_t-1, L: 2019]	2023-Scenario 3 [Y:2023, indexation: HICP_t, L: 2019]	2023-Scenario 4 [Y:2023, indexation: % Δ (tax base 2019-23), L: 2019]
1	2.8	1.4	2.9	2.9	2.8	2.9
2	2.3	1.3	2.7	2.4	2.3	2.4
3	2.9	2.1	3.4	2.9	2.8	3.0
4	3.3	2.6	3.8	3.3	3.1	3.4
5	4.0	3.4	4.6	3.9	3.7	4.0
6	5.1	4.4	5.8	5.0	4.7	5.1
7	6.0	5.4	6.7	5.8	5.5	6.0
8	7.1	6.5	7.8	6.9	6.6	7.0
9	8.4	8.1	9.1	8.3	7.9	8.4
10	16.9	17.9	17.9	17.1	16.8	17.2
Total	***8.8***	***8.7***	***9.6***	***8.8***	***8.5***	***8.9***

Sources: EUROMOD and Bank of Greece calculations.
Note: Y: income, L: tax legislation, SSC: social security contributions.

MACROECONOMIC IMPLICATIONS OF A TAX ON BANKS' PROFITS

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ABSTRACT

This paper investigates the potential macroeconomic effects of a tax on banks' profits for the Greek economy. To this end, a Dynamic Stochastic General Equilibrium (DSGE) model is employed, which allows the identification of the main transmission channels through which a tax on bank profits may affect the real economy and the financial sector. We find that such a tax affects the economy primarily via the banking capital channel and the bank funding channel, constraining the supply of credit, reducing the value of banking collateral and potentially leading to a contraction in economic activity. Overall, the findings highlight that a tax on bank profits may generate adverse effects on both the financial sector and the real economy, underscoring the need for careful policy design and evaluation of such a policy measure.

Keywords: bank profit taxation; banking capital; bank funding cost; Greece; dynamic stochastic general equilibrium model

JEL classification: E44; E62; G21; O52

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ΜΑΚΡΟΟΙΚΟΝΟΜΙΚΕΣ ΕΠΙΔΡΑΣΕΙΣ ΤΗΣ ΕΠΙΒΟΛΗΣ ΦΟΡΟΥ ΣΤΑ ΚΕΡΔΗ ΤΩΝ ΤΡΑΠΕΖΩΝ

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ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη διερευνά τις δυνητικές μακροοικονομικές επιδράσεις στην ελληνική οικονομία από την επιβολή φόρου στα κέρδη των τραπεζών. Για το σκοπό αυτό, χρησιμοποιείται ένα δυναμικό στοχαστικό υπόδειγμα γενικής ισορροπίας (Dynamic Stochastic General Equilibrium model), το οποίο επιτρέπει την ανίχνευση και την κατανόηση των διαύλων μετάδοσης μέσω των οποίων ένας φόρος στα τραπεζικά κέρδη ενδέχεται να επηρεάσει την πραγματική οικονομία και το χρηματοπιστωτικό τομέα. Τα αποτελέσματα δείχνουν ότι ένας τέτοιος φόρος επηρεάζει την οικονομία μέσω δύο κύριων διαύλων, του τραπεζικού κεφαλαίου και της τραπεζικής χρηματοδότησης, περιορίζοντας την προσφορά πιστώσεων, μειώνοντας την αξία των τραπεζικών εξασφαλίσεων και οδηγώντας δυνητικά σε συρρίκνωση της οικονομικής δραστηριότητας. Επομένως, η επιβολή φόρου στα τραπεζικά κέρδη ενδέχεται να έχει αρνητικές επιδράσεις τόσο στο χρηματοπιστωτικό τομέα όσο και στην πραγματική οικονομία. Οι θεωρητικοί δίαυλοι μετάδοσης που αναδεικνύονται στο υπόδειγμα υπογραμμίζουν την ανάγκη συνεκτίμησης μιας σειράς παραγόντων για την αξιολόγηση ενός τέτοιου μέτρου πολιτικής.

ΜΗ ΤΕΧΝΙΚΗ ΣΥΝΟΨΗ

Η μελέτη διερευνά τις πιθανές μακροοικονομικές επιδράσεις της επιβολής φόρου στα κέρδη των τραπεζών για την ελληνική οικονομία. Για το σκοπό αυτό, χρησιμοποιείται ένα δυναμικό στοχαστικό υπόδειγμα γενικής ισορροπίας (Dynamic Stochastic General Equilibrium model), το οποίο επιτρέπει να ανιχνευθεί και να γίνει κατανοητό μέσω ποιων διαύλων η επιβολή ενός προσωρινού φόρου στα τραπεζικά κέρδη μπορεί να μεταδοθεί στην πραγματική οικονομία και στο χρηματοπιστωτικό τομέα.

Διαπιστώνεται ότι η επιβολή ενός τέτοιου φόρου επιδρά στην οικονομία μέσω δύο κύριων διαύλων, του τραπεζικού κεφαλαίου και της τραπεζικής χρηματοδότησης, περιορίζοντας την προσφορά πιστώσεων, μειώνοντας την αξία των τραπεζικών εξασφαλίσεων και οδηγώντας δυνητικά σε συρρίκνωση της οικονομικής δραστηριότητας. Η αναδιανομή των εσόδων από το φόρο προς τα νοικοκυριά λειτουργεί ως αντισταθμιστικός μηχανισμός, περιορίζοντας εν μέρει τις αρνητικές επιδράσεις στο εισόδημά τους και στη συνολική ζήτηση. Ωστόσο, δεν επαρκεί για να αντισταθμίσει πλήρως τις αρνητικές επιδράσεις του φόρου και, ως εκ τούτου, το καθαρό αποτέλεσμα στη συνολική ζήτηση και το ΑΕΠ είναι αρνητικό.

Επισημαίνεται ότι οι δίαυλοι που ανιχνεύονται στην παρούσα μελέτη προκύπτουν στο πλαίσιο ενός θεωρητικού υποδείγματος της οικονομίας. Στην πράξη, στην περίπτωση του ελληνικού τραπεζικού συστήματος, ο άμεσος αντίκτυπος των ως άνω διαύλων αναμένεται ότι θα ήταν περιορισμένος, δεδομένου ότι τα ελληνικά πιστωτικά ιδρύματα διαθέτουν υψηλά επίπεδα κεφαλαιακής επάρκειας και ρευστότητας, αρκετά άνω των ελάχιστων απαιτούμενων εποπτικών ορίων. Συνεπώς, έχουν σημαντικό βαθμό ευελιξίας και η όποια μείωση της κερδοφορίας τους πιθανόν να μην επηρεάσει άμεσα τη δυνατότητά τους να αντλούν κεφάλαια από τις αγορές. Μολαταύτα, το υπόδειγμα αναδεικνύει τις δυνητικές επιπτώσεις της επιβολής ενός φόρου στα κέρδη των τραπεζών και τους διαύλους μέσω των οποίων θα μπορούσε αυτή να επιδράσει στα πραγματικά μεγέθη της ελληνικής οικονομίας, υπογραμμίζοντας έτσι την ανάγκη να λαμβάνεται υπόψη μια σειρά παραμέτρων για την αξιολόγηση ενός τέτοιου μέτρου πολιτικής.

MACROECONOMIC IMPLICATIONS OF A TAX ON BANKS' PROFITS*

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I INTRODUCTION

Over the past few years, European banks have been reporting increased profitability, fuelled by the post-pandemic economic recovery and the rise in inflation. At the same time, the tightening of monetary policy, together with the slow pass-through of policy rate increases to deposit rates, widened the interest rate spread between loans and deposits, further boosting bank profits.

Greek banks are no exception, having markedly improved their fundamentals in recent years. They have recorded persistently strong profitability, underpinned by an increase in net interest income and a decline in loan-loss provisions, coupled with strong credit expansion. These improvements have also been reflected in a series of upgrades of their credit ratings by international rating agencies (see Bank of Greece 2025).

On the fiscal front, faced with rising budget deficits, many European countries have already imposed or are considering imposing additional, permanent or temporary, taxes on banks. This development has triggered discussions in both academia and international institutions about the potential effects of such a policy on the financial sector and the real economy (see, *inter alia*, Maneely and Ratnovski 2024 as well as Chen et al. 2024).

Against this backdrop, this paper explores the potential macroeconomic effects of a tax on banks' profits for the Greek economy. To this end, a Dynamic Stochastic General Equilibrium (DSGE) model is employed, which allows the identification and understanding of the propagation channels through which a tax on bank profits may affect the real economy and the financial sector. The results indicate that the imposition of such a tax affects the economy via two primary channels. First, through the banking capital channel, the tax reduces banks' internal net worth, weakening their balance sheets and limiting their capacity to extend credit. Second, via the bank funding channel, lower bank profitability and equity returns increase the cost of external finance and further tighten credit conditions. Together, these channels constrain the supply of credit and reduce the value of banking collateral, leading to a contraction in economic activity. Thus, a tax on bank profits could potentially have negative effects on both the financial sector and the real economy.

The paper relates and contributes to the literature on bank taxation in several important ways. First, it provides an analysis of bank profit taxation within a structural general equilibrium framework, allowing us to examine how such a tax affects both the financial sector and real economic activity in general equilibrium. While much of the existing literature relies on reduced-form empirical approaches or focuses on balance-sheet-based bank levies (see Section 2), the analysis of bank taxation within DSGE models remains relatively limited.[1] Our framework jointly captures the main transmission mechanisms through which bank profit taxation operates, allowing them to interact endogenously in general equilibrium. Second, within this unified framework, we

* The views expressed in this article are of the authors and do not necessarily reflect those of the Bank of Greece. The authors are responsible for any errors or omissions.

1 Boscá et al. (2019) develop a DSGE model with a banking sector to study the macroeconomic effects of different banking taxes, including a tax on bank profits. Our analysis extends this line of research by incorporating endogenous default risk at the level of households, firms and banks, allowing the tax to also impact the systemic resilience of the economy. Balfoussia et al. (2017) use a set-up closely related to ours to examine the effects of bank transaction taxes.

identify and assess the relative importance of two core transmission mechanisms, namely the bank capital channel and the bank funding channel. We demonstrate how the taxation of bank profits tightens lending conditions, reduces collateral values and dampens economic activity.

The remainder of this paper is structured as follows: Section 2 offers a literature review; Section 3 briefly describes the model and methodology employed; Section 4 presents the findings and discusses their policy implications and Section 5 concludes.

2 LITERATURE REVIEW

Recent instances of bank profit taxes

The taxation of banks, and in particular of bank profits, entered the academic and policy discussion in the aftermath of the global financial crisis. The crisis exposed the systemic risks posed by large and interconnected financial institutions and highlighted the substantial fiscal costs of bank bailouts. In response, policymakers sought instruments that could internalise the social costs of bank risk-taking and moral hazard as well as recoup public funds. In this spirit, the IMF (2010) proposed several instruments, including bank levies and financial activities taxes, aimed precisely at internalising systemic externalities while raising public revenue. The European Commission (2010) also explored bank taxes as tools to reduce excessive risk-taking, as did several national authorities. In parallel, academic research at the time suggested that bank taxation could, in theory, correct distortions arising from implicit government guarantees and moral hazard (Acharya et al. 2010). Other studies cautioned that bank taxes could influence a number of variables, including leverage, risk and credit supply, thus potentially generating broader macroeconomic effects (Keen 2011; Devereux et al. 2019). In sum, while post-crisis taxes were in practice largely focused on balance-sheet size or liabilities, rather than profits per se,[2] their conceptual foundation was based on the notion of taxing excessive bank profits and excess revenue.

