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# Trois essais sur la prudence budgétaire et l'ancrage de la politique monétaire : politique économique et évaluation d'impact

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# Résumé général

Cette thèse explore l'impact des règles budgétaires sur la stabilité budgétaire et l'inflation à travers une analyse empirique fondée sur des données macroéconomiques et des méthodologies économétriques avancées. Elle s'attache à déterminer dans quelle mesure ces règles favorisent la discipline budgétaire, l'inflation et l'ancrage des anticipations d'inflation, tout en tenant compte des spécificités institutionnelles et économiques des pays étudiés.

L'analyse se déploie à différentes échelles. D'abord, en se focalisant sur les pays de l'Union Européenne, elle examine l'effet des engagements et de l'application des règles budgétaires sur la stabilité des finances publiques entre 1995 et 2022. Les résultats indiquent que si les règles limitant la balance budgétaire et le déficit ont un effet significatif sur l'ajustement budgétaire, celles relatives à la dette et aux dépenses ne garantissent pas nécessairement une consolidation budgétaire durable. Ces conclusions reposent sur des techniques économétriques rigoureuses, notamment une approche en différence-en-différences hétérogène et des instruments exploitant la diffusion régionale des politiques budgétaires.

L'étude s'élargit ensuite à un échantillon de 79 pays, comprenant des économies avancées, émergentes et en développement, afin d'évaluer l'effet des règles budgétaires sur l'inflation. Les résultats mettent en évidence une relation différenciée selon la nature et le degré de contrainte des règles budgétaires, mais aussi en fonction du contexte économique et institutionnel. Si la mise en place de règles budgétaires strictes et bien appliquées tend à stabiliser l'inflation, leur efficacité

demeure conditionnée par la qualité institutionnelle, le régime de change et le niveau de développement du pays.

Enfin, le troisième chapitre s'intéresse à l'impact des règles budgétaires sur l'ancrage des anticipations d'inflation des ménages, mobilisant des données microéconomiques et macroéconomiques. Elle révèle que des règles budgétaires bien conçues et rigoureusement appliquées renforcent la crédibilité des politiques budgétaires et monétaires, contribuant ainsi à la stabilité économique.

Cette thèse apporte une contribution originale en combinant une approche comparative entre les pays de l'UE et une perspective élargie intégrant des économies émergentes et en développement. Elle souligne que l'efficacité des règles budgétaires ne dépend pas uniquement de leur existence, mais aussi de leur mise en œuvre effective, de la robustesse institutionnelle et de l'environnement macroéconomique. À l'heure où les cadres budgétaires font l'objet d'importants débats, notamment dans le contexte de la réforme du Pacte de Stabilité et de Croissance, ces résultats éclairent la nécessité de concevoir des règles flexibles et crédibles, adaptées aux réalités économiques et permettant des ajustements contracycliques.

**Mots-clés:** Règles budgétaires; Stabilité budgétaire; Inflation; Anticipations d'inflation; Évaluation des politiques publiques.

# Overall summary

This dissertation explores the impact of fiscal rules on budgetary stability and inflation through an empirical analysis based on macroeconomic data and advanced econometric methodologies. It seeks to determine the extent to which these rules promote fiscal discipline, influence inflation, and anchor inflation expectations, while accounting for the institutional and economic specificities of the countries studied.

The analysis in this dissertation is conducted at different levels. First, by focusing on European Union countries, it assesses the effect of fiscal rule commitments and enforcement on fiscal stability between 1995 and 2022. The findings indicate that while budget balance rules and deficit rules significantly contribute to fiscal adjustment, debt and expenditure rules do not necessarily ensure sustainable fiscal consolidation. These conclusions rely on rigorous econometric techniques, including a heterogeneous difference-in-differences approach and instrumental variables exploiting the regional diffusion of fiscal policies.

The study then expands its scope to a sample of 79 countries, encompassing advanced, emerging, and developing economies, to evaluate the effect of fiscal rules on inflation. The results reveal a differentiated relationship depending on the nature and stringency of the rules, as well as the broader economic and institutional context. While well-designed and strictly enforced fiscal rules stabilize inflation, their effectiveness remains contingent on institutional quality, exchange rate regimes, and economic development.

Finally, the third chapter examines the influence of fiscal rules on the anchoring of household inflation expectations, leveraging both microeconomic and macroeconomic data. It finds that well-structured and strictly enforced fiscal rules strengthen the credibility of fiscal and monetary policies, contributing to economic stability.

This dissertation contributes by combining a comparative approach between EU countries with a broader perspective that includes emerging and developing economies. It highlights that the effectiveness of fiscal rules is not solely determined by their existence but also by their actual implementation, institutional robustness, and macroeconomic environment. At a time when fiscal frameworks are undergoing significant debate, particularly regarding the reform of the Stability and Growth Pact, these findings underscore the need for flexible and credible fiscal rules that adapt to economic realities while allowing for countercyclical adjustments.

**Keywords:** Fiscal rules; Fiscal stability; Inflation; Inflation expectations; Public policy evaluation.

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# Introduction Générale

## 0.1 Contexte et motivation

### Défis macroéconomiques mondiaux et régionaux

Le paysage économique mondial actuel est le résultat d'une succession de chocs et de réponses politiques ayant profondément transformé les enjeux auxquels font face les décideurs. La crise du COVID-19 a nécessité des plans de relance massifs et une mobilisation budgétaire exceptionnelle, entraînant une hausse significative de la dette publique. Si ces mesures ont permis d'éviter une dépression économique, elles ont également accru les vulnérabilités budgétaires et alimenté l'inflation, déjà exacerbée par les perturbations des chaînes d'approvisionnement. À cela se sont ajoutées des tensions géopolitiques majeures, notamment la guerre en Ukraine à travers les crises énergétiques, qui ont amplifié les pressions inflationnistes et accru les contraintes budgétaires.

Dans ce contexte, les gouvernements doivent concilier stabilisation de la dette publique et maîtrise de l'inflation. Or, ces objectifs peuvent entrer en conflit : une consolidation budgétaire trop brutale peut renforcer les tensions inflationnistes si la hausse des prélèvements ou la réduction des dépenses publiques entraîne un renchérissement des coûts ou une contraction de l'offre. Par ailleurs, une trajectoire budgétaire perçue comme incertaine par les marchés financiers peut faire grimper les taux d'intérêt, alimentant ainsi des pressions inflationnistes supplémentaires. La gestion actuelle de ces défis impose donc une stratégie équilibrée, conciliant discipline budgétaire et soutien à la croissance.

L'évolution de la dette et de l'inflation est au cœur des préoccupations économiques, car ces enjeux conditionnent la stabilité macroéconomique et financière. Premièrement, des déficits persistants menacent la solvabilité des États et peuvent générer des pressions inflationnistes qui freinent la croissance. Deuxièmement, une inflation élevée érode le pouvoir d'achat des ménages, alourdit les coûts de production des entreprises et accroît l'incertitude quant à la capacité

des banques centrales à restaurer une trajectoire d'inflation stable. Enfin, un endettement excessif en réduisant l'espace budgétaire (Apeti *et al.*, 2021) et risque d'alimenter des anticipations inflationnistes défavorables.

Les crises récentes ont accentué ces défis et renforcé les tendances haussières de l'inflation et de la dette publique. La crise financière de 2008-2009 avait déjà conduit à une augmentation significative de l'endettement public dans de nombreux pays, principalement en raison des plans de relance budgétaire déployés pour soutenir l'économie. Toutefois, le contexte était alors marqué par des taux d'intérêt historiquement bas, voire proches de zéro, ce qui rendait la dette pratiquement gratuite et minimisait les préoccupations sur sa soutenabilité (Blanchard, 2019). En revanche, la situation post-COVID est fondamentalement différente : la combinaison d'une inflation élevée et d'un endettement public massif a entraîné une normalisation rapide de la politique monétaire, augmentant ainsi le coût de la dette et réduisant les marges de manœuvre budgétaires. Cela pose un défi majeur, nécessitant une approche privilégiant d'abord des ajustements budgétaires ciblés avant un éventuel durcissement monétaire, afin d'éviter une contraction économique excessive (Barro et Bianchi, 2023; Anderson et Leeper, 2023). Par ailleurs, la théorie budgétaire des prix suggère que l'inflation post-COVID est en grande partie liée aux déséquilibres budgétaires, renforçant ainsi l'argument en faveur d'une discipline budgétaire accrue avant de recourir à des hausses de taux supplémentaires.

Les mesures exceptionnelles de soutien à l'économie ont mécaniquement aggravé l'endettement et alimenté des tensions inflationnistes à mesure que l'activité redémarrait. À peine cette crise surmontée, la guerre en Ukraine a aggravé ces déséquilibres en perturbant les marchés de l'énergie et des matières premières, déclenchant une nouvelle vague inflationniste et forçant les banques centrales à relever leurs taux directeurs. Cette dynamique a conduit à une envolée de la dette mondiale. Selon le FMI, celle-ci s'élevait à 97 000 milliards de dollars en 2023 et devrait franchir les 100 000 milliards de dollars en 2024, atteignant 93% du PIB

mondial contre 83% en 2019, soit une hausse de 10 points de pourcentage en seulement quatre ans.

Cette envolée de la dette est en grande partie le résultat des politiques budgétaires exceptionnelles mises en place pendant la crise du COVID-19 sous l'approche du "*quoi qu'il en coûte*". Cette stratégie, adoptée par de nombreux gouvernements, visait à soutenir l'économie coûte que coûte en mobilisant des dépenses massives pour éviter un effondrement de l'activité, protéger les entreprises et préserver l'emploi. Si ces mesures ont permis de limiter les effets récessifs de la pandémie, elles ont aussi creusé des déficits budgétaires historiques, repoussant à plus tard la question de leur financement.

Aujourd'hui, le temps est venu d'assumer le coût de ces interventions. Face à une dette qui atteint des niveaux records et à des conditions de financement qui se durcissent sous l'effet de la remontée des taux d'intérêt, les gouvernements sont contraints d'adopter des politiques de rigueur budgétaire pour stabiliser leurs finances publiques. Cela passe par des mesures d'ajustement, allant de la réduction des dépenses publiques à l'augmentation des recettes fiscales, dans un contexte où l'équilibre entre consolidation budgétaire et soutien à l'activité reste fragile.

Cependant, cette transition vers une discipline budgétaire pose un défi majeur : une consolidation excessive et mal calibrée pourrait freiner la reprise économique et aggraver certaines tensions inflationnistes, notamment si la hausse des impôts ou la baisse des dépenses publiques pénalise la production et l'investissement. Dès lors, l'enjeu pour les décideurs est de mettre en place des stratégies d'assainissement budgétaire progressives et adaptées aux spécificités économiques de chaque pays, tout en évitant un choc récessif qui compromettrait la croissance à long terme.

Face à ces défis, les gouvernements et les banques centrales doivent trouver un équilibre délicat entre soutenir la croissance économique qui peine à retrouver le

niveau pré-crise, lutter contre l'inflation et assurer la viabilité à long terme des finances publiques.

Pour les décideurs, trouver et maintenir cet équilibre entre croissance économique et rigueur budgétaire est une tâche complexe, alors que la dette publique et l'inflation continuent de peser sur les perspectives économiques globales. Dans les faits, cela nécessite une réponse coordonnée et stratégique, car une bonne utilisation des instruments de politique budgétaire et monétaire peut garantir la résilience des économies face à de futures crises.

## Interaction entre politique budgétaire et monétaire

Traditionnellement analysée sous l'angle de la politique monétaire, l'inflation trouve également ses racines dans la politique budgétaire. En effet, la politique budgétaire influence les anticipations en termes d'inflation des agents économiques et dans certaines conditions conduit les banques centrales à ajuster leurs politiques en conséquence. Cette interdépendance entre la politique monétaire et budgétaire a été soulignée par Sargent et Wallace (1981) dans leur analyse de la "dominance fiscale", qui montre comment une dette publique excessive peut limiter l'indépendance des banques centrales dans la lutte contre l'inflation. Ils stipulent que dans certains cas, la politique monétaire ne peut pas à elle seule contrôler l'inflation si la politique budgétaire est en situation de « dominance fiscale ». En d'autres termes, si un gouvernement a une dette élevée qu'il finance en partie par la création monétaire, la banque centrale perd son indépendance pour stabiliser les prix. Ainsi, selon Sargent et Wallace (1981), lorsque les finances publiques sont en difficulté, la politique monétaire est contrainte par la politique budgétaire : même si la banque centrale souhaite limiter l'inflation, elle est contrainte d'imprimer de la monnaie pour financer le déficit public, générant ainsi de l'inflation. Les auteurs décrivent ceci dans un jeu de poule mouillé où la poule mouillée est toujours la banque centrale

Par ailleurs, la théorie fiscale du niveau des prix (FTPL), avancée par des chercheurs comme Leeper (1991), Sims (1994) et Woodford (1995), élargit ce cadre en affirmant que l'inflation est en partie conditionnée par la soutenabilité des finances publiques, traduisant ainsi une origine budgétaire des pressions inflationnistes. La FTPL postule que l'inflation est en partie déterminée par l'état des finances publiques, en fonction de la soutenabilité des niveaux de dette publique et des attentes concernant les futures politiques budgétaires. Selon cette théorie, si les gens pensent que l'État ne pourra rembourser sa dette qu'en imprimant plus de monnaie ou en augmentant fortement les impôts (ce qui peut être difficile), ils anticipent une perte de valeur de la monnaie. Cela pousse les prix à la hausse et entraîne de l'inflation.

Ces théories montrent que l'inflation peut avoir une origine budgétaire, où une dette publique excessive génère des pressions inflationnistes. Mais l'inflation peut aussi, en retour, aggraver la contrainte budgétaire. En réduisant la valeur réelle de la dette, elle peut sembler favorable aux États endettés, mais elle renchérit le coût du financement futur, de plus cela pousse les investisseurs à opter pour des obligations libellés en monnaie étrangère pour se protéger contre l'utilisation de l'inflation pour réduire la valeur de la dette impliquant ainsi des soucis décrit comme "péché originel" ("original sin") (Eichengreen et Hausmann, 1999; Eichengreen *et al.*, 2003).

Ainsi, le contrôle de l'inflation repose sur une coordination efficace entre politique budgétaire et politique monétaire (Sims, 2011; Cochrane, 2022). Une politique budgétaire responsable, limitant le recours excessif à la dette, est essentielle pour garantir l'indépendance et l'efficacité de la politique monétaire (Leeper et Leith, 2016).

Bien que l'inflation actuelle soit le résultat de divers facteurs, les politiques budgétaires expansionnistes mises en œuvre pour atténuer les effets économiques de

la pandémie de COVID-19 ont joué un rôle significatif en stimulant la demande (Blanchard, 2020; Summers, 2021). Toutefois, cette stimulation s'est accompagnée de pressions inflationnistes et d'une augmentation de l'endettement public, soulevant des enjeux en matière de soutenabilité budgétaire et de stabilité économique. Dans ce contexte, la mise en place de règles budgétaires strictes constitue un levier essentiel pour contenir l'inflation et garantir l'équilibre des finances publiques à long terme.

## Outils de contrôle de la dette publique et de l'inflation

Face aux défis économiques actuels, le contrôle de la dette publique et de l'inflation repose sur un ensemble d'outils économiques qui doivent être mobilisés de manière cohérente pour assurer la stabilité macroéconomique. Selon la règle de Tinbergen, chaque objectif économique doit être associé à un instrument spécifique pour être efficacement atteint. Une approche qui mobilise simultanément plusieurs leviers (monétaire, budgétaire, fiscal) sans coordination adéquate risque non seulement d'engendrer des contradictions, mais aussi de rigidifier excessivement l'action publique, réduisant ainsi sa réactivité face aux chocs économiques.

Historiquement, la politique monétaire a été le principal outil de stabilisation de l'inflation. Par l'ajustement des taux d'intérêt et les interventions sur les marchés financiers, les banques centrales ont cherché à contrôler la dynamique des prix. Le ciblage d'inflation est un cadre relativement récent prisé par beaucoup de pays dont la première adoption vient de la Nouvelle-Zélande en 1990 (Bernanke *et al.*, 1999; Woodford, 2003).

Toutefois, l'efficacité de la politique monétaire à elle seule est remise en question dans un contexte où l'inflation et la dette publique sont profondément interconnectées. La gestion de la dette relève principalement de la politique budgétaire, qui vise à maîtriser les déficits publics et à garantir la soutenabilité des finances

publiques.

Cependant, les crises économiques successives ont souligné les limites des approches traditionnelles et la nécessité d'un cadre plus intégré pour répondre aux nouvelles dynamiques inflation-dette.