In recent years, following a prolonged period of low interest rates and subdued earnings, European banks have been experiencing a sharp recovery in profits, largely driven by the post-pandemic economic recovery, rising policy rates and widening net interest margins. This trend renewed interest in bank taxation and prompted several countries to introduce temporary "windfall" taxes on bank profits or net interest income, motivated by the need to boost fiscal revenue and respond to political economy considerations (Maneely and Ratnovski 2024).[3] The design of these taxes varies, from narrow tax bases targeting excess profits relative to historical averages (e.g. in the Czech Republic, Lithuania and Italy) to broader turnover-based instruments (e.g. in Romania and Hungary). Some measures were explicitly temporary, while others have evolved into more permanent instruments. This notable cross-country heterogeneity points to the need to factor in both financial conditions and the institutional context in designing bank profit taxation.

Possible transmission channels

Turning to the theoretical underpinnings of bank taxation, in a benchmark setting where profits reflect pure economic rents, taxation may be largely non-distortionary and welfare-enhancing. Applying this principle to banking, if high profits reflect rents from implicit safety nets or concentrated market power, taxing these rents could in theory enhance allocative efficiency, without adversely affecting credit supply. However, in more realistic models of

2 Devereux et al. (2019) details 14 such instances of bank levies imposed following the global financial crisis across Europe.

3 Maneely and Ratnovski (2024) document multiple such measures imposed recently across Europe. For example, Lithuania has applied a 60% tax on excess net interest income for 2023-24; the Czech Republic has imposed a 60% tax on excess profits through to 2025; Hungary has progressively taxed net revenue culminating in a 30% rate; and Romania has introduced a new turnover-based bank tax for 2024-26. In addition, Slovakia has adopted a bank corporate income tax surcharge, while Spain has levied a 4.8% surtax on banks' net revenue and Italy instituted a one-off 40% windfall tax on excess net interest income in 2023, alongside a higher statutory corporate rate for banks compared to other sectors.

financial intermediation, bank profits are closely linked to lending, risk-taking and capital accumulation decisions, giving rise to potentially significant macroeconomic effects (Devereux et al. 2019).

Indeed, standard intermediation models suggest a number of transmission channels through which taxes on bank profits can affect macroeconomic outcomes. First, profit taxation reduces net returns to equity and retained earnings, potentially increasing the cost of capital for banks (Bini Smaghi 2025). This can curtail lending or increase lending rates, thereby dampening investment, consumption and output (Freixas and Rochet 2008).

Second, banks facing higher tax burdens may partially pass costs on to borrowers, as aforementioned, through higher lending rates or to depositors through lower interest rates on savings. This pass-through can weaken monetary policy transmission, potentially hampering central bank efforts to stimulate or cool economic activity. For example, an increase in banks' tax burden coupled with monetary policy tightening could exacerbate credit tightening. The extent of the pass-through depends on market structure and the interest-rate elasticity of deposit and loan demand.

Finally, taxation, depending on its design, can affect capital accumulation and risk-taking incentives. By reducing retained earnings, profit taxes may constrain capital buffers, dampening the sector's resilience to shocks (Berger et al. 2025). Conversely, if tax liabilities are tied to a measure of excess profits, banks may be discouraged from excessive risk-taking, thus enhancing financial stability.

Empirical evidence

Empirical research on the macroeconomic implications of bank profit taxation remains relatively limited. Studies examining bank taxes in Europe, in the aftermath of the global financial crisis, find that these taxes reduced leverage and altered balance-sheet composition, though the effects on credit growth were modest and heterogeneous across countries (Devereux et al. 2019; Buch et al. 2016). Others find that banks shifted the tax burden to customers with low credit demand elasticity, such as households, i.e. they increased intermediation costs (Capelle-Blancard and Havrylchyk 2017).

More recent evidence, focusing specifically on profit-based or windfall taxes, suggests a partial pass-through to lending rates and potential reductions in credit supply, particularly in less competitive banking systems, with potential macroeconomic implications. For example, Sobiech et al. (2021) use exogenous variation in bank taxation to show that bank profit taxation can increase bank leverage, lower bank credit to firms and dampen corporate investment. Additionally, Valentinaite et al. (2025) show that the short-run macroeconomic effects of windfall taxes have been limited in countries with strong bank capital positions, but announcement effects and uncertainty about tax permanence can affect market valuations and funding costs. Martins (2025) finds that the announcements of a windfall tax on bank profits in Spain and Italy generated market volatility, precipitating sharp declines in bank equity prices, potentially signalling market concerns about profit prospects and credit contraction, while small and profitable banks were the ones most affected. All in all, evidence on the recent windfall taxes indicates that, where applied, banks continued to lend, underpinned by their strong profitability and substantial capital buffers, but uncertainty about the permanence of taxes and their design may have heightened risk premia and impaired investment decisions in sectors reliant on bank credit.

In sum, the literature suggests that bank profit taxation is likely to affect the macro economy, but its impact may vary across countries and over time, depending on the state of the business and financial cycle, regulatory constraints and market structure. Furthermore, the absence of bank profit taxes in many countries, including Greece, indicates that policymakers

may be carefully weighing potential credit and stability costs, especially if banks are still rebuilding their balance sheets.

3 MODEL AND METHODOLOGY

To study the transmission mechanisms of a tax on banks' profits, we build on the theoretical framework of Clerc et al. (2015), as implemented in Balfoussia et al. (2025), and augment it to include a tax on bank profits. This is a DSGE model, suitable for studying the interactions between the real economy and the financial sector in the presence of financial frictions and endogenous default risk.

The economy consists of households, entrepreneurs, bankers and firms. Households are infinitely lived and derive utility from consumption and housing services, while supplying labour in a competitive labour market. The model features two types of households, namely patient and impatient, which differ in their subjective discount factors. In equilibrium, patient households act as savers (depositors), whereas impatient households are borrowers who obtain mortgage loans from banks under limited liability and non-recourse conditions, using housing as collateral. They may optimally choose to default on their mortgage obligations, in which case they lose the housing units against which the mortgage is secured.

Entrepreneurs own the physical capital stock and finance their purchases of capital using a combination of internal net worth and external corporate loans. Similar to households, entrepreneurs face limited liability and may default on their debt obligations when adverse shocks reduce the value of their assets below outstanding liabilities.

Bankers are the providers of inside equity to perfectly competitive financial intermediaries, referred to as banks. Banks provide mortgage loans to households and corporate loans to entrepreneurs, which are financed through household deposits and equity funding supplied by bankers. They operate under limited liability and are subject to regulatory capital constraints that require a fraction of their lending to be backed by equity. Bank balance sheets are exposed to default risk arising from both idiosyncratic and aggregate shocks affecting the performance of the loan portfolios.

Finally, the final consumption good as well as new units of physical capital and housing are produced by perfectly competitive firms using standard constant-returns-to-scale technologies.

A central novelty of the model is the incorporation of three "layers of default", at the level of households, firms and banks, capturing the conditions under which default on outstanding loan obligations becomes an optimal "strategic" choice, with knock-on effects on the financial system and the real economy.

3.1 TAXATION OF BANK PROFITS

Within this framework, we introduce a tax on bank profits to examine how it interacts with the existing financial frictions and affects the financial sectors and the real economy. To maintain analytical tractability, while preserving the key propagation mechanisms, we model the tax on bank profits, τ_t^{π}, as a levy on the equity payoff of the banking sector, specifically the net worth of bankers prior to the distribution of dividends.[4]

Formally, the post-tax net worth of bankers evolves according to:

$$W_{t+1}^{b} = (1 - \tau_t^{\pi})[\tilde{\rho}_{t+1}^{F} e_t^{F} + \tilde{\rho}_{t+1}^{H}(n_t^{b} - e_t^{F})] \quad (1)$$

where $\tilde{\rho}_{t+1}^{F}, \tilde{\rho}_{t+1}^{H}$ are the ex-post gross returns on the inside equity invested in banks that specialise in entrepreneurial loans (F banks) and mortgage loans (H banks), respectively. The variable e_t^{F} represents the amount of the ini-

4 In the model, the equity payoff of banks is equal to the difference between the returns on loans granted and the repayment obligations on deposits.

tial wealth of bankers, n_t^b, invested as inside equity in F banks and the remaining, n_t^b-e_t^F, in H banks.

The tax rate follows an $AR(1)$ stochastic process:

$$\tau_t^{\pi} = \rho_{\pi}\tau_{t-1}^{\pi} + \varepsilon_{\pi,t} \quad (2)$$

where $\rho_{\pi} \in [0,1)$ is the persistence parameter and $\varepsilon_{\pi,\tau} \sim N(0, \sigma_{\pi}^2)$ is an *i.i.d.* innovation. We assume that the resulting tax revenues are distributed back to the saving households in a lump-sum fashion. The remaining structural equations of the model are identical to those presented in the Appendix in Balfoussia et al. (2025).

3.2 CALIBRATION AND POLICY EXPERIMENTS

The model is calibrated for the Greek economy on a quarterly basis, using the parameter values from Balfoussia et al. (2025).[5] For the purposes of our policy experiment, it is assumed that a temporary tax of 1% is imposed on bank profits, with a persistent parameter of ρ_{π}= 0.6. The calibration of the size and duration of the tax is illustrative and aims to investigate the sensitivity of macroeconomic variables to the imposition of the tax. Given that the shock is temporary, all macroeconomic variables will gradually converge back to their initial levels.

4 DYNAMIC EFFECTS OF A TAX ON BANKS' PROFITS

The chart shows the dynamic effects of introducing a tax on banks' profits. According to the model's results, the tax affects the economy through two main channels.

The first channel operates through banking capital. The tax reduces banks' profits, negatively affecting the return on equity and, thus, the ability of banks to raise new equity. This limits the supply of loans in the model, exerting a negative impact on investment expenditure and, consequently, on the output of the real economy. At the same time, the tax creates an incentive for banks to increase lending rates on business and mortgage loans, in an effort to offset the decline in profits caused by the tax burden and to attract new equity funding. However, higher lending rates dampen demand for business and residential investment, leading to a further decline in output and a further widening of the interest rate spread between loans and deposits.

Additionally, the decline in output negatively affects the prices of physical and residential capital. Given that, in the model, these assets are used as collateral to provide business and mortgage loans respectively, the fall in their value leads to an increase in the default rates of households and entrepreneurs, as it is now more advantageous for borrowers to grant the mortgaged asset to the bank rather than repay the loan. This development prompts a deterioration in the quality of banks' loan portfolios and a weakening of banks' balance sheets and leads to a further decline in banking capital. As a result, the adverse effects of the policy measure under consideration on the financial sector, as well as on the real economy and household incomes, are amplified.

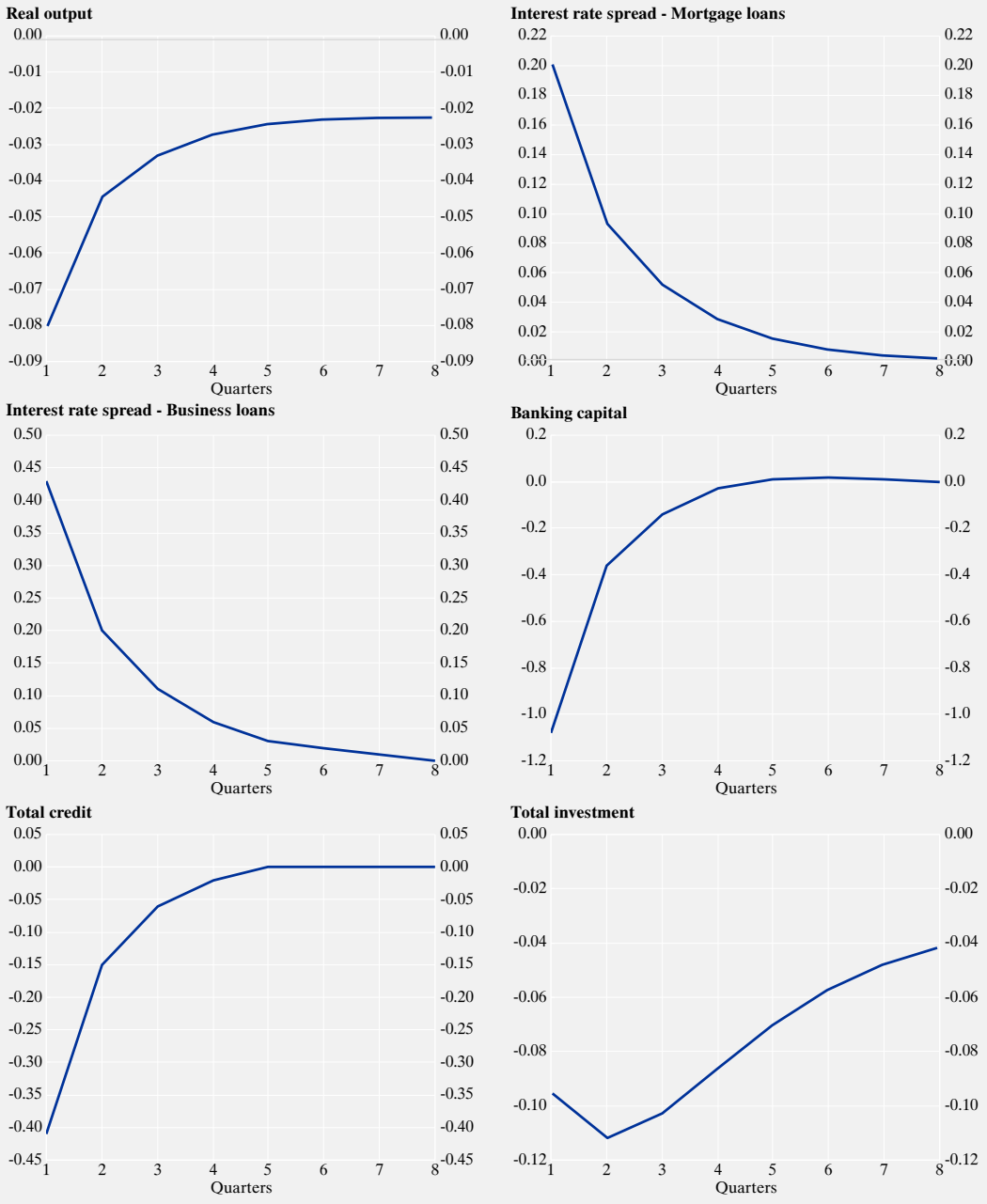
The second channel through which the tax affects the economy relates to the cost of bank funding through deposits. Higher default rates by households and firms negatively affect the creditworthiness of banks in the context of the model, leading to an increase in the interest rate demanded by depositors. As a result, the cost of funding through new deposits increases, leading to a further decline in banking capital and total credit. The increase in the deposit rate is in turn passed on to lending rates, further reducing credit demand and exacerbating the contraction of economic activity.

It should be noted that the redistribution of tax revenue to households acts as a compensating mechanism, partially offsetting the negative effects on their income and on aggregate demand. However, it is not sufficient to fully

5 For details on the calibration of the model for the Greek economy, see also Balfoussia and Papageorgiou (2016).

Dynamic effects of a tax on banks' profits

(percentage %)



Source: Bank of Greece estimates.
Note: All variables are expressed as percentage deviations from the steady state, except for the interest rate spreads that are expressed as percentage point changes (annualised). Interest rate spreads are calculated as the difference between lending and deposit rates.

offset the negative impact of the tax and, thus, the net effect on aggregate demand and output is negative.[6]

6 The decline in household income also leads to a reduction in household consumption expenditure, further dampening aggregate demand and, thus, real output.

These results are consistent with recent findings in the relevant literature. For instance, as confirmed by empirical studies for European countries, the imposition of a tax on banks leads to an increase in lending rates and a decline in bank credit. Reduced lending, in turn, causes a drop in business investment.[7] Nevertheless, it should be noted that the channels identified in this study operate in the context of a theoretical model of the economy. In practice, in the case of the Greek banking system, the direct impact of these channels may be limited, given that Greek credit institutions have high levels of capital adequacy and liquidity, well above the regulatory minimum required. Therefore, they have a considerable degree of flexibility and any decline in their profitability may not directly affect their capacity to raise funds from the financial markets. Nonetheless, the model highlights the potential implications of a tax on banks' profits as well as the channels through which such a policy could affect Greece's real economic aggregates, thus underlining the importance of including a range of factors in the assessment of such a policy measure.

5 CONCLUSIONS

This paper examines the potential macroeconomic effects of a tax on banks' profits, using a Dynamic Stochastic General Equilibrium (DSGE) model calibrated to the Greek economy. It is found that the imposition of such a tax affects the economy primarily through the banking capital channel and the bank funding channel, constraining credit supply and reducing the value of banking collateral, thereby leading to a contraction in economic activity. At the current juncture, Greek banks have high levels of capital adequacy and liquidity, therefore any decrease in their profitability is not likely to directly affect their ability to raise new capital. Nevertheless, the theoretical transmission channels identified in the model highlight the need to take into account a number of factors when evaluating the merits of a tax on banks' profits.

7 See, among others, Borsuk et al. (2024) and Buch et al. (2016).

REFERENCES

Acharya, V.V., L. Pedersen, T. Philippon and M. Richardson (2010), "Taxing systemic risk", in V.V. Acharya, T.F. Cooley, M. Richardson and I. Walter (eds.), Regulating Wall Street: *The Dodd-Frank Act and the new architecture of global finance*, New York University Stern School of Business, Wiley, Chapter 5, 121-142.

Balfoussia, H. and D. Papageorgiou (2016), "Insights on the Greek economy from the 3D macro model", Bank of Greece, Working Paper No. 218.

Balfoussia, H., D. Malliaropulos, D. Papageorgiou and A. Tagkalakis (2017), "Bank transaction taxes: International evidence and potential implications for Greece", in D.D. Thomakos and K.I. Nikolopoulos (eds.), *Taxation in crisis: Tax policy and the quest for economic growth*, Palgrave Macmillan Studies in Banking and Financial Institutions, Palgrave Macmillan, Cham, Chapter 10, 235-267, https://doi.org/10.1007/978-3-319-65310-5_10.

Balfoussia, H., H. Dellas and D. Papageorgiou (2025), "Fiscal distress and banking performance: The role of macroprudential regulation", *Journal of Money, Credit and Banking*, advance online publication, https://doi.org/ 10.1111/jmcb.13247.

Bank of Greece (2025), *Annual Report 2024*, April.

Berger, A.N., D.K. Chronopoulos, A.L. Sobiech and J.O.S. Wilson (2025), "Taxation and bank liquidity creation", *Journal of Money, Credit and Banking*, advance online publication, 1-34, https://doi.org/10.1111/jmcb.70023.

Bini Smaghi, L. (2025), "Why windfall taxes on banks backfire", Institute for European Policy-making at Bocconi University.

Borsuk, M., J. Przeworska, A. Saunders and D. Serwa (2024), "The macroeconomic costs of the bank tax", *Journal of Financial Stability*, Vol. 72.

Boscá, J.E., R. Doménech, J. Ferri and J. Rubio-Ramírez (2019), "Macroeconomic effects of taxes on banking", BBVA Bank, Economic Research Department, Working Paper No. 19-05.

Buch, C.M., B. Hilberg and L. Tonzer (2016), "Taxing banks: An evaluation of the German bank levy", *Journal of Banking & Finance*, 72, 52-66.

Capelle-Blancard, G. and O. Havrylchyk (2017), "Incidence of bank levy and bank market power", *Review of Finance*, 21(3), 1023-1046.

Chen, R., V. Guzzo, F. Jamaludin, A. Mohommad, R. Qu and Y. Zhao (2024), "Bank profitability in Europe: Not here to stay", IMF Working Paper No. WP/24/142.

Clerc, L., A. Derviz, C. Mendicino, S. Moyen, K. Nikolov, L. Stracca, J. Suarez and A.P. Vardoulakis (2015), "Capital regulation in a macroeconomic model with three layers of default", *International Journal of Central Banking*, 11(3), 9-63.

Devereux, M., N. Johannesen and J. Vella (2019), "Can taxes tame the banks? Evidence from the European bank levies", *The Economic Journal*, 129(624), 3058-3091.

Freixas, X. and J.C. Rochet (2008), *Microeconomics of banking*, 2nd edition, The MIT Press.

European Commission (2010), "Taxation of the financial sector", COM (2010) 549, Brussels.

International Monetary Fund (2010), "A fair and substantial contribution by the financial sector", IMF Staff Report for the G-20.

Keen, M. (2011), "Rethinking the taxation of the financial sector", *CESifo Economic Studies*, 57(1), 1-24.

Maneely, M. and L. Ratnovski (2024), "Bank profits and bank taxes in the EU", IMF Working Paper No. WP/24/143.

Martins, A.M. (2025), "Banks stock market reaction to the Italian and Spanish windfall tax announcement: an event study", *Journal of Banking Regulation*, 26(1), 54-61.

Sobiech, A.L., D.K. Chronopoulos and J.O.S. Wilson (2021), "The real effects of bank taxation: Evidence for corporate financing and investment", *Journal of Corporate Finance*, 69, 101989.
Valentinaite, M., E. Ceponyte and I. Zustrups (2025), "Taxing bank windfall profits in the Baltics", European Economy – Economic Briefs 086, DG ECFIN, European Commission.

THE ROLE OF TRAVEL-RELATED SERVICES IN THE EVOLUTION OF THE GREEK HICP

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ABSTRACT

This paper investigates the role of travel-related services – specifically package holidays, restaurants and hotels, and passenger transport by air – in the evolution of the Harmonised Index of Consumer Prices (HICP) in Greece. With tourism representing a substantial sector of the Greek economy, understanding how the prices of these services interact with broader inflationary dynamics is of increasing importance, particularly in the context of the euro area's harmonised statistical framework. The study begins with an overview of the HICP and the national Consumer Price Index (CPI), highlighting methodological differences and similarities in how travel-related services are treated within each. It then examines the individual components of travel-related services to assess their contribution to the overall HICP, using official monthly data and decomposition techniques. Subsequently, the paper tracks the historical evolution of these services prices, exploring seasonal patterns, structural shifts and the impact of major economic events, such as the COVID-19 pandemic and the subsequent recovery. To place the Greek experience in a broader context, the analysis incorporates a cross-country comparison, examining how travel-related services inflation has varied across euro area countries and identifying potential sources of heterogeneity. The findings aim to inform both statistical and policy discussions, shedding light on the weight and behaviour of a vital sector within inflation measurement and offering insight into price dynamics that are often volatile yet economically significant. The paper concludes by summarising key findings and proposing ideas for future research.