**Besoin d'approches intégrées : nouvelles dynamiques inflation-dette**

Les analyses récentes, notamment celles de Blanchard et Bernanke (2023), montrent que l'inflation post-pandémique résulte d'une combinaison de facteurs, tels que des perturbations de l'offre, des hausses des prix de l'énergie et des tensions sur le marché du travail. En complément, les évidences issues de la Théorie Fiscale du Niveau des Prix renforcent la nécessité de règles budgétaires pour contenir l'inflation. Si les agents économiques perçoivent un déficit public non soutenable et anticipent une monétisation de la dette future, cela peut générer des pressions inflationnistes indépendamment des décisions de la banque centrale. Ces éléments suggèrent que la politique monétaire seule, en ajustant les taux d'intérêt, pourrait ne pas suffire à maîtriser l'inflation actuelle. Une approche intégrée, combinant des mesures monétaires et budgétaires, est donc nécessaire pour assurer une stabilité macroéconomique durable.

Les politiques monétaires actuelles, centrées sur les taux d'intérêt, semblent insuffisantes face à la complexité des causes de l'inflation post-pandémique. Une coordination étroite entre les politiques monétaires et budgétaires est essentielle pour répondre efficacement à cette situation.

Dans ce contexte, les règles budgétaires apparaissent comme des instruments de choix, non seulement pour leur popularité croissante mais surtout pour leur capacité à imposer une discipline budgétaire qui pourrait stabiliser la dette publique sans compromettre les efforts de désinflation des banques centrales. Les règles budgétaires sont des limites numériques imposées aux États sur leurs grands agré-

gats budgétaires. Elles ont pour objectif d'aider à une gestion efficiente des finances publiques et des niveaux de dette pour assurer leur soutenabilité sur le long terme. On en dénombre quatre grands types à savoir : les règles d'équilibre budgétaire, les règles de dette, les règles de dépenses et les règles de revenus. Les règles de balance budgétaire fixent des limites numériques au solde budgétaire, afin de le maintenir dans une fourchette déterminée. Les règles de dette imposent des limites au niveau de la dette publique, en veillant à la maintenir sous un certain seuil fixe. Les règles de dépenses limitent la croissance des dépenses publiques, souvent en fixant des limites à leur augmentation d'une année à une autre et les règles de recettes sont fixées comme des objectifs à atteindre pour les revenus fiscaux.

**Les règles budgétaires et leur rôle dans le contrôle de la dette et de l'inflation**

Dans un environnement où la soutenabilité des finances publiques est un enjeu central, les règles budgétaires peuvent être considérées comme un instrument clé de la gouvernance économique. Elles visent à encadrer la politique budgétaire en imposant des contraintes explicites aux États, afin de garantir une trajectoire de dette maîtrisée et d'éviter les déséquilibres macroéconomiques susceptibles de compromettre la stabilité financière.

L'importance de ces règles repose sur un principe fondamental : sans cadre contraignant, la politique budgétaire est sujette à des pressions politiques et à des cycles d'endettement récurrents. L'histoire économique a montré que les gouvernements ont souvent tendance à accumuler des déficits structurels, reportant ainsi le coût de l'ajustement budgétaire aux générations futures. Cette dynamique peut, à long terme, générer des tensions sur les taux d'intérêt, affaiblir la crédibilité budgétaire et réduire l'efficacité de la politique monétaire dans la gestion de l'inflation.

Ces règles ne se substituent pas aux décisions budgétaires des gouvernements,

mais elles en délimitent les marges de manœuvre, assurant ainsi une cohérence intertemporelle dans la gestion des comptes publics. Elles sont généralement inscrites dans des cadres législatifs ou constitutionnels, garantissant ainsi leur respect et leur application.

Les règles budgétaires adoptées à travers le monde varient selon leur degré de rigidité et leur champ d'application. Toutefois, elles partagent une logique commune : imposer une discipline budgétaire tout en laissant une flexibilité suffisante pour s'adapter aux cycles économiques (Debrun et Kapoor, 2010; Bova *et al.*, 2014).

Quel que soit leur mode d'application, l'objectif commun de ces règles est d'assurer une stabilité à long terme des finances publiques, en empêchant les dérives susceptibles d'affaiblir la croissance et d'accroître les tensions inflationnistes.

Les règles budgétaires jouent un rôle fondamental dans le maintien de l'équilibre macroéconomique, en limitant les déficits excessifs et en garantissant une gestion prudente de la dette publique. Elles répondent à plusieurs enjeux majeurs.

D'abord, elles préservent l'efficacité de la politique monétaire en évitant qu'une dette publique excessive ne contraigne les banques centrales à adopter des politiques monétaires accommodantes pour contenir les coûts d'emprunt des États. Lorsqu'un gouvernement accumule une dette trop importante, les marchés exigent des taux d'intérêt plus élevés pour financer ses déficits, ce qui peut entraîner une hausse du coût du capital pour l'ensemble de l'économie. En limitant ces effets, les règles budgétaires permettent à la politique monétaire de se concentrer sur son objectif principal : la stabilité des prix.

Ensuite, ces règles contribuent à réduire la volatilité budgétaire en évitant des ajustements brutaux des finances publiques. Lorsque les déficits sont encadrés et que la dette suit une trajectoire soutenable, les États disposent de marges de manœuvre pour faire face aux crises économiques sans compromettre leur solv-

abilité. Cela leur permet d'adopter des politiques budgétaires contracycliques plus efficaces, sans risquer de provoquer une crise de confiance.

Enfin, elles permettent de prévenir les biais électoralistes souvent observés dans la gestion des finances publiques (Drazen, 2002; Wyplosz, 2012). Sans contrainte budgétaire, les gouvernements peuvent être incités à accroître les dépenses publiques avant une élection pour stimuler artificiellement la croissance, au détriment de la soutenabilité budgétaire. En fixant des règles claires, ces comportements opportunistes sont limités, réduisant le bais de déficit et donc un accroissement de la dette.

Si les règles budgétaires sont largement reconnues pour leur contribution à la discipline budgétaire, leur mise en œuvre n'est pas exempte de difficultés. Lorsqu'elles sont trop rigides, elles risquent de limiter la capacité des gouvernements à répondre efficacement aux chocs économiques. Une restriction budgétaire excessive en période de ralentissement économique peut aggraver la récession et ralentir la reprise. À l'inverse, des règles trop souples ou facilement contournables peuvent perdre en crédibilité et ne pas remplir leur rôle stabilisateur.

L'enjeu est donc de trouver un équilibre entre discipline et flexibilité, en intégrant des mécanismes d'ajustement permettant de prendre en compte les fluctuations conjoncturelles tout en assurant une trajectoire budgétaire cohérente à long terme. Certains dispositifs, comme les règles budgétaires structurelles, qui ajustent les objectifs en fonction du cycle économique, offrent une réponse partielle à cette problématique en permettant des écarts temporaires tout en garantissant un retour progressif vers l'équilibre budgétaire.

Un autre défi réside dans l'application effective des règles et leur crédibilité. L'existence d'une règle budgétaire ne garantit pas son respect : des stratégies de contournement peuvent émerger, notamment par le recours à des dépenses hors budget ou des manipulations comptables. L'efficacité de ces règles repose donc

sur des mécanismes de surveillance rigoureux et des sanctions crédibles en cas de non-respect.

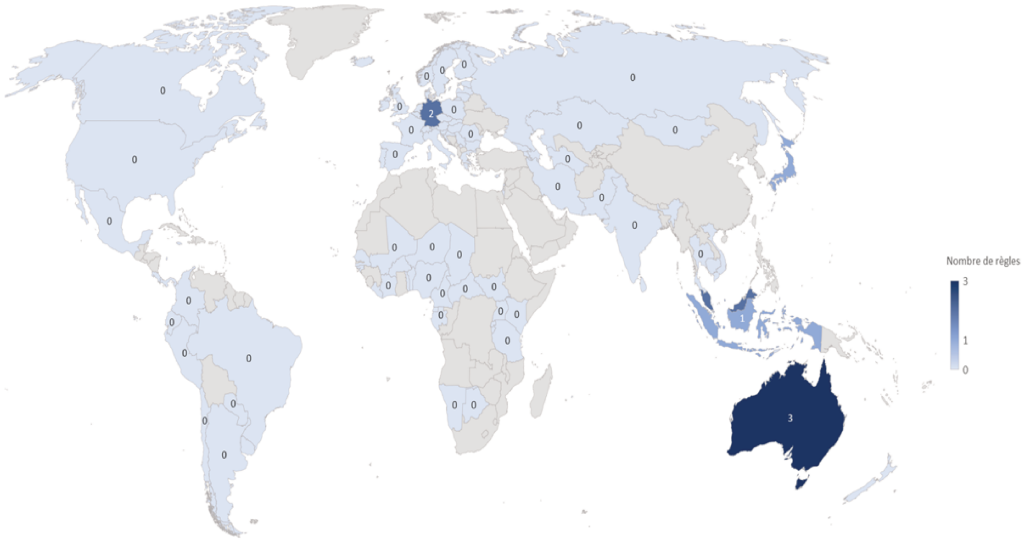
Dans l'ensemble, les règles budgétaires ne doivent pas être perçues comme une contrainte rigide, mais comme un outil stratégique permettant de concilier discipline et flexibilité. Elles représentent ainsi un cadre structurant fondamental pour les politiques économiques, assurant une gestion prudente des finances publiques tout en laissant la place à des ajustements en fonction du cycle économique.

## 0.2 Faits stylisés et observations empiriques

Depuis les années 1990, l'adoption des règles budgétaires a connu une expansion mondiale et elles se sont multipliées même au sein des pays, devenant des instruments incontournables de discipline budgétaire. En 1985, alors que seuls quelques pays comme l'Australie, l'Allemagne et le Japon ont adopté les règles budgétaires, on se retrouve près de 40 ans plus tard, en 2021 avec plus de 100 pays qui ont mis en place au moins une règle budgétaire (Figures 0.1 et 0.2). À travers le monde, elles ont été adoptées pour instaurer des limites claires aux déficits publics et mieux contrôler la dette. Cette expansion d'adoption de la règle budgétaire est surtout remarquable en Europe. L'Union européenne a par exemple institutionnalisé ces règles via le Pacte de Stabilité et de Croissance (PSC), imposant des plafonds stricts aux déficits et à la dette pour ses membres. Dans les pays en développement, ces règles renforcent la crédibilité des politiques budgétaires et facilitent l'accès aux financements internationaux. Selon la base de données du FMI, parmi ces types de règles en vigueur, la plus adoptée dans toutes ces économies en 2021 est la règle d'équilibre budgétaire (93 pays), suivie de la règle de dette (85 pays). La règle des dépenses arrive en troisième position avec 55 pays l'ayant adopté et enfin la règle de revenu avec seulement 17 pays l'ayant mise en place. Cela peut s'expliquer par le fait que les décideurs publics sont plus focalisés

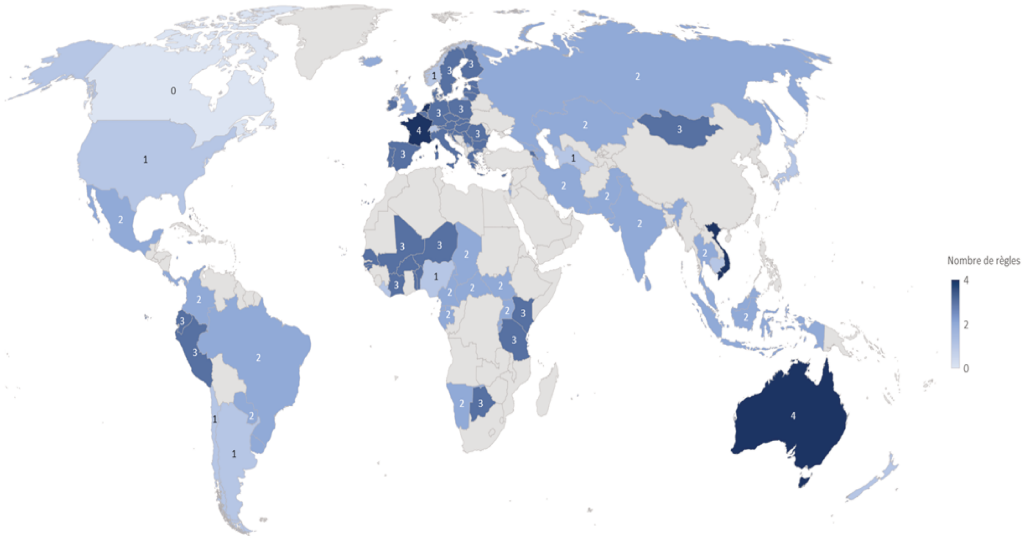
sur l'équilibre budgétaire (balance primaire) que les autres agrégats budgétaires.

Figure 0.1: Nombre de règles budgétaires adoptées dans le monde, par pays en 1985




Source : Calculs de l'auteur avec les données de la base des règles budgétaires du FMI (Davoodi *et al.*, 2022)

Figure 0.2: Nombre de règles budgétaires adoptées dans le monde, par pays en 2021




Source : Calculs de l'auteur avec les données de la base des règles budgétaires du FMI (Davoodi *et al.*, 2022).

En dehors de la simple adoption de ces règles et de l'effet que cela peut avoir sur les comptes publics, un autre élément important garant de leur efficacité est la conformité à ces règles et leur force d'application. La présence des règles budgétaires a un effet de discipline et s'y conformer renforce son efficacité font une réelle

différence sur les agrégats macroéconomiques. Les Tableaux 0.1 et 0.2 ci-dessous montrent une comparaison suivant l'inflation et la balance budgétaire. On remarque que pour les pays ayant adopté au moins une règle budgétaire, la moyenne de l'inflation et de la balance budgétaire est beaucoup plus faible. Toutefois pour ces variables nous avons des niveaux de variabilité, représentés par l'écart-type relativement faibles. Ces observations laissent présager l'efficacité des règles budgétaires.

Table 0.1: Statistiques descriptives pour les pays n'ayant pas adopté de règles budgétaires

| Variable | Moyenne | Écart-type | Min. | Max. | N |
|---|---|---|---|---|---|
| Inflation (%) | 18.67 | 62.65 | -31.25 | 992.39 | 1539 |
| Balance budgétaire (% PIB) | -2.51 | 3.96 | -15.72 | 7.76 | 390 |

Source: Calculs de l'auteur avec les données présentes dans la base World Economic Outlook (Octobre 2024) du FMI.

Table 0.2: Statistiques descriptives pour les pays ayant adopté au moins une des règles budgétaires

| Variable | Moyenne | Écart-type | Min. | Max. | N |
|---|---|---|---|---|---|
| Inflation (%) | 3.79 | 10.14 | -7.44 | 346.05 | 2091 |
| Balance budgétaire (% PIB) | -2.23 | 3.19 | -13.6 | 11.14 | 1272 |

Source: Calculs de l'auteur avec les données présentes dans la base World Economic Outlook (Octobre 2024) du FMI.

Ces intuitions se confirment avec les Tableaux 0.3 et 0.4 qui répertorient également les statistiques descriptives des variables susmentionnées, uniquement pour les pays ayant adopté au moins une règle budgétaire selon l'indice de force d'application de la règle. On peut alors faire le même constat que ci-dessus pour les pays dont la force d'application de la règle budgétaire est forte.

Table 0.3: Statistiques descriptives pour les pays dont la force d'application de la règle budgétaire est faible

| Variable | Moyenne | Écart-type | Min. | Max. | N |
|---|---|---|---|---|---|
| Inflation (%) | 12.09 | 47.37 | -31.25 | 992.39 | 2845 |
| Balance budgétaire (% PIB) | -2.57 | 3.58 | -15.72 | 11.14 | 1142 |

Source: Calculs de l'auteur avec les données présentes dans la base World Economic Outlook (Octobre 2024) du FMI.
Note: L'indice de force d'application de la règle budgétaire à été calculé par l'auteur en suivant la méthode de Gootjes *et al.* (2021) et normalisé de 0 à 1.

Table 0.4: Statistiques descriptives pour les pays dont la force d'application de la règle budgétaire est forte

| Variable | Moyenne | Écart-type | Min. | Max. | N |
|---|---|---|---|---|---|
| Inflation (%) | 2.85 | 4.26 | -7.44 | 53.55 | 785 |
| Balance budgétaire (% PIB) | -1.69 | 2.82 | -11.57 | 8.33 | 520 |

Source: Calculs de l'auteur avec les données présentes dans la base World Economic Outlook (Octobre 2024) du FMI.
Note: L'indice de force d'application de la règle budgétaire à été calculé par l'auteur en suivant la méthode de Gootjes *et al.* (2021) et normalisé de 0 à 1.