Keywords: travel-related services; HICP; CPI; Greece; euro area

JEL classification: Z39; E31; E61; F45

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Ο ΡΟΛΟΣ ΤΩΝ ΤΑΞΙΔΙΩΤΙΚΩΝ ΥΠΗΡΕΣΙΩΝ ΣΤΗΝ ΕΞΕΛΙΞΗ ΤΟΥ ΕΛΛΗΝΙΚΟΥ ΕΝΑΡΜΟΝΙΣΜΕΝΟΥ ΔΕΙΚΤΗ ΤΙΜΩΝ ΚΑΤΑΝΑΛΩΤΗ (ΕΝΔΤΚ)

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ΠΕΡΙΛΗΨΗ

Το παρόν άρθρο διερευνά το ρόλο των ταξιδιωτικών υπηρεσιών – και συγκεκριμένα των πακέτων διακοπών, των υπηρεσιών εστίασης και φιλοξενίας και της αεροπορικής μεταφοράς επιβατών – στην εξέλιξη του Εναρμονισμένου Δείκτη Τιμών Καταναλωτή (ΕνΔΤΚ) στην Ελλάδα. Δεδομένου ότι ο τουρισμός αποτελεί σημαντικό τομέα της ελληνικής οικονομίας, η κατανόηση του τρόπου με τον οποίο οι τιμές αυτών των υπηρεσιών αλληλεπιδρούν με την ευρύτερη πληθωριστική δυναμική αποκτά όλο και μεγαλύτερη σημασία, ιδίως στο πλαίσιο του εναρμονισμένου στατιστικού πλαισίου της ζώνης του ευρώ. Η μελέτη ξεκινά με μια επισκόπηση του ΕνΔΤΚ και του εθνικού Δείκτη Τιμών Καταναλωτή (ΔΤΚ), επισημαίνοντας τις μεθοδολογικές διαφορές και ομοιότητες στον τρόπο με τον οποίο αντιμετωπίζονται οι ταξιδιωτικές υπηρεσίες σε κάθε δείκτη. Στη συνέχεια, εξετάζονται οι επιμέρους συνιστώσες των ταξιδιωτικών υπηρεσιών προκειμένου να αξιολογηθεί η συμβολή τους στο συνολικό ΕνΔΤΚ, με τη χρήση επίσημων μηνιαίων δεδομένων και τεχνικών ανάλυσης. Στη συνέχεια, το άρθρο παρακολουθεί τη χρονική εξέλιξη των τιμών αυτών των υπηρεσιών, διερευνώντας εποχικά πρότυπα, διαρθρωτικές μεταβολές και την επίδραση σημαντικών οικονομικών γεγονότων, όπως η πανδημία COVID-19 και η επακόλουθη ανάκαμψη. Για να ενταχθεί η ελληνική εμπειρία σε ευρύτερο πλαίσιο, η ανάλυση περιλαμβάνει διακρατική σύγκριση, εξετάζοντας πώς διαφέρει ο πληθωρισμός των ταξιδιωτικών υπηρεσιών μεταξύ των χωρών της ζώνης του ευρώ και εντοπίζοντας πιθανούς παράγοντες ετερογένειας. Τα ευρήματα αποσκοπούν στο να ρίξουν φως στο βάρος και τη συμπεριφορά ενός ζωτικού τομέα στη μέτρηση του πληθωρισμού και να προσφέρουν πληροφορίες για τη δυναμική των τιμών, η οποία είναι συχνά ευμετάβλητη αλλά και οικονομικά σημαντική. Το άρθρο ολοκληρώνεται συνοψίζοντας τα βασικά ευρήματα και προτείνοντας κατευθύνσεις για μελλοντική έρευνα.

ΜΗ ΤΕΧΝΙΚΗ ΣΥΝΟΨΗ

Η μελέτη εξετάζει το ρόλο που παίζουν οι ταξιδιωτικές υπηρεσίες – όπως τα πακέτα διακοπών, οι υπηρεσίες εστίασης και φιλοξενίας και οι αεροπορικές μεταφορές – στη διαμόρφωση του Εναρμονισμένου Δείκτη Τιμών Καταναλωτή (ΕνΔΤΚ) στην Ελλάδα. Πρόκειται για υπηρεσίες που συνδέονται στενά με την τουριστική δραστηριότητα, έναν από τους σημαντικότερους τομείς της ελληνικής οικονομίας, και γι' αυτό η εξέλιξη των τιμών τους επηρεάζει άμεσα το συνολικό πληθωρισμό. Η μελέτη αναδεικνύει επίσης τις διαφορές μεταξύ του εθνικού Δείκτη Τιμών Καταναλωτή (ΔΤΚ) και του ΕνΔΤΚ, καθώς ο δεύτερος καταγράφει και τη δαπάνη των ξένων επισκεπτών, κάτι που είναι ιδιαίτερα κρίσιμο για μια χώρα με τόσο ισχυρό τουριστικό αποτύπωμα.

Η διερεύνηση του θέματος στηρίζεται σε επίσημα μηνιαία στοιχεία τιμών για την περίοδο 2016-2025 και αξιοποιεί τεχνικές ανάλυσης, προκειμένου να εκτιμηθεί η συμβολή των εξεταζόμενων ταξιδιωτικών υπηρεσιών στο συνολικό πληθωρισμό. Παράλληλα, εξετάζεται η ιστορική τους εξέλιξη ώστε να καταγραφούν εποχικά μοτίβα, διακυμάνσεις που προκαλούν παράγοντες όπως η ενέργεια, αλλά και η επίδραση σημαντικών γεγονότων όπως η πανδημία COVID-19 και η μεταγενέστερη ανάκαμψη. Η μελέτη ενσωματώνει επίσης σύγκριση με άλλες χώρες της ζώνης του ευρώ, εστιάζοντας ιδιαίτερα σε όσες έχουν παρόμοιο τουριστικό προφίλ με την Ελλάδα, όπως η Κύπρος, η Μάλτα, η Πορτογαλία και η Κροατία.

Τα ευρήματα δείχνουν ότι οι εξεταζόμενες ταξιδιωτικές υπηρεσίες έχουν μεγάλη βαρύτητα στον ελληνικό ΕνΔΤΚ, καθώς αντιστοιχούν στο μισό σχεδόν της συνιστώσας των υπηρεσιών, γεγονός που αναδεικνύει τον καθοριστικό ρόλο τους στη διαμόρφωση του πληθωρισμού. Λόγω της εποχικότητας και της έντονης εξάρτησης από τη διεθνή ζήτηση, οι τιμές τους παρουσιάζουν μεγαλύτερη μεταβλητότητα σε σχέση με το γενικό δείκτη. Η συμπεριφορά αυτή έγινε ιδιαίτερα αισθητή στη διάρκεια της πανδημίας, όταν η καθίζηση των ταξιδιών οδήγησε σε απότομη πτώση τιμών και σε προσωρινό αποπληθωρισμό. Από την άρση των περιορισμών (περίπου στα τέλη 2021 - αρχές 2022) και μετά, οι ταξιδιωτικές υπηρεσίες κατέγραψαν έντονη άνοδο τιμών, κυρίως λόγω της εκρηκτικής αύξησης της ζήτησης και της ανατίμησης των καυσίμων και άλλων λειτουργικών εξόδων. Οι τιμές σε εστιατόρια και ξενοδοχεία παρέμειναν υψηλές, ενώ τα αεροπορικά εισιτήρια εμφάνισαν μεγάλη μεταβλητότητα, συχνά με έντονες αυξήσεις τους καλοκαιρινούς μήνες.

Σε ευρωπαϊκό επίπεδο, η Ελλάδα αποτελεί την τρίτη κατά σειρά χώρα όσον αφορά τη βαρύτητα των ταξιδιωτικών υπηρεσιών στον ΕνΔΤΚ, γεγονός που την καθιστά ιδιαίτερα ευάλωτη στις διεθνείς εξελίξεις που επηρεάζουν τον τουρισμό. Η σύγκριση με άλλες τουριστικές οικονομίες δείχνει ότι η Ελλάδα καταγράφει την υψηλότερη μεταβλητότητα τιμών μετά την Κύπρο, φαινόμενο που συνδέεται με το έντονα εποχικό προφίλ της και τη μεγάλη εξάρτηση από την αερομεταφορά. Τα αποτελέσματα υποδηλώνουν ότι οι πιέσεις στις τιμές των ταξιδιωτικών υπηρεσιών δεν είναι απλώς συγκυριακές, αλλά ίσως έχουν και πιο μόνιμα χαρακτηριστικά, καθώς οι συνθήκες κόστους, η αλλαγή ταξιδιωτικών συνηθειών και η διεθνής ενεργειακή αβεβαιότητα διαμορφώνουν νέες ισορροπίες.

Συνολικά, η μελέτη καταλήγει στο συμπέρασμα ότι οι εξεταζόμενες ταξιδιωτικές υπηρεσίες αποτελούν έναν από τους βασικότερους μηχανισμούς μέσω των οποίων οι διεθνείς και εγχώριες εξελίξεις μεταφέρονται στον ελληνικό πληθωρισμό. Η σημασία τους για την κατανόηση της πορείας του ΕνΔΤΚ είναι καθοριστική, τόσο λόγω της μεγάλης βαρύτητάς τους όσο και λόγω της έντονης διακύμανσης των τιμών τους. Έτσι, η συνεχής παρακολούθησή τους είναι απαραίτητη για την αξιολόγηση των πληθωριστικών πιέσεων στην ελληνική οικονομία. Η μελέτη προτείνει, τέλος, η μελλοντική έρευνα να εξετάσει το ρόλο παρόμοιων τουριστικών οικονομιών εκτός ευρωζώνης, αλλά και τις αλλαγές που θα φέρει η πράσινη μετάβαση στον τρόπο που διαμορφώνονται οι τιμές στις υπηρεσίες μεταφοράς και φιλοξενίας.

THE ROLE OF TRAVEL-RELATED SERVICES IN THE EVOLUTION OF THE GREEK HICP*

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I INTRODUCTION

The Greek economy is heavily service-oriented, with the tertiary sector accounting for approximately 78% of total Gross Value Added (GVA) in 2024 (at nominal prices). Among services, tourism holds a particularly significant position (Kasimati and Sideris 2015; Kasimati and Antonopoulos 2025). It contributes to Greece's GDP not only directly but also indirectly, through its linkages with other sectors of production. On the demand side, inbound travel receipts account on average for 7.7% of GDP for the period 2016-2024, a share that has been rising in recent years, apart from the pandemic period, reaching 9.1% in 2024. The sector's direct contribution is higher when including transport receipts and tourism-related investment and amounts to about 12.7% of GDP in 2024 (Ikkos and Koutsos 2025).

On the supply side, Kasimati et al. (2020) identify accommodation and food service activities as the two main components of the tourism sector. Similarly, Nikiforos et al. (2025) highlight the macroeconomic importance of these activities, owing to (i) their substantial share in total employment and (ii) their critical role in improving Greece's current account balance. Hence, the sector's share in total GVA averages 6.4% during the period 2016-2024, rising to 7.3% in 2024 (ELSTAT 2025), while its contribution to total employment is also notable, averaging 13.1%. The overall impact of tourism becomes even more pronounced when adding its induced impact, i.e. its effects on other related sectors. Thus, tourism's overall contribution is estimated at 19.4% of GDP and 20.0% of total employment in 2024 (WTTC 2025).

Table 1 presents the classification of goods and services related to tourism consumption under the corresponding sector of economic activity according to NACE rev. 2 (IOBE 2012). As shown in the Table, accommodation is assigned to Division 55 of NACE, while food and beverage service activities fall under Division 56. In addition to Divisions 55 and 56, we consider passenger transport by air (NACE Division 51) and package holidays as representative of travel-related services. In terms of consumer price measurement, the accommodation and food service activities are captured within the "Restaurants and hotels" category (ECOICOP group 11), passenger air transport is classified under "Transport" (ECOICOP group 07) and package holidays are included in "Recreation and culture" (ECOICOP group 09). These sub-components are defined as travel-related services inflation indices and are critical for understanding inflation dynamics in tourism-intensive economies like Greece.

The purpose of this paper is to examine the role of travel-related services in shaping the evolution of the Greek HICP over the period 2016-2025. Specifically, the analysis examines how the weighting, pricing and seasonal patterns of these services have influenced overall inflation dynamics in Greece and how they compare to other euro area countries. Section 2 reviews the similarities and differences in the treatment of travel-related services between Greece's CPI and the HICP. Section 3 investigates the contribution of travel-related sub-components to the overall Greek HICP, while Section 4 explores cross-country heterogeneity in travel-related services inflation across euro area member countries. The final section summarises the main findings and proposes ideas for future research.

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Table 1 Classification of goods and services related to tourism consumption under sectors of economic activity based on NACE rev. 2

Goods and services related to tourism consumption	NACE rev. 2 category	2024* (constant prices, EUR millions)	% of total GVA
Accommodation	*Division 55:* Accommodation	13,778	6.9%
Restaurants	*Division 56:* Food and beverage service activities		
Travel agencies	*Division 79:* Travel agency, tour operator reservation service and related activities	1,147	0.6%
Land transport	*Division 49*: Land transport and transport via pipelines	3,719	1.9%
Water transport	*Division 50*: Water transport	4,432	2.2%
Air transport	*Division 51:* Air transport	1,334	0.7%
Car rental	*Division 77:* Rental and leasing activities	1,469	0.7%
Cultural services	*Division 91:* Libraries, archives, museums and other cultural activities	n/a	
Amusement and sports activities	*Division 93:* Sports activities and amusement and recreation activities	429	0.2%
Conventions and trade shows	*Group 82.3:* Organisation of conventions and trade shows	n/a	
Shopping for goods, gifts, souvenirs	*Group 47.2:* Retail sale of food, beverages and tobacco in specialised stores	n/a	
All sectors	***Total Gross Value Added (GVA)***	***199,340***	***100.0%***

Sources: IOBE (2012), Hellenic Statistical Authority and author's own calculations.
Notes: Groups 82.3 and 47.2 are sub-categories of NACE rev. 2 Division 82 "Office administrative, office support and other business support activities" and Division 47 "Retail trade, except of motor vehicles and motorcycles", respectively.
* Provisional data.

2 TRAVEL-RELATED SERVICES IN THE CPI AND THE HICP: DIFFERENCES AND SIMILARITIES

CPI measures changes over time in the prices of goods and services purchased, used or paid for by households. It is the primary indicator of inflation in all member states of the European Union (EU) and serves as a key input for assessing cost of living trends and economic stability. To ensure representativeness, each country constructs a "consumer basket" comprising a set of goods and services that reflect the average consumption pattern of households. This basket includes expenditure categories such as food and beverages, housing, energy, transport, communications, health, education and hospitality (ELSTAT 2012). Many of these items are purchased frequently and thus directly influence households' perceptions of inflation.

To enhance comparability of inflation measures across EU member states, a harmonised index, the HICP, was introduced in 1996 (ELSTAT 2016). The HICP differs from the national CPI mainly in its domestic concept, as it includes all goods and services purchased within a country by both resident and non-resident households. This design enables the HICP to capture price movements relevant to the single monetary policy of the Eurosystem and to facilitate the assessment of price stability and inflation convergence required by the Maastricht criteria for Economic and Monetary Union (EMU) membership. The HICP series is published monthly, currently using 2015=100 as the base year.[1]

As one of the most critical macroeconomic indicators, the HICP informs both monetary and fiscal policy, providing policymakers with a consistent and reliable measure of consumer price changes across the euro area (Gonçalves et al. 2021). Within this framework, the prices

1 As of 2026, the HICP base year will be updated to 2025=100.

Table 2 Weights (‰) of travel-related services in the CPI and the HICP in Greece in 2025 (based on COICOP 5-digit level of aggregation)

		2025	
		CPI	HICP
[CP00]	All-items HICP	1000.00	1000.00
[SERV]	Services (overall index excluding goods)	416.39	487.04
Total weight of travel-related services		***139.21***	***225.78***
[CP0733] Passenger transport by air			
07331	Domestic flights	8.59	7.48
07332	International flights	10.76	10.11
0733	Passenger transport by air *(weight of 07331+07332)*	19.35	17.59
[CP096] Package holidays			
09601	Package domestic holidays	0.85	2.93
09602	Package international holidays	1.25	4.27
096	Package holidays *(weight of 09601+09602)*	2.10	7.20
[CP11] Restaurants and hotels			
11111	Restaurants, cafés and dancing establishments	87.06	118.32
11112	Fast food and take away food services	18.30	24.92
1111	Restaurants, cafés and the like	105.36	143.24
1112	Canteens	6.37	8.42
111	Catering services *(weight of 1111+1112)*	111.73	151.66
11201	Hotels, motels, inns and similar accommodation services	5.90	48.11
11202	Holiday centres, camping sites, youth hostels and similar accommodation services	0.14	1.22
112	Accommodation services *(weight of 11201+11202)*	6.04	49.32
11	Restaurants and hotels *(weight of 111+112)*	117.76	200.98

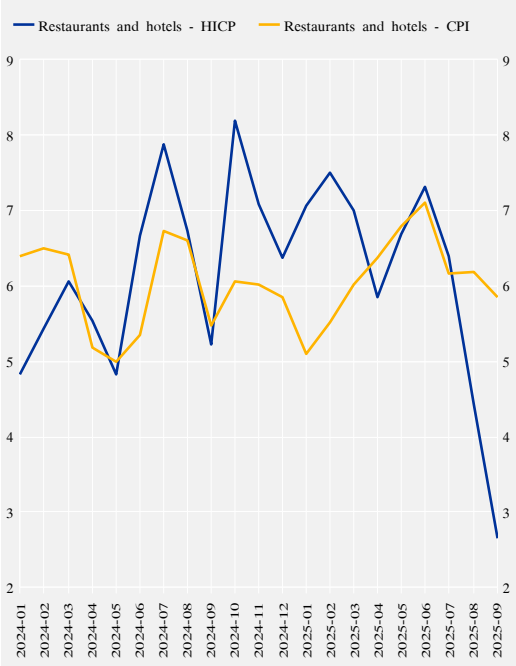
Sources: Eurostat database and author's own calculations.
Note: Accommodation services (sub-category 112) include the items mentioned in subcategories 11201 and 11202, but exclude short-term accommodation rental services provided by short-term rental platforms.

of travel-related services (i.e. package holidays, restaurants and hotels, and passenger air transport) play an increasingly significant role. These components are highly sensitive to both domestic and international demand conditions and often display pronounced seasonality, usually associated with holiday effects including Easter (Eiglsperger et al. 2025). This reflects the dynamics of the tourism sector, which is a major contributor to the Greek economy (ETC 2023).

Although the CPI and the HICP include the same sub-categories of goods and services, they differ in their weighting structure (Kasimati et al. 2021). Table 2 lists the 2025 weights assigned to these sub-components in both the CPI and the HICP. The weights are designed to indicate the importance of services, measured as shares in total household consumption. As can be seen in Table 2, the weights of travel-related services indices and sub-indices reflect divergences between the CPI and the HICP. This is explained by the fact that the weights compiled for the HICP index include the expenditure of private households, the expenditure of foreign visitors and the expenditure of individuals living in various social institutions, while the expenditure of residents abroad is excluded. On the other hand, the CPI tends to cover the expenditure of domestic residents only. In addition, weights for the CPI

Chart 1 Restaurants and hotels in Greece's HICP and CPI

(annual percentage change)



Sources: Eurostat and author's own calculations.

are calculated on the basis of data from the Household Budget Survey, whereas the HICP uses additional household expenditure data from the national accounts (Eidukas 2016). These methodological differences explain the variations observed between the Greek CPI and the HICP in the weighting and inflation patterns of travel-related services.[2]

As shown in Chart 1, discrepancies between the annual rates of change for restaurants and hotels in the CPI and HICP indices reflect the impact of foreign visitor expenditure and seasonal volatility, which are more strongly captured in the HICP due to Greece's pronounced tourism seasonality. While both indices aim to measure consumer price dynamics, their scope, weighting and data sources lead to systematic differences in how travel-related services affect the overall inflation rate. The HICP's broader coverage makes it more suitable for cross-country comparisons and monetary policy, while the CPI remains a more domestically focused indicator, particularly relevant for analysing resident household purchasing power.

3 THE CONTRIBUTION OF TRAVEL-RELATED SERVICES TO SERVICES INFLATION

Among the five main components of the HICP, the services component consistently carries the highest weight (Bank of Greece 2025). Table 3 presents the average annual rates of change in the services component, together with the contributions of travel-related services sub-indices over the period 2020-2025. In terms of their relative weighting in the HICP, the three travel-related sub-indices together account for a weight of 225.78‰, representing slightly less than 50% of the total weight of the services component (487.04‰ in 2025). Specifically, the combined contribution of these sub-indices to services inflation, which stands at 5.0% in 2025 (based on data for the first nine months), amounted to 61% in 2025 and 70% in 2024.

Following the sharp fall in travel-related activities in 2020 and 2021 due to pandemic-related restrictions, these sub-indices rebounded from 2022 onwards, causing a significant upward effect on services inflation. The restaurants and hotels category has been the primary driver of this recovery, reflecting both increasing demand and higher input costs (notably for energy[3]). The passenger transport by air and package holidays sub-indices also show consistently positive contributions, in line with large tourism flows and higher international travel costs. The sustained high contribution of these components in 2024 and 2025 suggests that travel-related services remain a key source of underlying inflationary pressure within the services sector. This indicates that inflation in these categories is not merely a temporary phe-

2 The different base years for the CPI (2020=100) and the HICP (2015=100) do not affect the variations observed in travel-related services between the two indices, since inflation rates are used for comparison.

3 Past record has shown that rising energy prices have consistently contributed to inflationary pressures (Lazaretou and Palaiodimos 2025). In addition, research by Corsello and Neri (2025) reveals that energy prices fuel a group of fast-moving items, such as transport-related services.

Table 3 Inflation of the services component and contributions of selected travel-related services

	Services inflation[1]	Restaurants and hotels	Passenger transport by air	Package holidays
2020	-1.4	-0.46	-0.48	0.01
2021	-1.0	-0.18	0.07	0.00
2022	4.5	3.38	0.46	0.08
2023	4.5	2.96	0.32	0.09
2024	4.4	2.59	0.34	0.17
Jan.-Sep. 2025	5.0	2.50	0.45	0.12

Sources: ELSTAT and author's calculations.
1 This column presents the annual rates of change (%) in prices for the services component, while the next columns display the contributions of travel-related services to the annual change in services inflation. The sum of these contributions per year does not equal the total inflation rate of the services component, as the table includes only three sub-indices out of a large number of services sub-indices that make up the services component.

nomenon, but may be related to structural shifts in post-pandemic consumption patterns or cost structures in the tourism industry.

4 THE EVOLUTION OF TRAVEL-RELATED SERVICES PRICES IN THE HICP OVER THE PERIOD 2016-2025

Between 2016 and 2025, inflation dynamics in Greece displayed distinct cyclical phases in response to successive global and domestic shocks. The examined travel-related sub-indices showed a clearly different behaviour from the HICP index, reflecting their exposure to tourism demand, energy costs and transport constraints (see Chart 2).

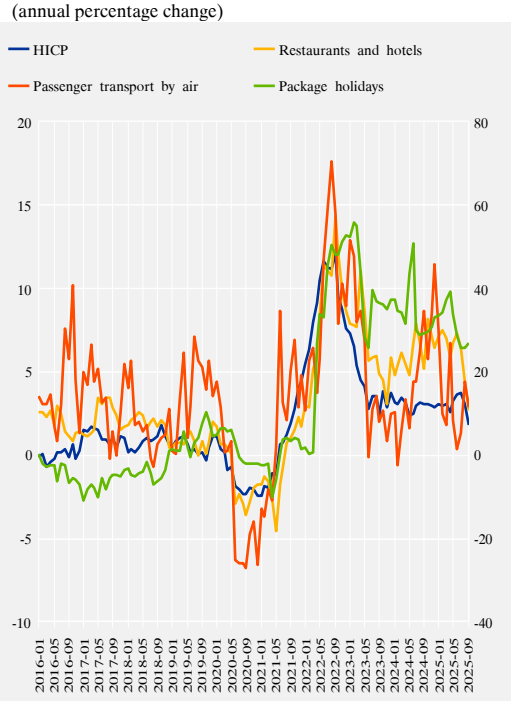
During the pre-pandemic period (2016-2019), Greece experienced a phase of subdued and stable inflation, with the overall HICP inflation averaging close to 0.7%. Inflation in restaurants and hotels was persistently higher, fluctuating around 2%-3%, in line with the gradual recovery of domestic demand and the steady expansion of the tourism sector following the sovereign debt crisis. In contrast, passenger air transport exhibited substantial volatility, with seasonal peaks frequently surpassing 20%-30%, largely driven by fuel-price movements and strong tourist arrivals. Prices for package holidays remained either negative or close to zero throughout this period, suggesting probably limited pricing power among tour operators amid strong competition and price discounting.