Ces faits stylisés et observations empiriques soulèvent la question de savoir s'il existe réellement une influence assez significative allant de la conformité et la force d'application dès règles budgétaires à la soutenabilité fiscale. La littérature actuelle aborde l'impact des règles budgétaires sur la discipline budgétaire, mais néglige souvent la manière dont la conformité à ces règles et leur crédibilité influencent les anticipations d'inflation et la dynamique de la dette publique. L'objectif de cette thèse qui est détaillé dans la section ci-dessous est donc d'apporter des éclairages dans ce sens.

## 0.3 Objectifs et intérêt de la thèse

Comme susmentionné, cette thèse a pour objectif d'analyser l'importance ou non d'adopter des règles budgétaires mais surtout de s'y conformer avec une certaine force d'application. Elle s'intéressera à l'inflation et ses anticipations, aussi à la dynamique de la dette publique, qui est un volet manquant à la littérature existante. En comblant cette lacune, cette thèse examine comment la capacité d'un pays à respecter des cibles budgétaires crédibles influence les anticipations économiques, stabilise la dette publique et modère l'inflation. La crédibilité et la conformité sont deux dimensions cruciales pour comprendre l'efficacité réelle des règles budgétaires au-delà de leur simple adoption nominale.

Cette thèse apporte une contribution précieuse en améliorant la compréhension des effets des règles budgétaires sur la stabilité économique et la formulation des

politiques publiques. Plus précisément, elle met en lumière le rôle fondamental de la crédibilité et de la conformité dans l'efficacité de ces règles. En s'appuyant sur une analyse méthodologique rigoureuse, cette recherche explore comment des règles budgétaires crédibles et respectées influencent les anticipations des agents économiques et contribuent à la stabilité de la dette publique et au contrôle de l'inflation.

Dans un environnement post-COVID où les niveaux de dette publique atteignent des sommets historiques, il est essentiel d'envisager des ajustements dans la conception des règles budgétaires pour s'assurer qu'elles soient à la fois crédibles et applicables. La thèse propose que des cibles budgétaires réalistes et adaptées à la conjoncture économique de chaque pays pourraient renforcer la conformité des États membres tout en préservant la stabilité économique. En modifiant l'architecture des règles budgétaires pour les rendre plus flexibles et mieux adaptées aux réalités économiques actuelles, les décideurs pourraient améliorer la crédibilité de ces règles tout en assurant leur viabilité à long terme. Ces résultats sont particulièrement pertinents dans le contexte actuel où le débat sur les règles budgétaires en Europe est central. Après leur suspension lors de la crise sanitaire, l'Union européenne réactive progressivement ses règles, et les discussions autour de leur réforme sont plus vives que jamais. Cette thèse se positionne donc comme un apport essentiel pour éclairer ce débat et fournir des éléments de réflexion solides sur la conception d'un cadre budgétaire européen durable et efficace.

Cette thèse s'inscrit aussi dans les discussions initiées par des économistes comme Blanchard *et al.* (2021), qui recommandent de passer de règles rigides à des standards plus flexibles pour les politiques budgétaires européennes. En évaluant si un tel passage pourrait améliorer la stabilité des finances publiques sans compromettre la croissance économique, cette thèse contribue de manière significative à cette réflexion critique. Plutôt que de rejeter les règles budgétaires existantes, elle

propose une réévaluation de leur structure pour qu'elles répondent mieux aux besoins actuels tout en restant des instruments de discipline fiscale efficaces.

En somme, ce travail apporte des éclairages précieux pour la recherche académique et la politique économique en montrant l'importance d'un cadre budgétaire crédible et flexible pour la stabilité macroéconomique. Les conclusions de ce travail apportent ainsi un éclairage pertinent pour les décideurs qui souhaitent repenser et adapter les règles budgétaires aux défis contemporains, tout en contribuant aux débats académiques sur la gouvernance économique en Europe et au-delà.

Il s'inscrit dans le champ de l'économie budgétaire et monétaire, tout en intégrant une dimension d'analyse de politiques publiques. Il explore l'interaction entre les règles budgétaires, la stabilité macroéconomique et les anticipations économiques, en tenant compte des dynamiques inflation-dette et des contraintes budgétaires dans un contexte de relance post-COVID. La structure de la thèse se décline en trois chapitres principaux qui approfondissent chacun un aspect central de cette problématique.

## 0.4 Présentation des chapitres

### 0.4.1 Premier chapitre: Do Commitment and Enforcement of Fiscal Rules Enhance Fiscal Stability? Evidence from European Union Countries

Le premier chapitre pose les bases de l'analyse en examinant le rôle des règles budgétaires dans la stabilité fiscale des pays de l'Union européenne. Il explore la manière dont leur mise en œuvre et leur crédibilité influencent les finances publiques.

### *Motivation*

Ce chapitre, co-écrit avec Antonia López-Villavicencio, étudie l'impact des règles budgétaires sur la stabilité fiscale des pays de l'Union européenne. Bien qu'elles soient perçues comme des outils essentiels pour renforcer la discipline budgétaire et réduire l'incertitude, leur efficacité dépend fortement de leur mise en application et du respect dont elles font l'objet. L'analyse s'inscrit dans le cadre du Pacte de Stabilité et de Croissance (PSC) et examine l'effet de règles budgétaires fortes sur le solde budgétaire primaire entre 1995 et 2022. Elle s'intéresse également à la composition des ajustements fiscaux, en étudiant les dépenses publiques et l'investissement, ainsi qu'à la durabilité de ces effets dans le temps. En prenant en compte l'hétérogénéité des contextes institutionnels et économiques, l'étude identifie les règles les plus efficaces parmi celles relatives au déficit, à la dette et à l'équilibre budgétaire. Cette approche permet d'affiner la compréhension du rôle des règles budgétaires dans la gouvernance fiscale en Europe.

### *Méthodologie*

L'étude évalue l'effet des règles budgétaires sur la stabilité fiscale des pays de l'Union européenne à l'aide de trois méthodologies complémentaires. L'approche en différences en différences hétérogène de de Chaisemartin et D'Haultfoeuille (2020, 2024) permet d'analyser l'impact des règles tout en tenant compte des dynamiques temporelles, avec un test placebo pour garantir la validité des résultats. L'approche par variables instrumentales (IV) corrige les biais d'endogénéité en exploitant la contagion réglementaire entre pays voisins et la force des règles budgétaires via le Fiscal Rule Strength Index (FRSI). Enfin, la Pondération Inverse Probabilisée Augmentée (AIPW) assure des estimations robustes en combinant correction des biais de sélection et ajustement des résultats aux covariables. En combinant ces méthodes, l'étude garantit la fiabilité des résultats et analyse les effets des règles budgétaires sur le solde primaire, les dépenses publiques et

l'investissement public.

***Résultats***

Les résultats de cette analyse apportent des enseignements clés pour les décideurs publics en soulignant l'importance d'une application crédible et ciblée des règles budgétaires, notamment la règle du solde budgétaire (BBR), qui se révèle être l'outil le plus efficace pour renforcer la discipline budgétaire. Son impact immédiat et significatif sur l'amélioration du solde primaire et la réduction des dépenses publiques en fait un levier central pour la consolidation des finances publiques. En revanche, les règles relatives aux dépenses et à la dette n'ont pas d'effet notable sur la stabilité fiscale, et la conformité simultanée à l'ensemble des règles du Pacte de Stabilité et de Croissance (PSC) ne procure pas d'avantage supplémentaire par rapport à la seule application de la BBR. De plus, l'inscription des règles budgétaires dans la constitution ne garantit pas une meilleure discipline fiscale, ce qui met en évidence que leur efficacité repose davantage sur leur mise en œuvre et les mécanismes de contrôle que sur leur statut légal. Ces résultats suggèrent que les décideurs doivent privilégier des règles budgétaires simples, claires et adaptées aux spécificités économiques des pays. L'enjeu n'est pas seulement d'adopter des règles strictes, mais aussi de garantir leur flexibilité afin de préserver la stabilité des finances publiques tout en permettant une capacité de réaction aux chocs économiques. Une gouvernance budgétaire efficace repose ainsi sur un équilibre entre rigueur et adaptabilité, assurant la soutenabilité des finances publiques sans compromettre les perspectives de croissance économique.

Ces résultats montrent que l'application des règles budgétaires peut avoir des effets structurels sur la discipline budgétaire. Toutefois, la relation entre politique budgétaire et stabilité macroéconomique ne se limite pas à la gestion des déficits publics. Un enjeu central demeure : comment la politique budgétaire influence-t-elle l'inflation, et dans quelle mesure les règles budgétaires peuvent-elles con-

tribuer à la stabilité des prix ? C'est la question centrale abordée dans le deuxième chapitre.

### 0.4.2 Deuxième chapitre: On the impact of fiscal policy on inflation: The case of fiscal rules

Le deuxième chapitre élargit la perspective en analysant l'impact des règles budgétaires sur l'inflation. Cette analyse s'inscrit dans une approche de politique économique globale, où la coordination entre politique budgétaire et politique monétaire joue un rôle central.

#### *Motivation*

La motivation théorique de cette étude repose sur l'idée que l'inflation n'est pas uniquement un phénomène monétaire, mais qu'elle est également influencée par la politique budgétaire. L'approche classique souligne que des déficits budgétaires excessifs peuvent conduire à une monétisation de la dette publique, générant ainsi des pressions inflationnistes. L'arithmétique monétaire désagréable de Sargent et Wallace (1981) met en évidence le lien entre une politique budgétaire expansionniste et la contrainte qu'elle impose à la politique monétaire, pouvant conduire à une dynamique inflationniste. De plus, la théorie fiscale du niveau des prix (FTPL) de Woodford (1994) postule que l'inflation résulte non seulement des décisions monétaires, mais aussi des anticipations sur la soutenabilité de la dette publique. Dans ce cadre, les règles budgétaires apparaissent comme un instrument permettant de limiter l'impact inflationniste des déficits publics. En imposant des restrictions aux finances publiques, elles réduisent la nécessité d'un financement monétaire des déficits et peuvent ainsi contribuer à stabiliser l'inflation. Toutefois, leur efficacité dépend du cadre institutionnel et de la crédibilité des engagements budgétaires pris par les gouvernements.

### *Méthodologie*

Pour traiter les biais de sélection et contrôler l'endogénéité, l'étude utilise la méthode d'entropy balancing. Cette technique, introduite par Hainmueller (2012), permet d'ajuster les distributions de variables de manière à obtenir des groupes comparables en équilibrant les caractéristiques entre les pays qui adoptent des règles budgétaires et ceux qui ne le font pas. En appliquant cette méthodologie, l'étude peut isoler les effets causaux des règles budgétaires sur l'inflation en neutralisant les différences structurelles inhérentes entre pays (comme la gouvernance et la performance économique) qui pourraient biaiser les résultats. L'étude utilise principalement la méthode de l'entropy Balancing, une technique de repondération des observations permettant d'égaliser les moments des distributions des covariables entre les groupes traités et non traités. En complément, elle applique le matching des scores de propension, avec différentes variantes : Nearest Neighbor Matching, Kernel Matching, Local Linear Matching et Radius Matching.

### *Résultats*

L'étude met en évidence un effet négatif significatif des règles budgétaires sur l'inflation, particulièrement dans les pays émergents et à faible revenu. Les résultats montrent que les pays ayant adopté de telles règles enregistrent en moyenne un taux d'inflation inférieur de 1,92 points de pourcentage par rapport à ceux qui ne les appliquent pas. L'impact est plus marqué lorsque ces règles imposent des contraintes sur la dette publique et le déficit budgétaire. Cet effet est particulièrement prononcé dans les pays émergents, où l'inflation diminue d'environ cinq points de pourcentage, alors qu'il est plus modéré dans les pays à faible revenu et inexistant dans les économies avancées. L'étude souligne également que l'influence des règles budgétaires est plus forte lorsque le taux d'inflation initial est inférieur à 15% et dans les pays ayant un régime de change fixe, contrairement aux pays à taux de change flottant où l'effet est moins significatif. La durée

d'application des règles budgétaires apparaît comme un facteur déterminant, avec un impact plus marqué dans les trois à cinq ans suivant leur adoption, mais qui tend à s'estomper après une décennie. De plus, l'étude met en lumière le rôle complémentaire de la crédibilité des banques centrales, les pays combinant des règles budgétaires avec une institution monétaire crédible bénéficiant d'une réduction plus importante de l'inflation. Ces résultats confirment que les règles budgétaires jouent un rôle dans la maîtrise de l'inflation, bien que leur efficacité dépende du contexte institutionnel et économique dans lequel elles sont mises en œuvre.

Ce chapitre a mis en évidence le rôle des règles budgétaires dans le contrôle de l'inflation, en particulier dans les pays où la soutenabilité budgétaire est un enjeu majeur. Toutefois, au-delà de leur impact sur les indicateurs macroéconomiques agrégés, ces règles influencent également les anticipations des agents économiques. Le troisième chapitre approfondit cette dimension en s'intéressant à l'ancrage des anticipations d'inflation des ménages et au rôle stabilisateur des règles budgétaires.

### 0.4.3 Troisième chapitre: Keep your hands tied or not? Fiscal rules and household inflation anchoring

Dans la continuité des deux premiers chapitres, le troisième chapitre s'intéresse aux anticipations des ménages et à la stabilité des prix, un enjeu clé pour la crédibilité des politiques économiques. Il examine comment la dette publique et la présence de règles budgétaires influencent la formation des anticipations d'inflation.

#### *Motivation*

Cette étude menée en collaboration avec Estel Apeti, examine l'impact des règles budgétaires sur la relation existante entre la dette publique et les anticipa-

tions d'inflation, en abordant une question essentielle de la politique macroéconomique: des règles budgétaires bien conçues peuvent-elles contribuer à stabiliser les anticipations d'inflation dans un contexte de dette élevée ? Une augmentation de la dette publique peut accroître l'incertitude quant à l'évolution future de l'inflation, ce qui risque d'affaiblir l'ancrage des anticipations, notamment parmi les ménages. Toutefois, des règles budgétaires telles que les freins à l'endettement, les plafonds de déficit et les limites de dépenses pourraient atténuer cet effet en garantissant une discipline budgétaire et en renforçant la confiance dans la capacité des gouvernements à assurer la stabilité macroéconomique. L'étude part du postulat qu'en l'absence de discipline budgétaire, une hausse de la dette publique peut accroître l'incertitude inflationniste, entraînant un désaccord accru entre les ménages quant à l'évolution future des prix. Ce phénomène peut être exacerbé par une perte de confiance dans la capacité du gouvernement à gérer ses finances publiques, affaiblissant ainsi la crédibilité de la politique monétaire et augmentant le risque de désancrage des anticipations d'inflation. À l'inverse, des règles budgétaires rigoureusement appliquées renforcent la stabilité en rassurant les ménages et les marchés financiers sur la soutenabilité de la dette publique. Cet effet de crédibilité devrait réduire l'incertitude et maintenir les anticipations d'inflation en ligne avec l'objectif de la banque centrale.

**Méthodologie**

L'approche empirique adoptée dans cette étude repose sur l'utilisation des données de l'Enquête sur les anticipations des consommateurs de la Banque Centrale européenne (CES) pour analyser le lien entre dette publique et ancrage des anticipations d'inflation des ménages dans la zone euro sur la période 2020-2022. L'analyse s'appuie sur un modèle de régression en moindres carrés ordinaires (MCO) avec l'introduction d'effets fixes pour contrôler les spécificités temporelles, nationales et individuelles. Afin d'atténuer les risques d'endogénéité et de biais

de variables omises, plusieurs contrôles sont intégrés, notamment des caractéristiques socio-économiques des ménages (âge, revenu, accès au crédit, dépenses passées) ainsi que des variables macroéconomiques et budgétaires (croissance du PIB, solde budgétaire primaire, taux de change effectif nominal, choc Covid-19, conditions politiques et géopolitiques). L'interaction entre la dette publique et les règles budgétaires permet d'évaluer dans quelle mesure ces dernières modèrent l'effet déstabilisateur de l'endettement sur l'ancrage des anticipations d'inflation. L'étude complète cette analyse par des tests de robustesse via des méthodes d'estimation alternatives, notamment la méthode des variables instrumentales (IV) et le système GMM, afin de renforcer la validité des résultats. Enfin, des tests d'hétérogénéité sont réalisés pour examiner comment cet effet varie selon les caractéristiques des ménages (niveau d'éducation, statut d'emploi, confiance en la BCE), offrant ainsi une compréhension plus fine des mécanismes en jeu.