The start of the COVID-19 pandemic in 2020 suddenly reversed these trends. As containment measures and international travel bans took effect, both headline and sectoral inflation turned negative. The overall HICP fell to around -2% in late 2020, while prices in restaurants and hotels declined by roughly -3% as demand collapsed and temporary tax reductions were introduced. The impact on passenger air transport was extraordinary, with prices dropping by more than 25% at the height of the crisis. Inflation for package holidays also turned slightly negative. This deflationary episode reflected a sharp contraction in demand for travel-related services, together with significant excess capacity and deep uncertainty in the tourism industry.

A strong rebound followed in 2022 and 2023, when global reopening and supply-chain disruptions triggered an abrupt and persistent rise in inflation rates not seen for decades (Kofina and Petroulakis 2023; Catiforis 2022). The strong inflationary pressures were driven by a series of adverse supply and demand shocks that affected economies across the globe (Papageorgiou and Rizos 2024). Headline

Chart 2 Inflation rates in travel-related services and headline HICP

(annual percentage change)



Sources: Bank of Greece, Eurostat and author's own calculations.

inflation accelerated to above 12% in September 2022, while the impact on travel-related services was stronger. The rise in prices for restaurants and hotels climbed to nearly 14%, as energy and food costs soared (Bragoudakis et al. 2024), and passenger air transport inflation reached an exceptional 70% in August 2022, reflecting elevated jet-fuel prices and increasing air-travel demand. Inflation in package holidays also rose above 12%, driven by capacity constraints and the release of pent-up household savings. This phase illustrated the re-normalisation of tourism activity following the pandemic, combined with cost-push pressures intensified by Russia's invasion of Ukraine in February 2022, the conflict in the Middle East in October 2023 and the subsequent energy-price shock (Bank of Greece 2023, 2024).

From mid-2023 onwards, inflation gradually moderated across all categories, though travel-related services remained above the pre-pandemic levels. The overall HICP inflation eased to around 3% by 2024, while inflation for restaurants and hotels stabilised at a level between 6% and 7%, reflecting persistent wage and food-price pressures in the hospitality sector (Bragoudakis et al. 2024). Passenger air transport continued to display volatility, alternating between temporary deflation in early 2024 and renewed surges above 30% during the summer months, in line with global energy fluctuations and limited airline capacity. Inflation for package holidays followed a similar but milder path, settling around 7%-9% as tourism demand normalised and supply conditions improved.

Overall, it seems that the travel-related services inflation in Greece has been more volatile and persistent than HICP inflation. The pattern underscores the strong cyclical sensitivity of tourism-dependent sectors to global economic shocks. By September 2025, headline inflation had largely normalised, yet prices in hospitality and air transport remained comparatively elevated, pointing to structural rigidity and sustained demand in Greece's tourism-driven economy.

5 CROSS-COUNTRY HETEROGENEITY: TRAVEL-RELATED SERVICES INFLATION ACROSS EURO AREA COUNTRIES

The examination of travel-related services weights in euro area inflation demonstrates substantial cross-country heterogeneity (see Table 4). This heterogeneity reflects differences in the share of household consumption devoted to travel-related services across the twenty euro area countries. These differences are driven by a combination of factors, including geography, income levels, tourism intensity and cultural consumption patterns. Understanding these variations is essential for interpreting travel-related services inflation and for designing policy responses that account for country-specific consumption structures.

Table 4 Weights (‰) of the HICP travel-related services sub-indices in the euro area countries (2025)

		Euro area	Belgium	Germany	Estonia	Ireland	Greece	Spain	France	Croatia	Italy	Cyprus	Latvia	Lithu-ania	Luxem-bourg	Malta	Nether-lands	Austria	Portugal	Slovenia	Slovakia	Finland
[CP00]	All-items HICP	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
[SERV]	Services (overall index excluding goods)	456.49	443.07	461.58	348.49	527.46	487.04	478.24	495.24	324.64	408.8	450.09	277.11	283.39	383.9	450.61	446.77	480.42	448.15	355.93	303.58	444.62
Total weight of travel-related services		***135.72***	***102.93***	***103.77***	***126.32***	***249.43***	***225.78***	***186.19***	***126.93***	***134.11***	***139.72***	***249.07***	***66.79***	***84.89***	***120.4***	***182.86***	***129.19***	***186.48***	***170.08***	***125.23***	***97.27***	***106.92***
[CP0733] Passenger transport by air																						
07331	Domestic flights	1.58	0	0.43	0	0	7.48	1.87	4.03	0.14	1.75	0	0	0	0	0	0	0	0.68	0	0	0.32
07332	International flights	7.75	3.54	7.13	10.51	12.92	10.11	4.07	10.38	3.85	6.79	21.17	11.13	5.5	5.4	13.26	12.36	10.73	6.99	1.14	1.1	8.26
0733	Passenger transport by air *(weight of 07331+07332)*	9.33	3.54	7.56	10.51	12.92	17.59	5.95	14.41	3.99	8.54	21.17	11.13	5.5	5.4	13.26	12.36	10.73	7.67	1.14	1.1	8.58
[CP096] Package holidays																						
09601	Package domestic holidays	2.03	0.44	1.23	0	0	2.93	8.91	0	1.77	2.55	2.61	0	0	0	0	0	0	1.8	9.92	3.63	0
09602	Package international holidays	11.28	10.21	21.11	14.32	20.3	4.27	10.7	4.75	6.21	2.01	28.2	3.57	14.16	18.9	10.8	13.81	17.2	2.86	10.07	7.49	11.14
096	Package holidays *(weight of 09601+09602)*	13.31	10.65	22.34	14.32	20.3	7.2	19.61	4.75	7.98	4.56	30.81	3.57	14.16	18.9	10.8	13.81	17.2	4.66	19.99	11.12	11.14
[CP11] Restaurants and hotels																						
11111	Restaurants, cafés and dancing establishments	64.32	69.96	27.9	49.71	172.73	118.32	102.51	74.84	62.29	68.32	129.3	23.53	32.84	63.1	72.78	43.08	80.87	93.61	71.08	42.1	53.31
11112	Fast food and take away food services	19.01	10.26	22.45	23.85	18.37	24.92	34.07	0.88	12.93	23.6	36.11	6	7.19	7.8	11.84	31.86	21.33	6.51	3.6	12.15	18.09
1111	Restaurants, cafés and the like	83.33	80.23	50.35	73.56	191.1	143.24	136.58	75.71	75.22	91.92	165.42	29.52	40.03	70.9	84.62	74.94	102.2	100.12	74.67	54.25	71.41
1112	Canteens	6.24	1.45	6.1	11.25	7.52	8.42	4.62	10.15	5.99	2.94	3.19	8.61	13.43	6.1	1.03	2.16	8.22	9.65	4.72	23.23	7.3
111	Catering services *(weight of 1111+1112)*	89.57	81.68	56.45	84.81	198.62	151.66	141.2	85.87	81.21	94.86	168.6	38.13	53.46	77	85.65	77.1	110.43	109.77	79.4	77.47	78.71
11201	Hotels, motels, inns and similar accommodation services	16.03	3.98	12.29	14.72	16	48.11	11.16	9.97	8.77	26.06	28.48	13.05	8.24	15.4	73.15	11.47	40.35	39.49	18.03	6.3	6.75
11202	Holiday centres, camping sites, youth hostels and similar accommodation services	5.4	2.6	4.39	0	0.05	1.22	1.46	10.44	28.53	3.37	0	0	1.23	2	0	14.44	4.96	1.24	2.06	1.13	1.73
112	Accommodation services *(weight of 11201+11202)*	23.51	7.07	17.42	16.67	17.6	49.32	19.43	21.9	40.93	31.76	28.48	13.96	11.77	19.1	73.15	25.92	48.12	47.98	24.7	7.57	8.49
11	Restaurants and hotels *(weight of 111+112)*	113.08	88.74	73.87	101.49	216.21	200.98	160.63	107.77	122.14	126.62	197.09	52.09	65.23	96.1	158.8	103.02	158.55	157.75	104.1	85.05	87.2

Sources: Eurostat database and author's own calculations.

The HICP sub-component "passenger transport by air" exhibits notable variation, with an overall euro area aggregate weight of 9.33. Country-specific weights range from a low of 1.10 in Slovakia to a high of 21.17 in Cyprus, underscoring substantial differences in household spending on air travel. The highest weights are observed in Cyprus, Greece, France, Malta, Ireland and the Netherlands, reflecting a greater reliance on air transport for domestic and international travel, particularly in island nations and geographically peripheral countries. Conversely, Slovakia, Slovenia, Belgium and Croatia record the lowest weights, suggesting a smaller role for air travel in household consumption, possibly due to greater dependence on land transport or lower frequencies of international travel. These patterns highlight the influence of geographic location, infrastructure and travel habits on the relative importance of air transport in household expenditure.

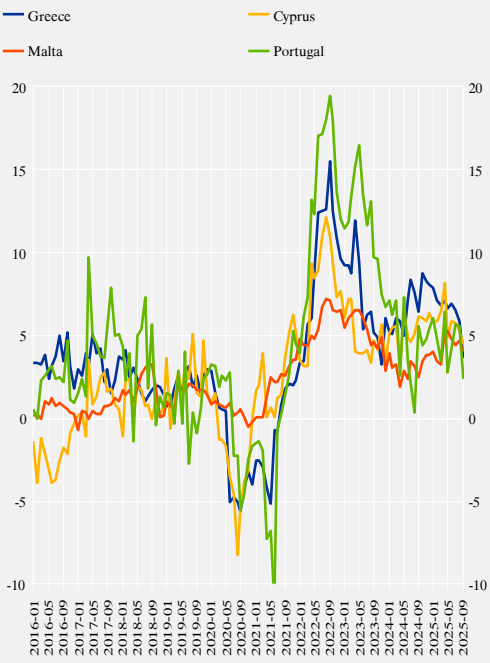
Similarly, the weight of "package holidays" varies considerably across countries, with an average of approximately 13.9, close to the euro area aggregate of 13.31. Country-specific weights range from 3.57 in Latvia to 30.81 in Cyprus. The highest weights are observed in Cyprus, Germany, Ireland, Slovenia, Spain and Luxembourg, reflecting a larger share of household spending on organised holiday packages, which may be associated with higher income levels or stronger preferences for pre-arranged travel. In contrast, Latvia, Italy, Portugal, France and Greece report the lowest weights, indicating that package holidays represent a smaller component of household consumption in these economies. Overall, these differences illustrate the diversity of travel consumption patterns within the euro area.

The "restaurants and hotels" sub-component shows the greatest degree of variation, with an overall euro area aggregate weight of 113.08. Country weights range from 52.09 in Latvia to 216.21 in Ireland, highlighting large cross-country differences in household spending on hospitality services. The highest weights are recorded in Ireland, Greece, Cyprus, Italy, Spain and Malta, suggesting that restaurants and hotels constitute a significant portion of household budgets in countries with strong tourism sectors or high domestic demand for hospitality services. Conversely, Latvia, Lithuania, Germany, Slovakia and Finland exhibit the lowest weights, indicating a comparatively smaller role for restaurants and hotels in household consumption. Across all euro area countries, the sub-index for catering services consistently exceeds that of accommodation services, reflecting higher household spending on meals and dining relative to lodging. These findings highlight the importance of tourism intensity, income levels and cultural habits in shaping household expenditure patterns within the hospitality sector.

In this section, we also examine the evolution of prices and inflation for travel-related services in Greece and a group of comparable EU

Chart 3 Inflation rates of the Travel Services Price index in selected EU countries

(annual percentage change)



Sources: Bank of Greece, Eurostat and author's own calculations.

economies. The selection of comparable countries – Cyprus, Malta, Portugal and Croatia – is based on their status as tourist destinations competing with Greece. For each country, we construct a composite inflation index, referred to as the Travel Services Price index, using a weighted average of three sub-indices (restaurants and hotels, passenger air transport and package holidays), all adjusted to a common base year (2015=100). The analysis covers the period 2016-2025 (latest data available as of September 2025), capturing the effects of recent economic shocks, namely the COVID-19 pandemic (2020-2021) and the subsequent inflationary crisis (from 2022 onwards).

Chart 3 presents the year-on-year inflation rates based on the Travel Services Price index for the selected countries. The COVID-19 pandemic led to a sharp GDP decline as governments implemented restrictive measures to contain the spread of the virus. Following the severe decline in economic activity and the consequent uncertainty, commodity prices and inflation rates both fell (Le et al. 2021). Inflation in the travel-related services sector followed a similar trajectory, albeit to varying degrees across countries. In Cyprus, the fall in travel-related services inflation was the most pronounced among the selected economies, averaging -5.1% between June and October 2020, followed by Greece and Portugal. This comparatively milder decline in Greece compared to Cyprus may reflect the extent of stringent containment measures during key phases of 2020[4].

As the global economy recovered, aggregate demand rebounded more strongly than supply, generating inflationary pressures (Bernanke and Blanchard 2023), which were further amplified by Russia's invasion of Ukraine in February 2022. The geopolitical shock led to a sharp increase in commodity prices and intensified overall inflation (Caldara et al. 2022). Regarding the travel-related services sector, inflation rose to unprecedented levels, with Portugal and Croatia recording the largest increases among the countries examined, while Malta experienced comparatively lower inflation rates. In sum, the Travel Services Price index appears to intuitively capture price developments in the tourism industry, providing a useful summary metric.

6 CONCLUSIONS

This paper examines the role of travel-related services inflation, namely restaurants and hotels, passenger air transport and package holidays, in shaping the evolution of the Greek HICP during the period 2016-2025. The findings demonstrate that these services constitute an important and dynamic part of consumer expenditure in Greece, having a significant impact on the country's inflation profile through both their weight in the index and their price volatility.

The analysis reveals that the combined weight of travel-related services accounts for almost half of the total services component of the HICP, highlighting their critical role in the measurement of consumer prices. This weight reflects not only the domestic relevance of tourism-related consumption, but also Greece's exposure to foreign visitor expenditure, which the HICP captures more comprehensively than the national CPI. As such, the Greek HICP seems to incorporate the cyclical fluctuations and external shocks transmitted to the tourism sector, linking domestic inflation dynamics with global travel demand and energy markets.

From a business cycle perspective, travel-related services have exhibited strong cyclical sensitivity as well as structural persistence over a medium-term horizon. Their prices declined sharply during the COVID-19 pandemic, contributing to a temporary deflationary episode, but rebounded strongly during the post-pan-

4 The containment measures, including mobility limitations, business closures and social-distancing mandates, are documented by the Oxford COVID-19 Government Response Tracker (OxCGRT) that collected information on policy measures to tackle COVID-19 over the years 2020, 2021 and 2022.

demic recovery, driven by pent-up demand, rising supply-chain costs and energy prices. In particular, inflation for restaurants and hotels has remained persistently elevated since 2022, reflecting continued cost pressures and a robust tourism rebound, while passenger air transport and package holidays continue to display noticeable seasonal and fuel-related price volatility. These developments suggest that inflationary pressures within the tourism sector are not purely temporary but partly structural, linked to changes in consumer behaviour[5], supply conditions and global energy trends.

The cross-country comparison highlights that Greece, together with other tourism-intensive economies such as Cyprus, Malta and Portugal, exhibits higher weights and greater volatility in travel-related services inflation than the euro area average. This heterogeneity reflects differing consumption patterns and tourism dependencies.

Overall, the results emphasise that travel-related services represent a vital and characteristic channel through which external and domestic shocks raise consumer price inflation. Their weight, volatility and sustained price momentum make them a key sector for understanding inflation persistence in Greece's services economy. Continuous monitoring of these components is therefore essential for understanding the behaviour of a vital sector within inflation measurement, assessing the transmission of global shocks and informing national policy responses to inflationary developments.

Future research could build on these findings in two ways. First, a comparative study could extend the analysis to non-euro area mediterranean economies, allowing for a better understanding of how exchange rate regimes affect inflation in tourism services. Second, as climate change and sustainability increasingly influence travel behaviour and energy use, future work could investigate the long-term structural implications of the green transition for price dynamics in transport, accommodation and related services.

5 Karakitsios et al. (2024) consider consumer behaviour as an additional factor that may determine international price differences.

REFERENCES

Bank of Greece (2023), "The Greek tourism sector: performance and changes following the pandemic", *Annual Report 2022*, Box IV.3, 114-119, September.

Bank of Greece (2024), "Developments in Greek-Israeli trade and the impact of the conflict in the Middle East", *Annual Report 2023*, Box IV.4, 130-134, April.

Bank of Greece (2025), "Services inflation in Greece and its main components", *Annual Report 2024*, Box IV.2, 101-105, April.

Bernanke, B. and O. Blanchard (2023), "What caused the US pandemic-era inflation?", Peterson Institute for International Economics (PIIE), Working Paper No. 23-4, June.

Bragoudakis, Z., A. Karakitsios, E. Kasimati and E. Kondelis (2024), "Food inflation persistence in Greece and in the Eurozone", SUERF, Policy Brief, No 1051, November.

Caldara, D., S. Conlisk, M. Iacoviello and M. Penn (2022), "The effect of the war in Ukraine on global activity and inflation", Board of Governors of the Federal Reserve System, *FEDS Notes*, 27 May.

Catiforis, Ch. (2022), "Post-pandemic inflation: Phillips curve, trends, drivers and lessons", Bank of Greece, *Economic Bulletin*, No. 55, 43-66.

Corsello, F. and S. Neri (2025), " 'Catch me if you can': fast-movers and late-comers in euro area inflation", SUERF, Policy Brief, No. 1070, January.

Eidukas, A. (2016), "Coverage differences between the Harmonised Index of Consumer Prices and national Consumer Prices Indices", Office for National Statistics, 23 May 2016.

Eiglsperger, M., M. Porqueddu and E. Wieland (2025), "Uncertainty in seasonally adjusted services inflation: the role of Easter and travel", ECB, *Economic Bulletin*, Issue 5/2025.

European Travel Commission (ETC) (2023), "European tourism: trends & prospects", Quarterly report (Q2/2023), July.

Eurostat database, https://ec.europa.eu/eurostat/databrowser/view/prc_hicp_cow/default/table?lang=en&category=prc.prc_hicp.prc_hicp.

Gonçalves, E., L. Henkel, O. Kouvavas, M. Porqueddu and R. Trezzi (2021), "2021 HICP weights and their implications for the measurement of inflation", ECB, *Economic Bulletin*, Issue 2/2021.

Hellenic Statistical Authority (ELSTAT) (2012), *Αναθεωρημένος Δείκτης Τιμών Καταναλωτή/Revised Consumer Price Index [2009=100.0]*, Piraeus.

Hellenic Statistical Authority (ELSTAT) (2016), *Εναρμονισμένος Δείκτης Τιμών Καταναλωτή – Μεθοδολογικό Σημείωμα [Harmonized Index of Consumer Prices – Methodological Note] (2005=100.0)*, Piraeus.

Hellenic Statistical Authority (ELSTAT) (2025), *Ακαθάριστη προστιθέμενη αξία κατά κλάδο (A64) [Gross Value Added by Industry (A64)]* (1995-2024).

Ikkos, A. and S. Koutsos (2025), "The contribution of tourism to the Greek economy in 2024: 1st estimate (provisional data)", Institute of the Greek Tourism Confederation (INSETE), May.

IOBE (2012), "Η επίδραση του τουρισμού στην Ελληνική Οικονομία", ["Tourism's impact on the Greek economy"], Foundation for Economic and Industrial Research, September 2012 [in Greek].

Karakitsios, A., E. Kasimati, E. Kondelis and Z. Bragoudakis (2025), "Investigation of the persistence of Harmonised Inflation and its components in Greece and the euro area", Centre of Planning and Economic Research, *Greek Economic Outlook*, No. 56, 66-81, February.

Karakitsios, A., Th. Kosma, D. Malliaropulos, G. Papadopoulos and P. Petroulas (2024), "Price level differences in the euro area: the case of Greece", Bank of Greece, *Economic Bulletin*, No. 59, 53-72.

Kasimati, E. and C. Antonopoulos (2025), "Η συμβολή του τουρισμού στην ελληνική οικονομία κατά το έτος 2023" ["The contribution of tourism to the Greek economy in the year 2023"], in A. Mitropoulou (ed.), *Ο τουρισμός στην Ελλάδα: μετασχηματισμοί, αντιστάσεις και προ-*

οπτικές [Tourism in Greece: transformations, challenges and prospects], 21-37, ENA Institute for Alternative Policies [in Greek].
Kasimati, E., E. Kondelis and C. Lagopoulos (2020), "Greek tourism during coronavirus: Estimation of non-residents' travel receipts and the turnover of enterprises in accommodation and food service activities", Centre of Planning and Economic Research, *Greek Economic Outlook*, No. 43, 70-80.
Kasimati, E., E. Kondelis and C. Lagopoulos (2021), "An estimate of international receipts and the turnover of the hotel and food sectors during the second year of the pandemic", Centre of Planning and Economic Research, *Greek Economic Outlook*, No. 46, 63-69.
Kasimati, E. and D. Sideris (2015), "Towards a new growth model for tourism: structural reforms and the tourism product in Greece during the crisis (2008-2014)", Bank of Greece, *Economic Bulletin*, No. 42, 7-20.
Kofina, I. and F. Petroulakis (2023), "Drivers of inflation in the Greek economy", Bank of Greece, *Economic Bulletin*, No. 57, 31-46.
Lazaretou, S. and G. Palaiodimos (2025), "The long record of inflation shocks in Greece: drivers and impacts", Bank of Greece, *Economic Bulletin*, No. 61, 63-86.
Le, T.H., A.T. Le and H.C. Le (2021), "The historic oil price fluctuation during the Covid-19 pandemic: what are the causes?", *Research in International Business and Finance*, 58, 101489.
Nikiforos, M., V. Missos, C. Pierros and N. Rodousakis (2025), "The café economy: structural transformation in Greece in the wake of austerity and 'reforms' ", London School of Economics, Hellenic Observatory Discussion Papers on Greece and Southeast Europe, GreeSE Paper No. 212, October.
Papageorgiou, D. and A. Rizos (2024), "Inflation dynamics and the role of domestic factors", Bank of Greece, *Economic Bulletin*, No. 60, 7-26.
World Travel & Tourism Council (WTTC) (2025), "Greece 2025 Annual Research: Key Highlights", 23 June.

WORKING PAPERS (JULY – DECEMBER 2025)

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 texts is available on the Bank of Greece's website (www.bankofgreece.gr).