***Résultats***

L'étude met en évidence que la dette publique a un effet significatif de désancrage des anticipations d'inflation des ménages dans la zone euro, mais que les règles budgétaires atténuent cet effet en renforçant la stabilité des anticipations. L'analyse montre que dans les pays où la dette publique est élevée, les ménages anticipent une inflation plus instable et éloignée de l'objectif de la banque centrale. Toutefois, lorsque des règles budgétaires strictes sont en place, comme des plafonds de déficit ou des freins à l'endettement, l'incertitude diminue et les anticipations restent mieux ancrées. Cette dynamique est particulièrement marquée chez les ménages à hauts revenus et les travailleurs en activité, tandis que ceux ayant une faible confiance en la BCE sont plus sensibles à l'effet déstabilisateur de la dette. Les tests de robustesse confirment que ces résultats sont valables à différentes échéances d'anticipation et avec diverses méthodes économétriques. L'étude souligne ainsi le rôle crucial des règles budgétaires dans la préservation

de la crédibilité de la politique monétaire et recommande un cadre de policy mix combinant discipline budgétaire et politique monétaire adaptée pour assurer la stabilité des anticipations d'inflation à long terme.

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# Chapter 1

# Do Commitment and Enforcement of Fiscal Rules Enhance Fiscal Stability? Evidence from European Union Countries[1]

1. Note: A version of this chapter has been published as "López-Villavicencio, A., & Zoumenou, J. (2025). Do commitment and enforcement of fiscal rules enhance fiscal stability? Evidence from European Union countries. *Journal of Macroeconomics*, 84, 103664".

## 1.1 Introduction

Fiscal policy rules, which impose numerical limits on government deficits or debt levels, are widely regarded as one of the most effective tools for strengthening budgetary discipline and enhancing the credibility of public finances. By promoting predictability and transparency in fiscal policy, these rules-based frameworks have become the dominant mechanism for fiscal governance globally. In 2021, 105 countries had some form of fiscal rule (FR) in place, compared to only 23 countries in 1995, 15 of which were members of the European Union (EU).

In the EU, fiscal rules are outlined within the Stability and Growth Pact (SGP). Adopted in 1997 and reformed in 2005 and 2011-13, the SGP clarifies the budgetary criteria established in the 1992 Maastricht Treaty. Compliance with the Maastricht fiscal criteria requires maintaining government deficits below 3% of GDP and debt levels below 60% of GDP. EU countries also committed to achieving fiscal balance over the medium term. However, following the 2008 global financial crisis and the subsequent euro area crisis, fiscal and monetary policies began to diverge from these criteria, highlighting the difficulty for governments in adhering to these rules. Later, in response to the COVID-19 crisis in 2020, EU countries activated escape clauses, allowing them to deviate from or temporarily suspend the fiscal rules.[2] This period also saw a harmonization of monetary and fiscal policies at the regional level, marked by extensive fiscal support at both the national and EU levels.

By improving government budget balances and reducing public debt levels, fiscal policy rules are a widely-accepted policy to promote fiscal discipline (see Alesina and Perotti, 1995, Debrun, 2000, Debrun, 2000, Lledo et al., 2010, Piguillem and Riboni, 2021, Caselli and Wingender, 2021, Ardanaz et al., 2021, etc.). Yet, despite

2. The SGP consists of a preventive arm, which seeks to monitor and recommend actions to prevent fiscal imbalances, and a corrective arm – known as the Excessive Deficit Procedure (EDP) – which monitors and prescribes actions to correct excessive fiscal imbalances.

the growing adoption of fiscal rules by countries, some theoretical and empirical studies offer a more skeptical view of their potential benefits. This lack of consensus highlights two key issues: first, a methodological challenge and second, concerns related to the adherence to and implementation of the rules.

When evaluating the effectiveness of fiscal rules in stabilizing fiscal outcomes, a well-known methodological challenge arises from the potentially endogenous decision to adopt a fiscal rule in the first place (see Grembi et al., 2016). For instance, Heinemann et al. (2018) and Caselli and Wingender (2021) both document a constraining effect of fiscal rules, which weakens considerably when more refined identification strategies are employed. To address this issue, recent literature often adopts a treatment effect approach to estimate the causal impact of fiscal rules on various fiscal outcomes (see Vinturis, 2023). However, the widespread adoption of fiscal rules complicates this task. In particular, the lack of a clear counterfactual or control group makes it increasingly difficult to isolate the true effect of fiscal rules.

Moreover, the effectiveness of fiscal rules can be undermined by issues related to commitment and enforcement. Simply adopting a fiscal rule does not guarantee its success; rather, the robustness of the rule and the degree of adherence are crucial factors in determining its effectiveness. For instance, Grembi et al. (2016) shows that relaxing fiscal rules leads to a significant deficit bias. Similarly, Milesi-Ferretti (2004) finds that fiscal rules often target only specific parts of the budget, allowing policymakers to comply with the rules while avoiding broader improvements in overall fiscal discipline.

This chapter contributes to the ongoing debate on the relationship between fiscal rules and fiscal outcomes. We extend previous research by examining the effects of the commitment to and enforcement of the fiscal rules (FRs) introduced by the Stability and Growth Pact (SGP) in the EU-27 countries. First, we quantify the

magnitude of primary fiscal balance adjustments in the presence of strong and conforming fiscal rules over the 1995–2022 period. Next, we analyze the composition of fiscal adjustments by examining general government expenditure and public investment, which serve as reliable indicators of discretionary fiscal policy (Fatas and Mihov, 2006). Finally, we assess the sustainability of fiscal consolidation by investigating whether the effects of compliance with the rules persist over time or are quickly reversed after compliance. This final point is critical, as political economy arguments suggest potential shifts due to the stringent application of rules or post-compliance effects.[3]

Focusing on the EU-27 countries is important for several reasons. First, fiscal policies, including taxation, government spending, and fiscal objectives, vary significantly among EU member states. Second, although all countries in the region have fiscal rules in place, they have alternated between compliance and non-compliance with these rules for many years.[4] Third, with the suspension of the general escape clause set to end in 2024, attention has shifted towards the future of fiscal governance in Europe and the need to reshape fiscal rules (FRs) to better fit current economic conditions, without hindering economic recovery. In particular, there is a growing recognition that fiscal rules must adapt to the realities of high public debt and low real interest rates. They should also enable or incentivize counter-cyclical policies during both economic downturns and upturns. Furthermore, fiscal rules should be simpler, more enforceable, and less reliant on unobserved variables such as the output gap, while allowing flexibility to account for country-specific circumstances.

3. For example, it is argued that the political costs of fiscal consolidation may incentivize politicians to avoid compliance with the rules in the future. Political economy considerations may also lead governments with large budget surpluses to relax their fiscal efforts if they observe widespread non-compliance by other countries in the union (e.g., Alesina, 2000). Additionally, lobbying pressures from various interest groups over surplus allocation may result in a less stringent fiscal stance (Caselli and Wingender, 2021).

4. For instance, in 2008, just before the financial crisis, only 11 of the 27 EU countries were in compliance with the fiscal criteria (see Caselli and Wingender, 2021).

While some of the previous issues are also relevant to other regions, such as the West African Economic and Monetary Union (WAEMU) countries, focusing on EU countries allows for a richer analysis due to the availability of an operational database on numerical compliance with fiscal rules.

Instead of relying on *de jure* rules, as the majority of the existing literature does, we capture the bindingness of fiscal rules using the Compliance Tracker provided by Larch et al. (2023) and the European Commission. This dataset enables us to focus on numerical compliance, as opposed to merely legal compliance. We define full compliance as the situation in which a country adheres to all existing supra-national rules set by the SGP simultaneously. Additionally, we utilize data from Asatryan et al. (2018) to examine the fiscal impact of budget balance rules (BBRs) that are enshrined in national constitutions. This allows us to test the hypothesis that constitutional BBRs are more binding than non-constitutional, or statutory, laws.[5]. Finally, we incorporate fiscal rule strength data as a further measure of rule adherence and enforcement. The strength of fiscal rules is crucial, as there are arguments suggesting that neither overly strict rules nor full discretion is optimal for ensuring fiscal discipline (e.g., Blanchard et al., 2021). To the best of our knowledge, we are the first to use this dataset to estimate the impact and effectiveness of fiscal rules.

We use different empirical strategies to estimate causality. First, we adopt a heterogeneous difference-in-difference (DID) design as proposed in de Chaisemartin and D'Haultfoeuille (2020, 2024). DID requires that trends in fiscal variables of treated and control units are comparable. In a static set-up, the methodology allows us to control for the presence of other episodes of compliance. In its dynamic

5. BBRs can be either constitutional or statutory. While the constitutional or statutory nature of a rule does not necessarily dictate whether it is strong or weak, constitutional rules tend to be more difficult to override, often requiring a legislative super-majority or a public referendum for amendment. Research suggests that stricter BBRs can lead to reduced spending and smaller deficits, though they may also force countries to make rapid service cuts or raise taxes during economic downturns. See Giannitsarou (2007), Azzimonti et al. (2016), and Afonso et al. (2022)

specification, we allow the effect to differ in each time period. This recent progress on staggered treatment designs and heterogeneous treatment effects makes these methods suitable for application that involves a staggered treatment, i.e., countries with the same FRs that complied with it for the first time at different dates.

The second strategy relies on diffusion and regulation contagion arguments to instrument compliance and strength of fiscal rules. More precisely, as geographical proximity is known to be a powerful channel of diffusion of policy reforms (e.g. Brueckner, 2003, and Pitlik, 2007), the probability that a country complies with the criteria in place is likely to increase with the number of neighboring countries that have implemented similar policies (see Caselli and Reynaud, 2020). We follow Eklou and Joanis (2019) and Caselli and Reynaud (2020) and use the number of countries in the region that have complied with the rule as an instrument for compliance. The strength of the rule, in turn, is instrumented by the average strength in the rest of the countries in the region.

Since DID requires assumptions such as parallel trends, and IV methods depend on identifying a valid instrument—often a challenging task—we also employ the Augmented Inverse Probability Weighting (AIPW) method. This approach allows us to control for factors that influence compliance with fiscal rules. By utilizing these three different methods, we are confident in the robustness of our findings.

Our results show a significant impact of budget balance rule compliance on the primary balance, total public expenditures (henceforth, public expenditure), and public investment. On the contrary, even if expenditure rules are recognized as one of the most effective tools to manage budgetary aggregates, complying with this rule or maintaining a debt below 60% of GDP are not requirements to achieve consolidation. As a result, countries that accomplish all the targets imposed by the SGP simultaneously do not perform better than countries that comply exclusively with the budget balance rule. Our results also indicate that strong fiscal rules,

defined as those with wide coverage, a strong legal base, independent monitoring, or well-specified consequences for non-compliance, are not necessary to achieve better fiscal performance.

The chapter proceeds as follows. Section 1.2 provides a brief review of the literature. Section 1.3 describes the data and their properties. Section 1.4 introduces the empirical strategy. Section 1.5 presents the estimation results. Section 1.6 concludes.

## 1.2 Related literature

There is a large theoretical and empirical literature that suggests that governments persistently spend and borrow at levels that may deviate from the prescriptions of optimal fiscal policies (see Rogoff, 1987 or Persson and Tabellini, 2000, for instance). Moreover, overspending during economic growth may stem from a "voracity effect" (Tornell and Lane, 1999), which can undermine countercyclical fiscal policies.

Under this scenario, fiscal rules are a widely-accepted policy to promote fiscal discipline. The vast literature on fiscal policy and fiscal rules usually finds that FRs are associated with less discretion in conducting fiscal policy (e.g. Alesina and Perotti, 1995, Alesina et al., 1999, Debrun, 2000; Lledo et al., 2010, Piguillem and Riboni, 2021, etc.), improve government budget balances (Debrun et al., 2008, Luechinger and Schaltegger, 2013, Bergman et al., 2016, Burret and Feld, 2018, Caselli and Reynaud, 2020) and reduce public debt levels (Hallerberg et al., 2007, Azzimonti et al., 2016, Asatryan et al., 2018, Apeti et al., 2024). Moreover, Grembi et al. (2016) shows that relaxing fiscal rules increases the deficit and lowers taxes. Fiscal rules are also shown to curb political budget cycles, which involve deliberate manipulations of fiscal policy to bolster the incumbent's reelection prospects (Gupta et al., 2016, Bonfatti and Forni, 2019, Gootjes et al., 2021). Moreover, FRs

prompt the adoption of more countercyclical fiscal measures (Combes et al., 2018, Gootjes and de Haan, 2022).

An important channel through which FRs can lead to fiscal stability is credibility. For instance, the literature suggests that FRs signal a commitment to fiscal responsibility by constraining politicians' discretion and fostering political consensus across parties (Eyraud et al., 2018). Successful implementation of these rules can reassure economic agents, lower borrowing costs, and provide resources to cushion the economy against shocks or fund policies that promote long-term growth.

Despite the well-recognized positive effects on fiscal discipline, strict adherence to fiscal rules may prove counterproductive when economic policies, particularly public investment and structural reforms, can improve long-term fiscal health despite short-term fiscal burdens (Fiori et al., 2012). Moreover, fiscal rules may constrain governments seeking structural reforms with upfront costs, necessitating flexibility in rule enforcement (Beetsma and Debrun, 2004; Sajedi and Steinbach, 2019). As such, countries do not always comply with rules.

Recent literature on fiscal rules compliance seeks to find its main determinants and their impact on fiscal outcomes. For instance, focusing on the EU members, Reuter (2019) uses a logistic model and highlights that determinants of fiscal rules' compliance particularly concern fiscal rules' characteristics such as the registration in the law, the level of rigor, or the degree of public finance coverage. Furthermore, Reuter (2015) shows that, even if fiscal rules are not complied with, governments implement efforts to move close to the limit. Including both national and supranational rules and a large sample of emerging and developing countries, similar conclusions are reached by Caselli and Reynaud (2020). Likewise, Eyraud et al. (2018) highlights a "magnet-effect" to describe the trend of government to move close to the limit of fiscal rules, pointing out the benchmark status that the fiscal

rules seem to have, suggesting that compliance seems to be a goal for governments. Caselli and Reynaud (2020) also find evidence for 96 countries from 1985 to 2015 that there is a positive and significant relation between the index of rule strength and fiscal balance. However, their results lose significance when they exclude European countries from the sample. The authors justify this lack of evidence since European countries generally exhibit the strongest rules and removing them from the sample significantly reduces the sample variation.

Moreover, the existing literature also shows that the effectiveness of setting fiscal rules for fiscal performance is state-dependent and linked to institutional and/or legal design. For instance, Andrián et al. (2024) or Chrysanthakopoulos and Tagkalakis (2024) show that fiscal rules are most effective in reducing debt or leading to a fiscal easing during positive economic cycles, with the design and institutional support playing a crucial role. Ardanaz et al. (2021), in turn, provides evidence that fiscal rule design can affect the growth-friendliness of fiscal adjustment strategies. In particular, the authors find that in countries with no fiscal rule or with a rigid fiscal rule, a fiscal consolidation of at least 2 percent of GDP is associated with an average 10 percent reduction in public investment. Contrary to these findings, Chrysanthakopoulos and Tagkalakis (2023) show that, panel of 40 advanced economies over the period 1990–2020, both strict and flexible fiscal rules lead to successful adjustments.

The literature that aims to analyze the economic effects of compliance is not only scarce but also relatively recent. An interesting contribution is Larch et al. (2023) which focuses on compliance with the supranational fiscal rules included in the SGP and its effect on various macroeconomic variables such as market volatility, the output gap, nominal GDP growth, or the quality of governance. More specifically on compliance and fiscal stability, Reuter (2015) finds that if countries do not comply with their fiscal rule in the year or forecast before, there is a strong downward tendency of the constrained variable towards the

numerical limit. Finally, using basic panel regressions without attempt to control for endogeneity issues Larch et al. (2021) show that EU supranational fiscal rules compliance reduces public debt and promotes counter-cyclical fiscal policies.

## 1.3 Data and descriptive statistics

### 1.3.1 Data

We employ data from 27 countries in the European Union between 1995 and 2022. We are interested in capturing the effects of the bindingness of the fiscal rules. To this purpose, our data for fiscal rules comes from three sources.

The first one is the fiscal rule strength index (FRSI) from the Fiscal Rules Database by the Directorate-General for Economic and Financial Affairs of the European Union. The criteria for the construction of the FRSI is that a fiscal rule is well designed when it is binding, thereby acting as an effective constraint on policy-making. In the case of the FRSI, the bindingness of a rule relates to the stringency of the legal basis. Additional desirable features of fiscal rules include monitoring bodies and correction mechanisms in case of deviations from the rule targets. A final important property is the resilience to shocks through some form of flexibility, usually embedded in the rule design, such as escape clauses.