CONTENTS

The effectiveness of macroprudential policies in curbing operational risk exposures

Working Paper No. 344
Panagiotis Th. Konstantinou, Anastasios Rizos and Artemis Stratopoulou

Banks' focus nowadays shifts to non-financial risks, since credit and market risks are now well understood and under better control. The authors investigate whether macroprudential policy, designed to enhance financial system resilience, can mitigate or magnify losses stemming from such risks. To do so, they use a panel dataset on eurozone countries between 2009-18 and examine the dynamic path of operational risk exposures in response to tightening and loosening events of various macroprudential policies. The results show that the tightening of specific measures, i.e. loan loss provisions, liquidity and loan to value, increases operational losses, whereas the loosening of measures, such as conservation buffers, loan loss provisions and debt service to income, leads to a reduction in operational losses. The results remain robust when the authors employ the inverse probability weighted estimator.

Details matter: loan pricing and transmission of monetary policy in the euro area

Working Paper No. 345
Kārlis Vilerts, Sofia Anyfantaki, Konstantīns Beņkovskis, Sebastian Bredl, Massimo Giovannini, Florian Matthias Horky, Vanessa Kunzmann, Tibor Lalinsky, Athanasios Lampousis, Elizaveta Lukmanova, Filippos Petroulakis and Klāvs Zutis

Does the maturity of the relevant risk-free rate influence the strength of monetary policy pass-through to interest rates on new loans? To address this question, the authors present novel empirical evidence on lending practices across all euro area countries, using AnaCredit data covering nearly seven million new loans issued to non-financial corporations in 2022-23. They document substantial variation in (a) the prevalence of fixed- vs floating-rate loans, (b) rate fixation periods and (c) reference rates. This variation results in lending rates being exposed to different segments of the risk-free rate yield curve which, in turn, influences their sensitivity to monetary policy changes. The authors show that loans linked to shorter-maturity risk-free rates experience more pronounced monetary pass-through. Importantly, this effect is not purely mechanical, as part of the effect is offset by adjustments in the premium, revealing previously less-explored heterogeneity in the pass-through to lending rates.

Exploring the role of technological innovation and fertility on energy intensity: is a fresh narrative unfolding?

Working Paper No. 346
George Hondroyiannis, Evangelia Papapetrou and Pinelopi Tsalaporta

Amid the transition to sustainable energy systems, understanding the drivers of energy intensity is essential for informed policymaking. This paper investigates the influence of technological innovation and demographic dynamics on energy intensity across 27 OECD countries from 1990 to 2022, offering novel policy insights. Employing a multifaceted empirical

strategy, the authors utilise dynamic common correlated effects (DCCE) estimators to address cross-sectional dependence and slope heterogeneity, both salient features of their dataset characterised by interdependent units. The empirical findings indicate that technological innovation significantly reduces energy intensity through improvements in efficiency and the adoption of cleaner technologies. Economic openness and GDP per capita are linked to lower energy intensity, underscoring the role of trade and wealth in driving energy efficiency. Conversely, higher fertility rates are linked to increased energy intensity, reflecting population growth and greater demand for energy-intensive services. Quantile regressions uncover heterogeneity across the distribution, with stronger effects of technological innovation and credit access at specific quantiles. The authors find that fertility positively influences energy intensity across most of the distribution, with the effect diminishing at the upper quantiles – highlighting the fact that higher fertility is associated with increased energy consumption primarily at lower and middle levels of energy intensity. Promoting technological innovation and financial access, while accounting for demographic pressures, is essential for achieving sustainable energy transitions in developed economies.

Decoding climate-related risks in sovereign bond pricing: a global perspective

Working Paper No. 347
Sofia Anyfantaki, Marianna Blix Grimaldi, Carlos Madeira, Simona Malovana and Georgios Papadopoulos

Climate change poses a significant risk to financial stability by impacting sovereign credit risk. Quantifying the exact impact is difficult, as climate risk encompasses different components – transition risk and physical risk – with some of these, as well as the policies to address them, playing out over a long-time horizon. In this paper, the authors use a large panel of 52 developed and developing economies over two decades to empirically investigate the extent to which climate risks influence sovereign yields. The results of a panel regression analysis show that transition risk is associated with higher sovereign yields, with the effect more pronounced for developing economies and for high-emitting countries after the Paris Agreement. In contrast, high-temperature anomalies do not appear to be priced-in sovereign borrowing costs. At the same time, countries with high levels of debt tend to record higher sovereign yields as acute physical risk increases. In the medium term, using local projections, the authors find that sovereign yields respond significantly but also differently to different types of disaster caused by climate change. They also explore the non-linear effects of weather-related natural disasters on sovereign yields and find a striking contrast in the impact of climate shocks on sovereign borrowing costs, according to income level and fiscal space when the shock hits.

Assessing the impact of unconventional monetary policy on long-term interest rates in the euro area with the use of a macro-finance model

Working Paper No. 348
Sophocles N. Brissimis and Evangelia A. Georgiou

This paper draws on the macro-finance model developed in Brissimis and Georgiou (2022), which exploits the expectations hypothesis with time variation in the term premium, to evaluate the effects of unconventional monetary policy on long-term interest rates in the

euro area. The empirical specification of the model provides an overall excellent fit to the data of the euro area. To assess the effects of quantitative easing, the authors employ stock measures of this variable derived from the liabilities side of the Eurosystem balance sheet. They provide estimates for both short-run and long-run effects, the latter resulting from sustained increases in central bank liabilities. The empirical results suggest that stronger effects on long-term rates arise from broader measures of quantitative easing, although these effects seem to have weakened during the negative interest rate period.

Policy interventions to mitigate the long-run costs of Brexit

Working Paper No. 349
George Economides, James Malley, Apostolis Philippopoulos and Anastasios Rizos

This paper examines the long-term macroeconomic impacts of Brexit on the UK economy employing a dynamic general equilibrium model that incorporates endogenous firm entry, price markups and market competition. By integrating the trade frictions introduced by Brexit, the model explains how increased trade costs have altered firm behaviour, market structure and broader economic performance. The authors assess a range of policy responses, from theoretically optimal but practically difficult tax-subsidy schemes to more realistic measures aimed at reducing firm entry barriers, encouraging private and public investment and subsidising labour costs. The findings underscore the critical role of policies that can most directly influence firm creation, investment and competition in addressing the structural challenges Brexit has introduced.

A new proposal for forecasting inflation in the eurozone: a global model

Working Paper No. 350
Georgios Angelopoulos, Zacharias Bragoudakis, Dimitrios Dimitriou and Alexandros Tsioutsios

This paper evaluates the forecasting performance of the relatively new machine learning Global Unrefined (hereafter "GlobalUN") model with respect to inflation in the eurozone. In this global pooled neural network framework, the authors use a quarterly panel dataset covering 20 euro area countries (2001Q1-2025Q1) together with the EA-20 aggregate, which includes key variables such as HICP, energy prices, food and others. Thus, the network remains simple yet flexible enough to absorb heterogeneity across countries. The contribution of this work is crucial, since monetary policy in the eurozone hinges on accurate inflation forecasts (i.e. as ECB decisions target expected rather than current inflation). The paper's findings are crystal clear. The GlobalUN model outperforms all other benchmark models, including the advanced machine learning XGBoost model, in almost all eurozone countries and horizons (i.e. the NAÏVE model seems to perform better in a few cases). These results are useful for policymakers, central banks and fiscal institutions, as they should take the GlobalUN model into account as part of their arsenal.

Bond portfolio rebalancing during dash-for-cash events: evidence from the COVID-19 outbreak

Working Paper No. 351
Stefanos Delikouras, Athanasios Kontinopoulos, Dimitris Malliaropulos and Petros Migiakis

Using a granular dataset of bond fund holdings at the security level, the authors examine how non-bank financial intermediaries respond to extreme liquidity crises like the COVID-19 shock of March 2020. U.S. funds primarily liquidated high-quality bonds, like Treasuries, while euro area funds sold across the rating spectrum. Despite these large liquidations, portfolio allocations across ratings and sectors remained stable, suggesting proportional rebalancing to maintain investment mandates. Funds with larger shares of highly-rated bonds sold lower-rated bonds less aggressively and experienced smaller losses. The results highlight the importance of portfolio composition for the resilience of market-based finance and the transmission of monetary policy.

Bank concentration and asymmetric interest rate spreads pass through: evidence from selected euro area countries

Working Paper No. 352
Zacharias Bragoudakis and Alexandros Tsioutsios

The reaction of bank retail interest rates and deposit rates to shifts in interbank rates is influenced by the structural characteristics of the financial and banking system, as well as by the degree of competition within the banking sector. A recursive momentum threshold autoregressive asymmetric error correction model (Recursive MTAR-AECM) with non-linear adjustment is used to explore the existence of asymmetries in the adjustment of lending-deposits spreads to deviations in interbank rates for a group of selected euro area countries. The findings provide evidence in favour of asymmetric adjustment in interest rate spreads and the asymmetric adjustment associated with the market power of the banking sector concentration explanation of interest rate rigidity.

Doing matters more than knowing: evidence from environmental preferences

Working Paper No. 353
Panayiotis C. Andreou, Sofia Anyfantaki, Konstantinos Dellis and Christos A. Makridis

This paper examines the relation between financial knowledge proficiency, financial behaviours and pro-environmental attitudes, focusing on the willingness to pay for eco-friendly products. Individuals who exhibit stronger financial behaviours, such as saving for the future and making considered purchases, show significantly higher levels of environmental concern and are more likely to engage in sustainable consumption. The results also show that financial knowledge proficiency does not directly predict pro-environmental attitudes; rather, its influence operates indirectly by fostering sound financial behaviours. The study highlights the importance of financial habits in shaping long-term, environmentally responsible decision-making and provides insights for designing policies that integrate financial capability with sustainability initiatives to promote eco-conscious consumer practices.

Natural disasters and the effects of reconstruction expenditure on output

Working Paper No. 354
Christos Chrysanthakopoulos and Athanasios Tagkalakis

Using a panel of 116 advanced, emerging market and developing economies over the period 1990-2022, the authors examine the direct effects of natural disasters on economic activity and public finances and the medium-term effects of post-natural disaster reconstruction, through public spending, on economic activity. As anticipated, they find that natural disasters negatively affect both economic activity and public finances with the output effects being more pronounced in the case of extreme vis-à-vis major natural disasters. Employing a panel local projection methodology combined with an instrumental variable approach, and after conducting a series of robustness checks to address endogeneity concerns, the results reveal that reconstruction spending can serve as an effective driver of medium-term growth. Specifically, a 1% increase in real cyclically-adjusted government expenditure following an extreme natural disaster leads to a 2.49% increase in real output five years after the shock. Moreover, the effects of reconstruction spending are found to be stronger in countries with lower public debt, lower trade openness, higher financial development, fixed exchange rate regimes, emerging market rather than advanced or least developed economies, countries with higher old-age dependency ratios and lower agricultural or tourism dependence.

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 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.
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Dellas Harris, "ECB monetary policy strategy and macroeconomic volatility in Greece", No. 13, July 1999.
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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.
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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 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.
Demenagas 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 Theodoros, "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 Theodoros and Zografakis Stavros, "The redistributional 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 Nicholas, "Adjusting to the single monetary policy of the ECB", No. 25, August 2005.
Mitrakos Theodoros, Simigiannis Georgios and Tzamourani Panagiota, "Indebtedness of Greek households: evidence from a survey", No. 25, August 2005.
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Mitrakos Theodoros 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.
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Dimitropoulou Dimitra, Koutsomanoli-Filippaki Anastasia, Charalambakis Evangelos and Aggelis Georgios, "The financing of Greek enterprises before and during the crisis", No. 39, July 2014.
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