More in detail, to obtain a time series FRSI, a unique country Fiscal Rule Index (cFRI) is calculated as an average of four rules: budget balance rule (BBR), debt rule (DR), revenue rule (RR), and expenditure rules (ER) over the 1995-2022 period. For each of these rules, an FRSI is calculated as the average across five dimensions (the legal basis, the binding nature of the rule, the nature of the enforcement and monitoring body, the correction mechanism, and media visibility), summed overall rules in force weighted by the sector coverage and a penalty in

case of a second or third rule covering the same sector. It has a theoretical lower bound of 0 in case there are no rules in force and no theoretical upper bound.

The second source we use is the Compliance Tracker provided by Larch et al. (2023) and the European Commission. This data provides numerical compliance with the four main rules of the SGP since 1998. The indicators take the value of one (zero) if the relevant fiscal aggregates -the budget balance, the debt-to-GDP ratio, or government expenditure -evolved within (outside) the perimeters defined by the fiscal rules. Then, a country is considered: (i) deficit rule (DeficitR) compliant in case the -3% of the deficit to GDP threshold is breached, the deviation remains small (maximum 0.5% of GDP); ii) debt rule (DebtR) compliant if the debt-to-GDP ratio is below 60% of GDP or if the excess above 60% of GDP has been declining by 1/20 on average over the past three years; iii) balance budget rule (BBR) compliant if the budget balance of the general government is equal or above -3% of GDP; and iv) Structural balance rule (ER) compliance if the structural budget balance of the general government is at or above the medium-term objective. It is important to note that for countries that joined the EU after the inception of the SGP and for rules introduced after 1997, part of the compliance scores are hypothetical: They tell us how fiscal performance compared to the requirements of the SGP, and more importantly, whether compliance changed significantly once a country joined the EU or a rule was introduced.[6] Based on this information, we construct a variable that takes the value of one when there is compliance and the fiscal rule set at the SGP is active. This implies that years before 1998 take the value of zero. We further create a full compliance indicator, which is a binary variable that equals one for country/periods where the was compliance for the four rules simultaneously.[7]

A final measure of the bindingness of a fiscal rule is based on data provided by Asatryan et al. (2018). The authors argue that a recent trend in advanced

6. See Larch et al. (2023) for further details on the data construction.
7. It is important to note that whereas compliance relies on supranational rules the FRSI relies on national rules.

economies has been to strengthen the credibility of fiscal rules by enshrining them at the highest level of law: national constitutions. Indeed, during our period, four countries in our sample: Austria in 2008, Denmark and Italy in 2014, and Spain in 2011 have passed legislation.[8] In these cases, the treatment variable takes the value of one for the country/period after the change in the constitution.

The main dependent variable is the primary fiscal balances of the general government (percent of GDP). The primary balance refers to the financial situation of the government, considering revenues and expenditures but excluding interest payments on outstanding debt from both revenues and expenditures. It reflects whether the government is running a surplus (revenues exceed expenditures), a deficit (expenditures exceed revenues), or is balanced (revenues equal expenditures) over a certain period. As the primary balance focuses solely on the government's fiscal position and excludes the cost of servicing its existing debt – the government does not control the interest payments – it provides a clear picture of the government's ability to finance its ongoing operations without relying on borrowed funds. It is also a key indicator as regards public debt sustainability (see Combes et al., 2018). In addition, we study two further measures of a country's fiscal performance: the general government final consumption expenditure, which consists of total expense and the net acquisition of non-financial assets, and the general government investment (gross fixed capital formation), both as a percentage of GDP (source WEO and OECD respectively).[9]

Regarding the control variables and to address the influence of the fiscal stance and the fact that elevated public debt levels may prompt higher fiscal surpluses, we incorporate the lag of public debt (see Bohn, 1998). Real GDP growth rate is

8. Switzerland and Germany are the two exceptions among advanced countries that already have such constitutional rules.
9. Government total expenditure comprises several categories such as capital investments (gross capital formation), which made up 6.7% of general government total expenditure in the EU in 2022. Other categories included are: intermediate consumption; compensation of employees; social payments; social transfers in kind; other taxes on production; property income, etc.

included to reflect domestic economic conditions, which significantly influence fiscal policy behavior. We also include trade openness to capture external conditions affecting government fiscal behavior. Finally, including private investment helps control for potential crowding-in or crowding-out effects between public and private spending (Vinturis, 2023). The detailed descriptions and sources of all variables are provided in Table A-4.

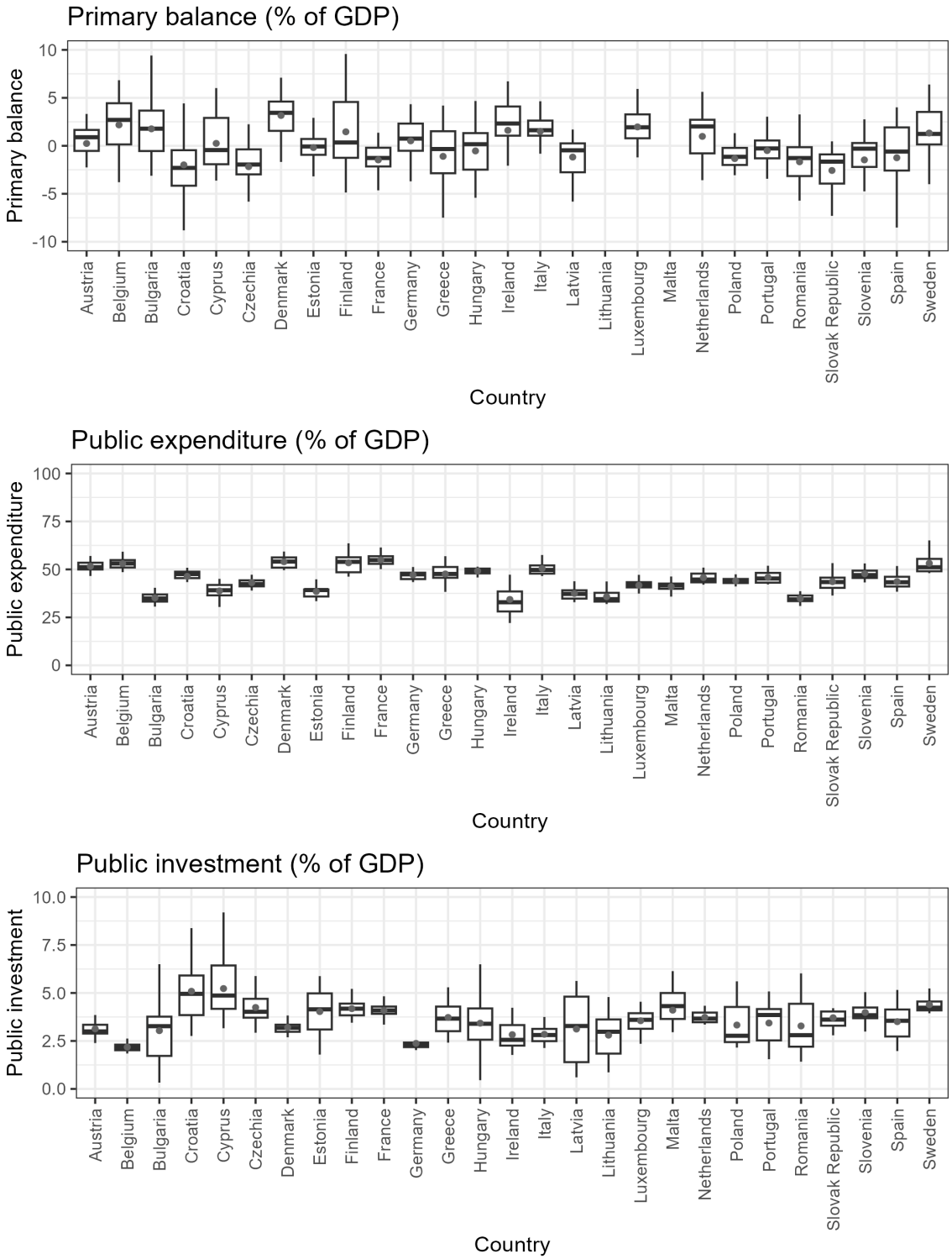
### 1.3.2 Descriptive statistics

A notable feature of fiscal behavior across EU countries is its substantial divergence not only to fiscal behavior but also regarding the strength and compliance of the fiscal rules in place.

Indeed, as seen in the first plot in Figure 1.1, there are important differences in the primary balance across EU countries. Notably, countries like Belgium, Bulgaria, Denmark, Finland, Germany, Ireland, and the Netherlands display a cluster of values above the median, indicating a generally positive primary balance. In contrast, countries such as Croatia, the Czech Republic, Greece, Romania, and Slovak Republic show more variability, often dipping into negative territories, reflecting fiscal deficits. Concerning differences in public expenditure, we observe that countries cluster around 40-50% of GDP with no extreme outliers. This suggests a relative uniformity in public spending, although the span of the boxes and whiskers indicates that the range of expenditures as a percentage of GDP can vary significantly from one country to another. Public investment, in turn, is relatively higher in Croatia, Cyprus, and Czechia than in the rest of the countries, probably linked to specific national policies or periods of economic stimulus.

The second series of figures provides insights into compliance with fiscal rules over time. The plots in Figure 1.2 show in gray areas the dates and countries that complied with each fiscal rule after the SGP entered into force in the late

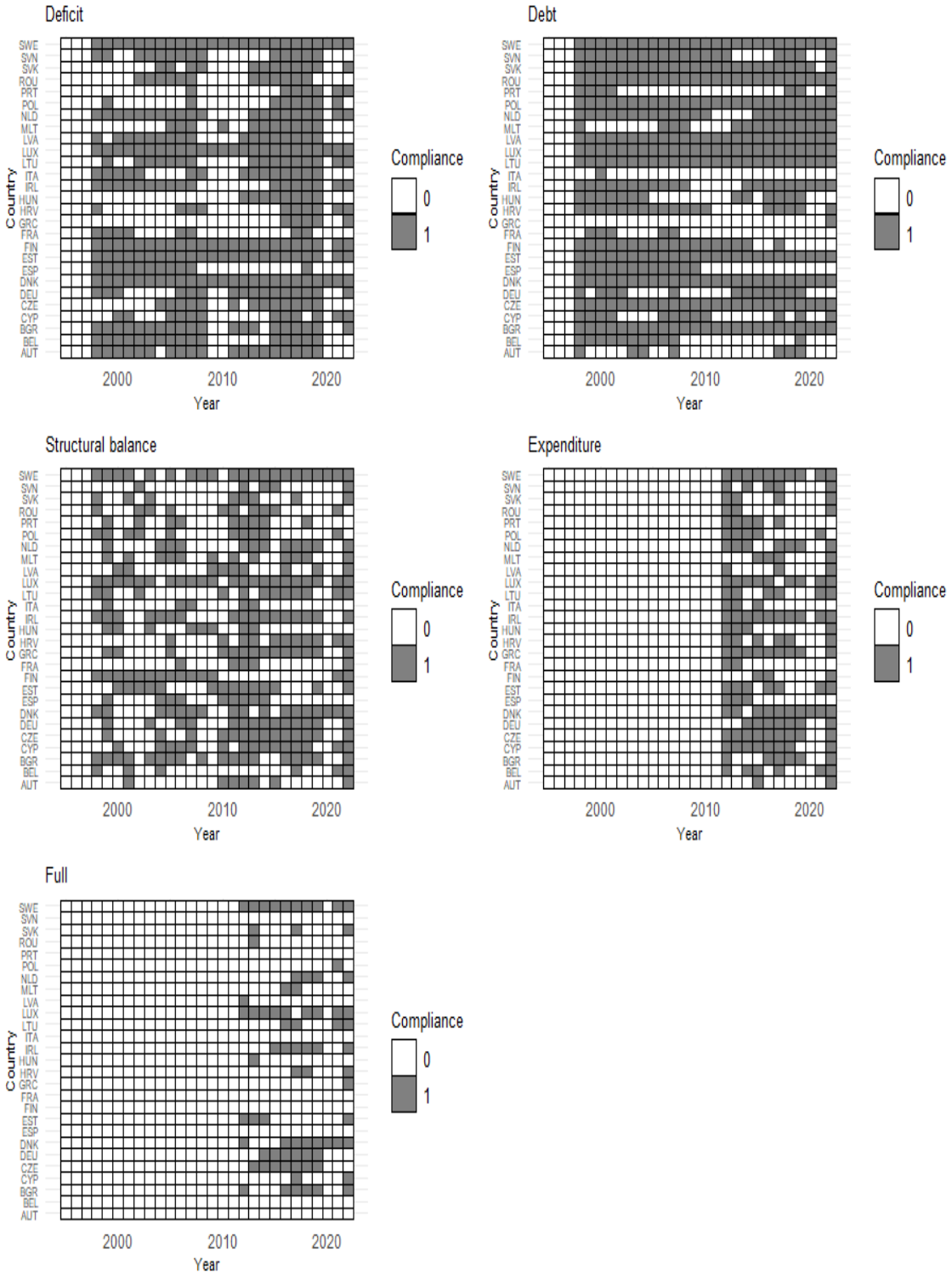
Figure 1.1: Box-Whisker plot for fiscal behavior in EU-27 countries. 1995-2022




Notes: The boxes in the plot represent the interquartile range of the data distribution for each country. The line inside the box represents the median. The whiskers extend up to 1.5 times the IQR from the edges of the box. The dots represent the mean of the variable for each country.

1990s. The last figure shows compliance with all four rules, i.e. full compli-

Figure 1.2: Fiscal rule compliance by year and country. 1995-2022




Notes: Compliance takes the value of 1 when the rule is accomplished (gray zone) and zero otherwise (white zone).

ance.[10] As seen, compliance with EU Fiscal Rules has been mixed. Whereas the

10. That is, compliance takes the value of 1 if the rule was implemented according to the SGP and

accomplishment of debt and deficit rules is more generalized, budgetary and expenditure rules are much less frequent, reflecting the challenges countries face in adjusting their fiscal policies to economic cycles. At the same time, during some periods, there has been considerably less compliance with the rules. For instance, just before the crisis in 2008, only 16 of the 27 EU countries complied with the deficit rule, 6 with the budgetary (structural) rule, and only 3 with the expenditure rule. By 2020, when the Commission concluded that the conditions to activate the general escape clause were met in the EU, Denmark, Luxembourg, and Sweden were the only countries where the budget balance of the general government was below 3% of GDP. These are the only 4 countries that have achieved high compliance for several years. Otherwise, countries have either alternated between full compliance and non-compliance during the whole period or have never complied with all four rules simultaneously.[11]

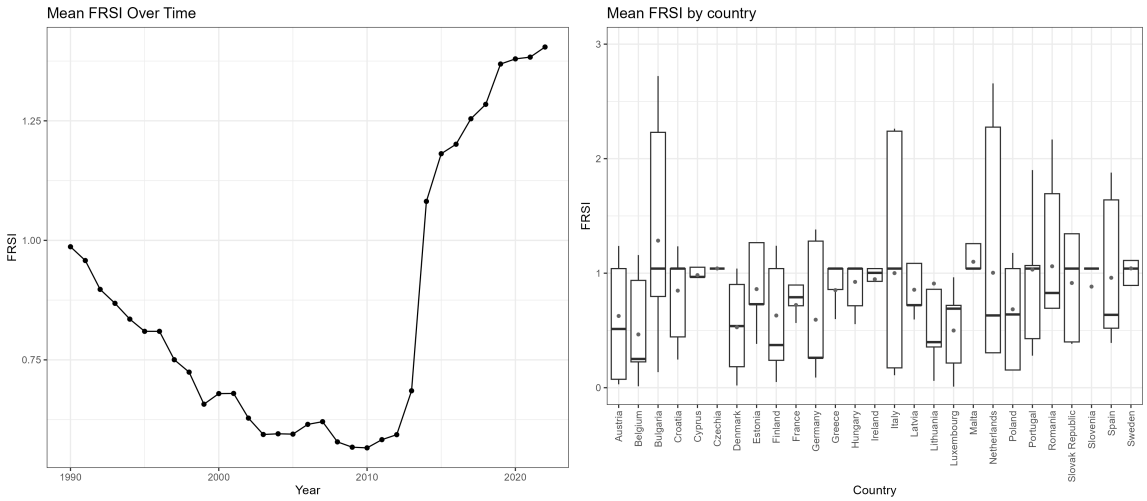
Finally, the two graphs in Figure 1.3 show the features of fiscal rule strength index. Looking at the development over the past two decades, there has been a clear upward trend for the member states of the European Union since 2010, which could be interpreted as a reaction to the crisis and a bid to improve fiscal sustainability. The second plot shows also noticeable differences among countries. For instance, Bulgaria, Malta, and Romania are characterized by having strong fiscal rules on average over the period. This implies that fiscal rules in these countries have wide coverage, a strong legal base, independent monitoring or/and well-specified consequences for non-compliance. These are all characteristics generally thought to make FRs more effective. On the opposite side, Austria, Belgium, and Luxembourg have relatively weaker fiscal rules on

there was compliance, zero otherwise. Therefore, for the debt, deficit, and BB rules, the first year of compliance is 1998. As it was until the 2011 reform that the expenditure rule was introduced, all the years before this date are counted as zero. Full compliance considers three rules up to 2011 and four rules afterward.

11. The general escape clause does not suspend the procedures of the SGP, but it allows the Commission and the Council to depart from the budgetary requirements that would normally apply.

average. The score of fiscal rules in Germany and Sweden suggests that they have consistent moderate fiscal rule strengths.

Figure 1.3: Fiscal rule strength index in EU-27 countries. Average evolution and Box-Whisker plot. 1995-2022




Notes: The first figure shows the average value over countries, by year. The boxes in the Box-Whisker plot represent the interquartile range of the data distribution for each country. The line inside the box represents the median. The whiskers extend up to 1.5 times the IQR from the edges of the box. The dots represent the mean of the variable for each country.

## 1.4 Empirical strategy

In addition to questions related to the binding nature of the rules, identifying their causal effect is not straightforward due to endogeneity issues. One source of endogeneity may come from selection bias, particularly if past fiscal performance influences the probability that a country accomplishes a rule. Second, endogeneity could also arise from the failure to account for variables that simultaneously drive the implementation of fiscal rules and correlate with the fiscal outcomes.

Nevertheless, we believe that our empirical methodologies offer reliable means to recover a causal estimate of the impact of fiscal rule compliance and strength on fiscal outcomes. The first one is a treatment effects framework. The second relies on instrumental variables. As a final robustness test, we control for the factors that influence compliance with fiscal rules by means of the Augmented Inverse

Probability Weighting estimator.

### 1.4.1 A staggered difference in difference approach

For our DID setup, we rely on de Chaisemartin and D'Haultfoeuille (2020, 2024) recent DID heterogeneous estimator ($DID_\ell$, henceforth), which overcome limitations recently identified for two-way fixed effects (TWFE) estimators widely utilized for policy evaluations with panel data. In particular, the recent DID literature has shown that TWFE relies on a homogeneous treatment assumption.

The $DID_\ell$ can accurately account for the characteristics of our setup and to provide consistent estimates of the Average Treatment effect on the Treated (ATT) for several reasons. First, our context implies a binary treatment with variation in the timing of treatment conditions. Indeed, in our design, countries may get treated and leave the treatment, i.e. alternate between compliance and no-compliance, several times during the period. New DID estimators, in contrast, do not rely on homogeneous treatment effects for identification.

Second, the heterogeneous DID estimation procedure allows us to recover the contemporaneous effect of the treatment. Moreover, for full compliance and constitutional BBR, we are also able to identify the dynamic effect. Analyzing a static case can be more straightforward than a dynamic one since it assumes that the treatment effect remains constant. However, the dynamic case may provide a more accurate representation of the real-world scenario, where FRs' compliance effects can change over time due to various factors.

Third, if TWFE regressions include multiple treatments as is our case – simultaneous debt and deficit compliance, for instance – a TWFE estimator for the impact of one treatment can be 'contaminated' by other treatments' impacts. Our estimation results in the static case are robust to having multiple treatments.[12] The

12. For instance, in the case of the static DiD model for the deficit rule compliance, the specification excludes observations where there are changes in the other treatments, i.e. if the observation

static specification also includes non-parametric trends. This implies that the DiD estimators computed only compare switchers to controls whose treatment has not changed yet, with the same baseline treatment, and with the same value of the rest of the rules complied. As such, estimators are unbiased even if groups experience differential trends, provided all groups with the same value of the rest of the rules complied experience parallel trends.[13]

The starting point in de Chaisemartin and D'Haultfoeuille (2020, 2024) is the definition of the treatment, which is a binary variable specified as follows:

$$\forall(g,t), D_{g,t} = 1\{E_g \geq t \geq F_g\}, \text{ with } 2 \leq F_g \leq E_g \tag{1.1}$$

where a panel of $G$ groups is observed at $T$ periods, indexed by $g$ and $t$ respectively. Then, $D_{g,t}$ denotes the treatment of group $g$ at period $t$, $F_g$ the first treatment, and $E_g$ is the treatment before the first exit. We have then a treatment (complying) which is observed over multiple periods ($T > 2$) and where treated counties start receiving the treatment at different periods.

For each treatment, i.e. compliance, the $DID_\ell$ estimator produces an "event-study" graph, where the event at $t = 0$ is the first time that the FRs' compliance status switches on. In the dynamic case, the graph displays both the instantaneous effect at $t = 0$ and the dynamic effects which are "reduced-form evidence of whether increasing the treatment for $\ell + 1$ periods increases or decreases the outcome on average". Then, the dynamic effect compares the evolution of outcomes between the units that switched into treatment $\ell$ periods ago and those that have not yet changed into treatment. Note, however, that the dynamic estimation does not take into account the case of multiple treatments. Indeed, to be able to

changed for no compliance to compliance for the other rules. This implies that any significant ATT is due to the change of the status regarding the specific rule.

13. See Section 1.4 of the Web Appendix of de Chaisemartin and D'Haultfoeuille (2024) for further details.

distinguish the effect of an individual-compliant rule, there must be countries that comply with this rule exclusively. Applying this restriction would limit the number of observations drastically. Since this is not the case for full compliance and BBR constitutional exclusively, the results have a straight interpretation.

If we consider the proportion of those units to which each dynamic effect applies, then the $DID_\ell$ estimator's average total effect has a policy interpretation and is an estimator of an ATT, i.e., the proportional FRs' compliance effects are for all $g$ and $n$. The weighted average of the effects of the current and $\ell - 1$ first treatment lags is noted $\delta^n_{g,\ell}$ :

$$\delta^n_{g,\ell} = \frac{1}{\ell} \sum_{k=0}^{\ell-1} E[\, Y_{g,F_g-1+\ell}(\, 0_{F_g-1}, 1_{\ell-k-1}, 1, 0_k) \, - Y_{g,F_g-1+\ell}(\, 0_{F_g-1}, 1_{\ell-k-1}, 0, 0_k) \,|D] \tag{1.2}$$

where $E[\, Y_{g,F_g-1+\ell}(\, 0_{F_g-1}, 1_{\ell-k-1}, 1, 0_k) \,|D]$ is the potential outcome of the treated cohort $g$ at time $t$ and $E[Y_{g,F_g-1+\ell}(\, 0_{F_g-1}, 1_{\ell-k-1}, 0, 0_k) \,|D]$ is the potential outcome in the never treated state (or not yet treated), i.e., of units not subjected to the treatment over a particular period. $\delta^n_{g,\ell}$ is the average, across $k$, ranging from 0 to $\ell - 1$, of the effect of switching the $kth$ treatment lag from 0 to 1, holding the previous treatments at 1 and subsequent treatments at 0.

Note that for identification, DiD relies on a "parallel trends" assumption that implies that treated and untreated units' mean post-treatment outcomes would have proceeded along parallel paths, had there been no treatment. Finally, the use of a set of country and time fixed effects enables us to control for unobservable factors that do not vary within countries in given years and capture the effect of several time-varying observable variables.

### 1.4.2 Instrumental variables

For the IV approach, our departing point is the following panel data model:

$$Y_{i,t} = \beta_1 FRSI_{i,t} + \beta_2 Compliance_{i,t} + \beta_3 X_{i,t} + \alpha_i + \lambda_t + \epsilon_{i,t} \tag{1.3}$$

where $Y_{it}$ is the fiscal outcome (i.e. primary balance, public expenditure, or public investment), $i$ and $t$, denote country and year, respectively. $FRSI$ is the fiscal rule strength index and $Compliance$ is a dummy variable that takes the value of 1 if in a specific year, the rule is active according to the SGP and there is compliance in country $i$. $X$ is the set of control variables previously described. $\alpha_i$ and $\lambda_t$ are individual and time fixed effects that control for any country/time-specific constant characteristic. Finally, $\epsilon_{it}$ is the error term.

To address reverse causality in Eq. (1.3), we follow Eklou and Joanis (2019) and Caselli and Reynaud (2020) and exploit the geographical pattern of the region in terms of strength and compliance of fiscal rules. In particular, diffusion arguments state that the likelihood that a country complies with a fiscal rule should increase as the number of neighboring countries that have complied becomes larger. The literature also documents the possibility of "regulation contagion" where the choices of policymakers in other countries influence policymakers and regulators in the country. For instance, Demirgüç-Kunt and Detragiache (2002) suggest that, as a policy or regulation becomes more widespread, it becomes a "universal best practice" and hence countries are more likely to adopt it. Furthermore, as regulators or policymakers learn more about the workings of regulation from those countries implementing the regulation, regulators might modify their regulations after observing regulatory changes in other countries.

Policy diffusion means that policies in one unit (country, state, city, etc.) are influenced by the policies of other units. The diffusion literature conceptualises these

interdependencies and propose some mechanisms that might encourage countries to adopt reforms based on neighboring countries' adoption. These mechanisms can include peer pressure, peer learning, imitation effects to signal credibility to financial markets, and others (e.g. Simmons et al., 2007, Shipan and Volden, 2008 or Ardanaz et al., 2021).

In European countries, anecdotal evidence suggests that fiscal behavior often aligns with regional trends, as countries tend to follow the actions of their neighbors. For instance, after the 2008 financial crisis, Southern European countries such as Italy, Greece, and Spain faced scrutiny for their high debt levels and deficits. As some countries, like Spain and Portugal, adopted austerity measures to comply with the Stability and Growth Pact (SGP), others in the region felt compelled to implement similar policies to avoid the risks of isolation or exclusion from EU support mechanisms.

A similar dynamic is evident in Northern Europe, where Germany's strict adherence to fiscal rules set an influential precedent. Germany's model of fiscal prudence inspired countries such as the Netherlands, Austria, and Finland to adopt equally stringent fiscal policies, solidifying a bloc of "fiscal hawks" within the EU.

We follow these propositions and define two $contiguity$ variables as follows:

$$contiguity_compliance_{i,t} = \sum_{j \neq i}^{n-i} Compliance_{j,t} \tag{1.4}$$

$$contiguity_FRSI_{i,t} = \frac{\sum_{j \neq i}^{n-i} FRSI_{j,t}}{N-1} \tag{1.5}$$

Where $j$ is the country in the region of domestic country $i$ and $Compliance$ is the dummy variable defined as in Eq. (1.3). Therefore, the variable $contiguity_compliance_{i,t}$ captures the number of countries that have complied with the fiscal rule in place. In the case of the strength of the fiscal rule, we use the av-

erage $FRSI$ in the region as a possible instrument, as shown in Eq.(1.5).

It is important to note that our chosen instrumental variable implies a selection of countries based on geographic proximity, where all the EU counties are considered as a broad region, regardless of their similarities. This measure captures the general regional trend in compliance but may include countries with very different contexts from the domestic country. Nonetheless, we also created instrumental variables using the scores in countries in the EU that share characteristics such as economic structure, political institutions, or cultural ties. This means the instrument is not just about geographic proximity but also about the comparability of countries.[14]

Note, however, that the presence of free rider behavior could complicate the assumed positive influence of neighboring countries' compliance with the rules invalidating our chosen instruments. Suppose a country can benefit from the regional stability provided by its neighbors' compliance without complying itself. In that case, it may be incentivized to exploit these benefits while avoiding the political or economic costs of compliance. This risk undermines the hypothesis that compliance in neighboring countries exerts positive pressure on the domestic country's compliance, especially in the case of the supranational fiscal rules. Indeed, some European countries have failed to implement fiscal reforms to control deficits and debt levels, relying instead on the eurozone's stability and the perception of collective responsibility among EU member states. [15]

14. In this second case, we have fours groups: Core EU, Peripheral EU and Central and East European EU countries. Then, the instrument for each country that belongs to the specific groups is the average of all the other countries in the same group. An argument to justify this instrument is based on a peer effect in fiscal rule compliance. Under this argument, neighboring countries might influence each other's adherence to fiscal rules, reinforcing the notion that compliance may spread due to regional or political pressures, shared economic challenges, or similar regulatory environments. As such, compliance with fiscal rules in one country encourages similar behavior in others.

15. We thank an anonymous referee for pointing this out to us.

### 1.4.3 Augmented Inverse Probability Weighting estimator

The Augmented Inverse Probability Weighting (AIPW) estimator is a statistical technique used in causal inference to estimate the average treatment effect (ATE). It combines both the Inverse Probability Weighting (IPW) and Outcome Regression (OR) estimators, resulting in a doubly robust estimator. This means that the AIPW estimator remains consistent if either the model for the treatment assignment (the propensity score) or the model for the outcome is correctly specified, but not necessarily both.

The first step in the AIPW is to estimate the propensity score using a logistic regression model to predict the probability of compliance with the fiscal rule, $Compliance_{it} = 1$, as a function of observable covariates, $X_{it}$ as follows:

$$P(Compliance_{it} = 1 \mid X_{it}) = \frac{\exp\left(\gamma_0 + X'_{it}\gamma\right)}{1 + \exp\left(\gamma_0 + X'_{it}\gamma\right)} \tag{1.6}$$

where $X_{it}$ includes the lagged GDP growth rate, lagged fiscal variables, the inflation targeting dummy, the effective number of electoral parties, and the cabinet composition (see below for the definition of these variables).

Next, we estimate the outcome model for both the compliant and non-compliant groups as in Eq.1.3. Finally, the AIPW estimator combines the propensity score and the outcome model to produce the following treatment effect estimate:

$$_{AIPW} = \frac{1}{n}\sum_{i=1}^{n}\left[\frac{Compliance_{it}(Y_{it} - \hat{m}_1(X_{it}))}{\hat{e}(X_{it})} - \frac{(1 - Compliance_{it})(Y_{it} - \hat{m}_0(X_{it}))}{1 - \hat{e}(X_{it})} + {}_1(X_{it}) - \hat{m}_0(X_{it}) \right. \tag{1.7}$$

where $\hat{e}(X_{it})$ is the estimated propensity score (probability of compliance) and $\hat{m}_1(X_{it})$ and $\hat{m}_0(X_{it})$ are the predicted fiscal outcomes for the compliant and non-compliant groups, respectively.

## 1.5 Results and Discussion

### 1.5.1 Difference-in-difference

Our benchmark identification strategy based on a DiD setup allows us to provide a complete picture of the short-term effects of well-designed fiscal rules. Importantly, we are also able to inquiry if fiscal stability is maintained in the long run.

To this end, we present the results of the DiD analysis. The placebo analysis allows us to distinguish the true effects of the FRs' compliance from spurious correlations or external factors. Moreover, for some cases, the DiD approach provides the dynamic effects to assess whether the impact of FRs' compliance is sustainable over time and to exclude if, for instance, a budget deficit reduction in one year is followed by a rebound in subsequent years if the underlying structural issues are not addressed.

Figures 1.4 plot the static effects for the primary balance – panel (a) – and its components – panel (b) and (c). The graphs show the placebo estimators for each year before the treatment 'switches on' for the first time and the effect at the time of the treatment. The graphs show that the placebo estimators for deficit, debt and BBR compliance, are near zero, and are statistically insignificant (Figures 1.4 to left of $t = 0$), with a joint test of these placebos' significance failing to reject the null hypothesis that all placebo estimators are zero. The placebo test indicates that in the years leading to compliance with rules, the differences in outcome variables between treatment and control countries are, on average, close to zero. This absence of pre-trends suggests no systematic bias coming from selection. Thus, in these cases, before complying with fiscal rules, the difference in primary balance between compliance and non-compliance countries is negligible. Economically, the advanced economic integration within the EU, and the similar institutional structures imposed, for example, by the SGP and the Maastricht criteria, support the hypothesis of parallel trends.

However, expenditure compliance appears to have effects at $t-2$ while constitutional BBR does so at $t-1$ (i.e. the confidence intervals do not contain zero). This would have implications for the validity of the assumption of parallel trends. Moreover, since the test results for the joint nullity of the placebos show that, on average, the placebos are different from zero, results for the ER and constitutional compliance should be interpreted with caution and used together with the two alternative specifications, i.e. the IV and AIPW presented below, that point to the non-significance of these variables.

The instantaneous effect (at $t=0$), which estimates an impact at the start of treatment, suggests no immediate effects of compliance with debt and expenditure rules on the primary balance, public expenditure, and public investment. In other words, once countries comply with debt and expenditure rules, these fiscal outcomes have no immediate effects. We do not find evidence that constitutional BBRs affect these variables either. However, compliance with deficit and budget balance rules has a positive and significant effect on the primary balance. This suggests that adhering to these specific rules can immediately improve fiscal stability. Likewise, complying with BB rules positively impacts the primary balance and reduces public expenditure and investment. This implies that countries adhering to these rules tend to cut back on public spending and public investment to meet compliance requirements. These two effects probably explain the significance of full compliance. To provide an idea of the magnitude of these effects, the ATTs for the deficit and BBR compliance are significant and around 1.23 and 1.11, respectively. With a mean primary balance of -0.03 (as a percentage of GDP) over the period and countries, these values imply sizable positive effects on the fiscal variable for countries that complied with these rules and small pre-treatment trends.

Figure 1.4: Effect of compliance on the primary balance, public expenditure and public investment. DiD static estimates

Figure 1.5: Primary balance

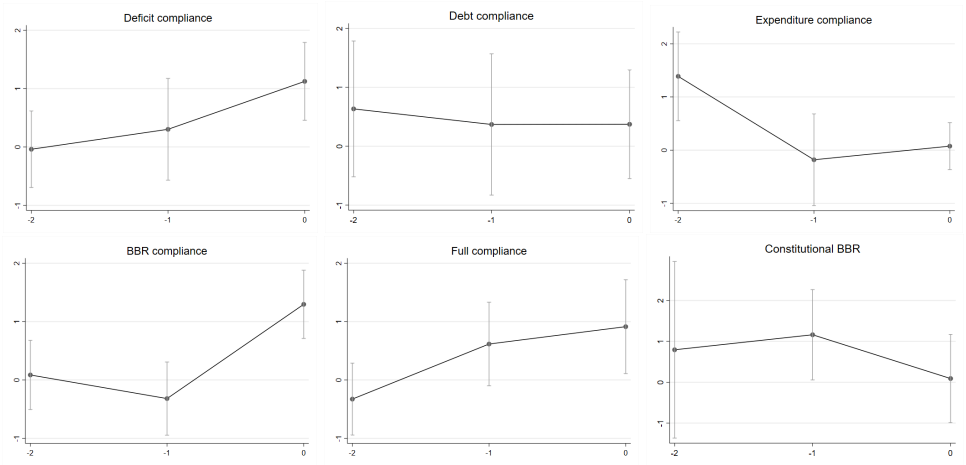



Figure 1.6: Public expenditure

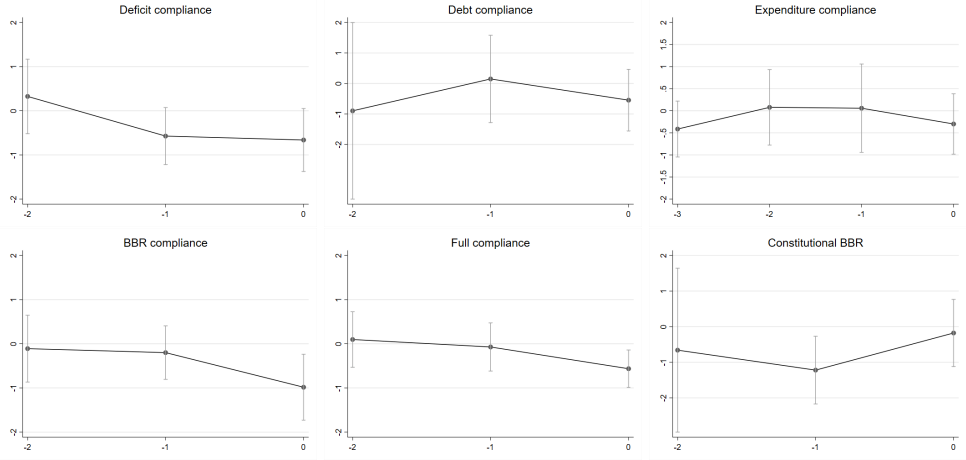
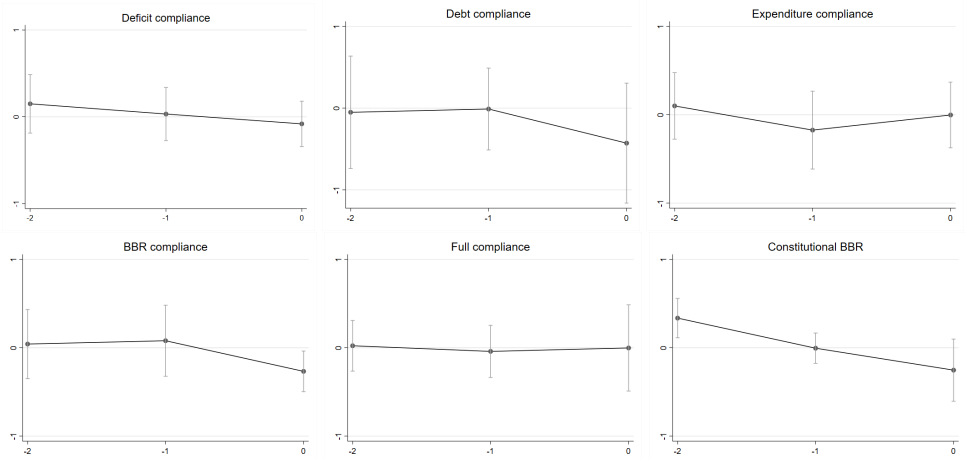



Figure 1.7: Public investment




Notes: The figures show the average effect of FRs' compliance on the countries that comply. It measures the average difference in the fiscal primary balance, expenditure and investment between those countries that complied with the FRs and those that did not. In the x-axis values before zero represent the placebo. The zero value represents the date of the treatment

The dynamic DiD, presented in Figure 1.8, should be interpreted as follows. For either treatment, when there are cohorts, i.e., multiple treatment-start years, the dynamic effects blend those cohorts by combining them using common years after the treatment.[16] This presumes that the impact is a function of years after treatment, which is well justified since discouraging the non-compliance of the rule can work better over time if word gets out about strong enforcement. Even if the dynamic DiD allows the study of the long-term implications, a drawback, in this case, is that, in order not to have bias, countries should comply exclusively with one rule. Yet, in our case, compliance is not exclusive, i.e., we can observe compliance with more than one rule. For instance, assume that there are only two rules: deficit and debt. Controlling by deficit compliance does not solve the problem if we are interested in the effect of debt compliance unless we assume that deficit compliance affects the fiscal variables only at the date of compliance with the deficit rule. Otherwise, we run into the problem of false control.[17]

Thus, for the dynamic DiD, we limit the analysis to two cases. The first one is for complying with all the rules simultaneously; the control is for all the rest of the possibilities (not complying or complying with one, two, or three rules). In the second case, the treatment is constitutional BBR. The dynamic effects, shown to the right of $t = 0$ in Figure 1.8, indicate no significant persistent effect of full compliance on the primary balance, public expenditure, or investment. These graphs suggest that complying simultaneously with all the rules set in the SGP

16. For instance, the second dynamic effect combines effects in 2000 for 1998 compliance or in 2022 for compliance in the year 2020. In a dynamic model, this would mean that even after suspending the rules in 2020, the fact that a country complied with the rule in the past will potentially have an effect in 2022.

17. Imagine we have three periods (1, 2, 3) and two rules, R1 and R2. Suppose that country A has never complied with rule R1 but complies with the R2 rule in years 2 and 3. Country B complies with rules R1 and R2 only in year 3. If we are interested in the effect of rule R1, by controlling with rule R2, we will be using country A as a control for country B. However, A is a false control because A applied the R2 rule in year 2, whereas B did not. If the model is dynamic, the fact that B applied R2 in year 2 influences its outcome at date 3, an effect that country A does not have. Note, however, that controlling by the presence of other treatments works in a static model, i.e., under the hypothesis that the rule compliance affects the primary balance only during the year of application.

does not increase fiscal stability over the medium term. However, the trends for the Constitutional BBRs show significant differences before adopting this type of rule. The non-significance of the outcome at the time of the treatment for the subsequent years should then be interpreted with caution.

Figure 1.8: Effect of compliance on the primary balance, public expenditure and public investment. DiD dynamic estimates

Figure 1.9: Primary balance

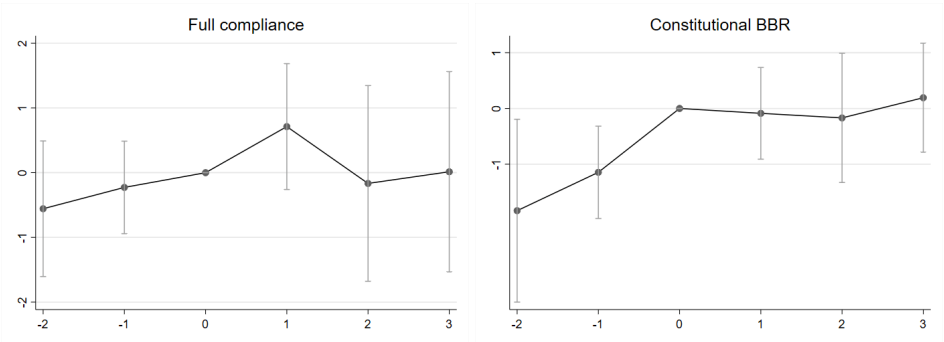



Figure 1.10: Public Expenditure

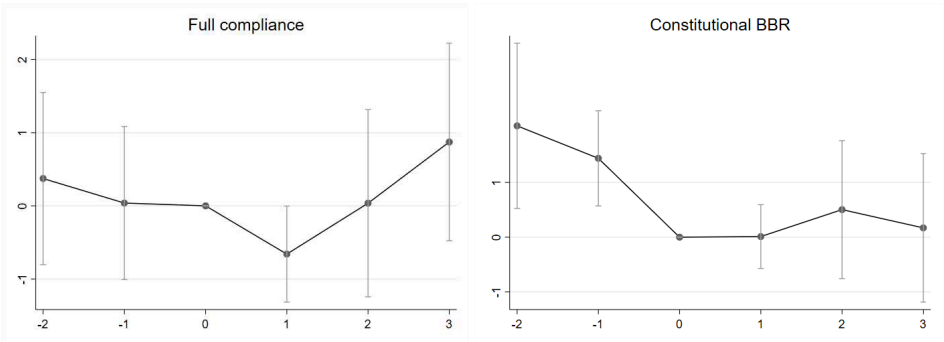
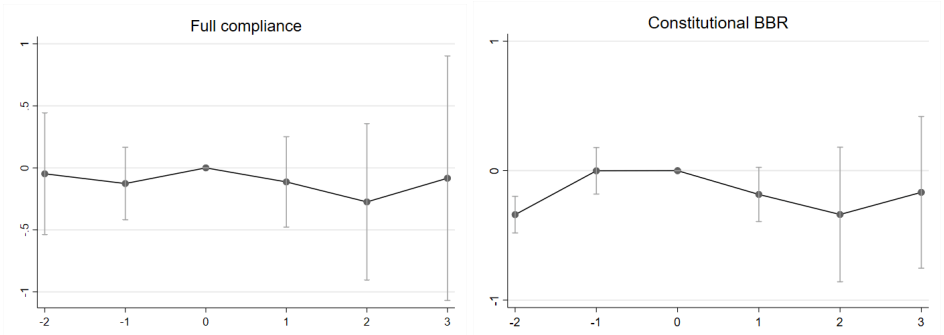



Figure 1.11: Public investment




Notes: The figures show the average effect of FRs' compliance on the countries that comply. It measures the average difference in the fiscal primary balance between those countries that complied with the FRs and those that did not. In the x-axis, values before zero represent the placebo. The zero value represents the date of the treatment. The values above are dynamic effects.

### 1.5.2 Instrumental Variables

Tables A-1 and A-2 in the Appendix show the correlation, and their significance level, between the compliance and the FRSI scores among countries and the results of the first step in the instrumental variable estimation, respectively. The high and significant correlations provide a strong preliminary evidence that the regional influence could be a critical factor in determining fiscal rule compliance and strength among EU countries. Moreover, as seen in table A-2, an increase in the number of countries in the region that achieve the requirement of the rule in place increases the probability of compliance with the rule in the domestic country. This first-stage estimates for the IV approach provides evidence of the pertinence of our instrument.

Given this evidence, we use as instruments for compliance and strength the contiguity variables as defined in Eq.(1.4) and (1.5).[18] Table 1.5.2 presents the results of three specifications: model (1) includes dummy variables for the compliance of each of the four rules, separately; model (2) includes a dummy variable for full compliance; model (3) tests the effect of the constitutional BBR. All three models include control variables as well as time and country fixed effects.[19]

Regarding the control variables, for all specifications, we confirm the so-called "fiscal reaction function" proposed by Bohn (1998). Indeed, an increase of the level of public debt is significantly associated to the government's surplus indicating that governments try to stabilize possible unsustainable debt dynamics. As expected, the previous level of the primary balance, the GDP growth, and trade openness have all had a positive effect on the primary balance.

Let us now turn to our variables of interest. The first one is the FRSI, the variable that captures the strength and the quality of the fiscal rule. As seen, the coefficient

18. For the IV models, the lagged dependent variable is instrumented by its first lag.
19. Before interpreting the results, note that the Kleinbergen-Paap statistic presented in the last row of the table indicate that the contiguity instruments are relevant for all the specifications, the F-stat being well above the Staiger and Stock rule of thumb value of 10.

Table 1.1: Effect of compliance and FRSI on the primary balance. IV estimates

| Dependent variable | **Primary balance** (1) | **Primary balance** (2) | **Primary balance** (3) |
|---|---|---|---|
| L.primary balance | 0.538*** | 0.655*** | 0.662*** |
| | (0.049) | (0.048) | (0.048) |
| FRSI | -0.104 | -0.116 | -0.132 |
| | (0.128) | (0.141) | (0.142) |
| Deficit rule comp. | 1.228*** | | |
| | (0.179) | | |
| Debt rule comp. | 0.303 | | |
| | (0.193) | | |
| Exp. rule comp. | 0.042 | | |
| | (0.199) | | |
| BB rule comp. | 1.340*** | | |
| | (0.119) | | |
| Full comp. | | 0.745*** | |
| | | (0.217) | |
| BB rule constitutional | | | -0.144 |
| | | | (0.279) |
| L.Gross debt | 0.022*** | 0.028*** | 0.024*** |
| | (0.004) | (0.005) | (0.005) |
| GDPG | 0.100** | 0.086** | 0.088** |
| | (0.031) | (0.036) | (0.035) |
| Openness | 0.010** | 0.010** | 0.013*** |
| | (0.004) | (0.004) | (0.003) |
| Observations | 635 | 635 | 635 |
| Weak identification statistic | 32.982 | 22.567 | 112.652 |

Note: (a) Standard errors are presented in parentheses; (b) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; (c) All the models include country and time fixed effects; (d) L. represents the lagged variable. (e) IV are the number of countries complying with the rule each year, the average value for FRSI in the rest of the countries in the EU the the first lag of the dependent variable; (f) The weak identification statistic corresponds to the Kleibergen-Paap rk statistic.

is not significantly different from zero. Likewise, the introduction of a constitutional budget balance rule does not imply any significant improvement in the fiscal stance. These first results seem to indicate that strong fiscal rules, those that have a strong statutory or legal base, or rules that do not leave room for setting or revising objectives and impose strong corrective mechanisms in case of deviations and are set and monitored by independent bodies, do not really make any difference, in terms of fiscal stability, compared with softer rules.

For the different rules, the results show that complying with the debt or expenditure rules has no immediate impact on the primary balance. On the contrary, a positive effect on the primary balance is observed after the introduction of deficit and budget balance rules when countries comply with them (improvements of the primary balance to GDP of 1.2 and 1.3, respectively). Likewise, full compliance has a positive effect on the primary balance. Note, however, that complying with all the rules set by the SGP does not seem to represent an advantage to the single compliance of the deficit and/or BB rules.[20]

Regarding the variables capturing the government's fiscal decisions, Table 1.2 reports the results of the instrumental variables estimation for public expenditure and investment. The results show the expected inertia of the fiscal behavior, the coefficients associated with the past fiscal variables being statistically significant at a 1% confidence level. Again, the FRSI and constitutional BBRs' do not significantly influence these fiscal variables.

The results also show that reducing public spending in EU countries requires compliance with the budget balance rule established in the SGP. Note also that the coefficient with the deficit rule is significant at the 10% confidence level. This low significance, together with the previous results on the DiD estimation, suggests

20. To complement this result, we created a dummy variable that takes the value of 1 if the country complies with both the deficit and the BBR rules simultaneously, zero otherwise. We estimate a model when we instrumented with the contiguity variable. The estimated coefficient in this case is 2.41 (t-stat=8.69 and p-values=0.000).

that the BB rule is the most important to control public spending among all the fiscal rules. Compliance with expenditure and debt rules does not significantly change public expenditure either, at least in the short term.[21] Regarding the part of government spending directed towards creating or improving physical or human capital assets, i.e., public investment, column (4) in the table shows that complying with the budget balance has a negative and significant coefficient at a 1% level of significance.

As previously mentioned, we also instrumented the variables using scores from EU countries with similar characteristics. While these results are not shown here for brevity, they are consistent with those obtained using the broader measure. Specifically, while the strength of the rules is not statistically significant, compliance with the deficit and BB rules positively impacts the primary balance. However, this last compliance is, on average, associated with a reduction in public expenditure.

Note that there are possible threats to some IV identification assumptions. In particular, the exclusion restriction implies that rules in neighboring countries capture an exogenous source of variation in domestic rules that does not directly impact the fiscal balance. The same applies to the instrument for the strength of the rule. Even though the exclusion restriction cannot be empirically verified, there are some arguments about the underlying economic mechanisms that we can use to be confident in our strategy. For instance, and as noticed by Caselli and Reynaud (2020), a violation of the exclusion restrictions could occur if compliance in the rest of the countries of the region impacts the domestic fiscal balance directly, for instance, because complying with the rule may generate fiscal spillovers through trade linkages or macroeconomic stability. In this sense, we capture how much a country is exposed to external shocks through trade linkages by control-

21. This result contradicts the findings in Herrero-Alcalde et al. (2024) who, for the Spanish case, find that the expenditure rule has largely improved budget sustainability by limiting both current and primary expenditure.

Table 1.2: Effect of compliance and FRSI on public expenditure and public investment. IV estimates

| | Public Expenditure | | | Public Investment | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| L.Expenditure | 0.677*** | 0.713*** | 0.641*** | | | |
| | (0.068) | (0.070) | (0.069) | | | |
| L.Investment | | | | 0.666*** | 0.658*** | 0.580*** |
| | | | | (0.053) | (0.054) | (0.158) |
| FRSI | 0.222 | 0.292* | 0.186 | -0.058 | -0.040 | -0.039 |
| | (0.133) | (0.138) | (0.375) | (0.063) | (0.063) | (0.064) |
| Deficit rule comp. | -0.444* | | | 0.070 | | |
| | (0.231) | | | (0.075) | | |
| Debt rule comp. | -0.389 | | | -0.015 | | |
| | (0.256) | | | (0.076) | | |
| Exp. rule comp. | -0.386 | | | -0.100 | | |
| | (0.213) | | | (0.098) | | |
| BB rule comp. | -1.093*** | | | -0.261*** | | |
| | (0.159) | | | (0.055) | | |
| Full comp. | | -0.659** | | | -0.228* | |
| | | (0.204) | | | (0.109) | |
| BB rule constitutional | | | 0.315 | | | 0.234 |
| | | | (0.279) | | | (0.149) |
| L.Gross debt | 0.001 | -0.005 | -0.000 | -0.003 | -0.005* | -0.006 |
| | (0.006) | (0.006) | (0.008) | (0.002) | (0.003) | (0.003) |
| GDPG | -0.302*** | -0.279*** | -0.373*** | -0.001 | 0.008 | 0.005 |
| | (0.028) | (0.028) | (0.032) | (0.013) | (0.012) | (0.017) |
| Openness | -0.014* | -0.016* | -0.021*** | -0.002 | -0.001 | 0.001 |
| | (0.007) | (0.007) | (0.006) | (0.002) | (0.002) | (0.003) |
| Priv. investment | | | | 0.492** | 0.508** | 0.533** |
| | | | | (0.161) | (0.173) | (0.192) |
| Observations | 683 | 683 | 683 | 605 | 605 | 602 |
| Weak identification statistic | 84.975 | 89.458 | 5.715 | 24.384 | 31.121 | 4.882 |

Note: (a) Standard errors are presented in parentheses; (b) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; (c) All the models include country and time fixed effects; (d) L. represents the lagged variable. (e) IV are the number of countries complying with the rule each year, the average value for FRSI in the rest of the countries in the EU the the first lag of the dependent variable; (f) The weak identification statistic corresponds to the Kleibergen-Paap rk statistic.

ling for trade openness in the benchmark equations. We also include the average growth in the region in columns 7-9 in Table 1.5.

### 1.5.3 AIPW

Table 1.3 presents the ATTs obtained from the AIPW estimates. The results provide further insights into the effects of compliance with various fiscal rules on the three key variables: the primary balance, public expenditures, and public investment.

Table 1.3: Effect of compliance on the primary balance and components. AIPW estimates

| **Effect of** | **On primary balance** | **Public expenditures** | **Public investment** |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Deficit compliance** | 2.03*** | - 1.07*** | 0.01 |
| | (0.24) | (0.23) | (0.06) |
| **Debt compliance** | 0.24 | - 0.63* | 0.10 |
| | (0.24) | (0.32) | (0.07) |
| **ER compliance** | 0.82* | - 0.60* | - 0.15* |
| | (0.46) | (0.36) | (0.06) |
| **BBR compliance** | 1.61*** | - 1.28*** | - 0.24*** |
| | (0.16) | (0.18) | (0.05) |
| **Full compliance** | 1.73*** | - 1.27*** | - 0.16*** |
| | (0.21) | (0.28) | (0.06) |
| **BBR constitutional change** | - 0.08 | 0.32 | - 0.15 |
| | (0.13) | (0.24) | (0.10) |

Note: (a) Standard errors are presented in parentheses; (b) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As seen, the results confirm our previous findings: deficit, BBR and full compliance significantly improve fiscal stability, by improving the primary balance and reducing public expenditure. In contrast, debt and expenditure rule's compliance, as well as constitutional BBR have modest effect, only slightly improving the primary balance (0.24), suggesting that these rules alone are insufficient to enhance fiscal discipline.

### 1.5.4 Changing the sample composition

As mentioned before, the Excessive Deficit Procedure is a process within the European Union designed to address situations where a member state's budget deficit exceeds the limits set by the EU's Stability and Growth Pact. Over the years covered by our study, many EU countries have been subject to the EDP at various times, especially during and after significant economic downturns, such as the 2008 financial crisis and the 2021 post-pandemic period. Since the inclusion of these periods could alter the empirical findings, Tables 1.4 and 1.5 present the estimation results for the DiD and the IV estimations, respectively, when we constraint the estimation to the 1995-2007 period. The main conclusion is regarding the importance of complying with deficit and budget balance rules to constrain the primary balance hold. A further issue deserving attention is the European sovereign debt crisis that began in 2010. For several years, some countries, i.e. Greece, Ireland, Portugal, Spain, and Cyprus, received financial assistance from the EU and the IMF. These programs were designed to stabilize economies facing severe fiscal challenges and to restore market confidence. These assistance packages were typically accompanied by strict economic reform conditions, including austerity measures, structural reforms, and fiscal adjustments. We therefore restricted the sample of countries by excluding countries that received financial assistance. Results for this restricted sample size are included in Tables 1.4 and 1.5.

Moreover, domestic political conditions might also affect fiscal outcomes. Therefore, we estimate the DiD and IV models where, in addition to the control variables in the benchmark equations, we added the following controls: i) government fragmentation, which we proxied by the effective number of parties (ENP), and ii) cabinet composition, which corresponds to the Schmidt- cabinet composition Schmidt-Index, where the score goes from 1 to 5 (from the hegemony of right-wing and centre to the hegemony of social-democratic and other left parties.

Table 1.4: Effect of compliance on the primary balance. Static and dynamic DiD for different sample compositions

| Treatment | **1995-2007 period** | | **Excluding EU-IMF assisted countries** | | **Adding control variables** | |
|---|---|---|---|---|---|---|
| | Coef. (1) | S.E. (2) | Coef. (3). | S.E. (4) | Coef. (5) | S.E. (6) |
| **Deficit comp.** | | | | | | |
| Effect 0 | 2.42** | 0.61 | 1.28 ** | 0.38 | 1.26** | 0.36 |
| Placebo 1 | 0.18 | 0.81 | 0.22 | 0.56 | 0.16 | 0.57 |
| **Debt comp.** | | | | | | |
| Effect 0 | 1.20 | 0.95 | 0.30 | 0.55 | 0.35 | 0.68 |
| Placebo 1 | -0.80 | 0.65 | 0.00 | 0.64 | 0.02 | 0.62 |
| **BBR comp.** | | | | | | |
| Effect 0 | 1.35** | 0.46 | 1.16** | 0.26 | 1.17** | 0.32 |
| Placebo 1 | -0.01 | 0.62 | -0.01 | 0.31 | -0.02 | 0.40 |
| **ER comp.** | | | | | | |
| Effect 0 | 0.32 | 1.28 | 0.29 | 0.21 | 0.34 | 0.18 |
| Placebo 1 | 0.19 | 0.85 | 0.24 | 0.41 | 0.24 | 0.40 |
| **Full comp.** | | | | | | |
| Effect 0 | 0.88 | 0.59 | 0.92** | 0.22 | 0.88 | 0.62 |
| Placebo 1 | -0.11 | 0.38 | 0.37 | 0.28 | 0.28 | 0.24 |
| Effect 1 | 1.68** | 0.52 | 1.53** | 0.33 | 1.42** | 0.35 |
| Effect 2 | 1.88** | 0.59 | 0.96 | 0.63 | 0.70 | 0.51 |
| Effect 3 | 2.92** | 0.85 | 2.08** | 0.65 | 1.73** | 0.60 |
| Placebo 1 | 0.19 | 0.28 | -0.21 | 0.27 | -0.10 | 0.28 |
| **BBR constitutional** | | | | | | |
| Effect 0 | 1.37** | 0.29 | -0.22 | 0.57 | -0.21 | 0.52 |
| Placebo 1 | -0.30 | 0.34 | 1.12** | 0.62 | 1.03** | 0.50 |
| Effect 1 | 1.21** | 0.24 | 0.03 | 0.49 | -0.21 | 0.48 |
| Effect 2 | -0.99 | 0.51 | -0.33 | 0.54 | -0.62 | 0.38 |
| Effect 3 | -0.95** | 0.44 | -0.01 | 0.43 | -0.30 | 0.47 |
| Placebo 1 | 0.38 | 0.33 | -1.20** | 0.40 | -1.03** | 0.31 |

Note: (a) S.E corresponds to standard errors; (b) ** $p < 0.05$; (c) All the models include country and time fixed effects. The coefficients represent the average effect of FRs' compliance on the countries that comply. They measure the average difference in the fiscal outcome between those countries that complied with the FRs and those that did not. Values before zero represent the placebo. The zero value represents the date of the treatment. The values above are dynamic effects.

The source of this data is the Comparative Political Data Set by the University of Zurich, Leuphana University, and the University of Lucerne (see Armingeon et al. (2024)). The final control variables we included for robustness purposes are

Table 1.5: Effect of compliance and FRSI on the primary balance. IV estimates for different sample compositions

| | 1995-2007 period | | | Excluding EU-IMF assisted countries | | | Adding control variables | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| L.primary balance | 0.48*** | 0.46*** | 0.45*** | 0.54*** | 0.66*** | 0.67*** | 0.54*** | 0.65*** | 0.66*** |
| | (0.10) | (0.11) | (0.11) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| FRSI | 0.31 | 0.50 | 0.50 | 0.08 | 0.07 | -0.02 | 0.07 | 0.07 | -0.01 |
| | (0.27) | (0.30) | (0.30) | (0.14) | (0.16) | (0.15) | (0.15) | (0.16) | (0.16) |
| Exp. comp. | – | | | 0.08 | | | 0.10 | | |
| | – | | | (0.21) | | | (0.21) | | |
| Deficit comp. | 0.89*** | | | 1.22*** | | | 1.24*** | | |
| | (0.27) | | | (0.18) | | | (0.18) | | |
| Debt comp. | 0.12 | | | 0.29 | | | 0.29 | | |
| | (0.28) | | | (0.19) | | | (0.19) | | |
| BB comp. | 1.54*** | | | 1.34*** | | | 1.31*** | | |
| | (0.18) | | | (0.12) | | | (0.12) | | |
| Full comp. | | 0.00 | | | 0.77*** | | | 0.75** | |
| | | – | | | (0.22) | | | (0.23) | |
| BBR const. | | | -0.94 | | | -0.15 | | | -0.09 |
| | | | (1.13) | | | (0.28) | | | (0.28) |
| L.Gross debt | 0.03* | 0.04** | 0.04** | 0.02*** | 0.03*** | 0.03*** | 0.02*** | 0.03*** | 0.02*** |
| | (0.01) | (0.01) | (0.01) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| GDPG | 0.21** | 0.20** | 0.19** | 0.10** | 0.09* | 0.09* | 0.09** | 0.07* | 0.08* |
| | (0.06) | (0.07) | (0.07) | (0.03) | (0.04) | (0.04) | (0.03) | (0.03) | (0.03) |
| Openness | 0.01 | 0.00 | 0.00 | 0.01* | 0.01* | 0.01** | 0.01* | 0.01* | 0.01** |
| | (0.01) | (0.01) | (0.01) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| IT | | | | | | | 0.80 | 0.47 | 0.41 |
| | | | | | | | (0.59) | (0.66) | (0.67) |
| ENP | | | | | | | 0.02 | 0.05 | 0.06 |
| | | | | | | | (0.04) | (0.05) | (0.05) |
| Cab. composition | | | | | | | 0.00 | -0.02 | -0.02 |
| | | | | | | | (0.04) | (0.05) | (0.05) |
| GDPG region | | | | | | | -0.00 | -0.10 | -0.15 |
| | | | | | | | (0.10) | (0.12) | (0.13) |
| Observations | 264 | 264 | 264 | 635 | 635 | 635 | 634 | 634 | 634 |
| Weak identification statistic | 32.9 | 38.9 | 18.7 | 159.2 | 225.6 | 112.6 | 152.0 | 217.7 | 108.3 |

Note: (a) Standard errors are presented in parentheses; (b) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; (c) All the models include country and time fixed effects; (d) L. represents the lagged variable. (e) IV are the number of countries complying with the rule each year, the average value for FRSI in the rest of the countries in the EU the the first lag of the dependent variable; (f) The weak identification statistic corresponds to the Kleibergen-Paap rk statistic.

dummy variables for the presence of inflation targets and the average growth rate of GDP in the rest of the countries in the region. The results are presented in the last columns of Tables 1.4 and 1.5.

Finally, we added a dummy variable for the inflation target and the average growth in the region to capture possible spillovers among countries. [22]

22. Since 1995, all Euro Area countries are classified as free-floating without inflation targeting regimes. The only inflation-targeting countries are Czech Republic since 1998, Finland since 1995, Hungary since 2008, Poland since 2001, Romania since 2008, and Sweden.

As seen, our previous results are robust to different sample compositions and the inclusion of additional control variables.

## 1.6 Conclusion

Fiscal rules are designed to enhance fiscal discipline and ensure sustainable public finances. Ideally, these rules should improve fiscal control by setting clear constraints on budgetary policies. However, as demonstrated by the global financial crisis of 2008 and the COVID-19 pandemic in 2020, governments do not always adhere to national or supranational fiscal rules. Notably, in 2020, European countries temporarily suspended their fiscal rules to implement necessary economic support measures. The reapplication and potential reform of these rules in the region highlight the need for a better understanding of the implications of strict adherence to fiscal rules in the future.

This chapter contributes to this ongoing debate by analyzing data for the EU-27 countries from 1995 to 2022. We offer a robust evaluation of the causal impact of fiscal rules, employing methodologies that address the endogeneity associated with the decision to adopt the rules in the first place. Crucially, rather than merely assessing the impact of the presence of fiscal rules on fiscal outcomes, we focus on the effects of true adherence and the strict implementation of these rules, with particular attention to the sustainability of compliance and its implications for fiscal stability.

We find that countries that comply with a budget balance or deficit rules achieve better fiscal outcomes in terms of primary balance, public expenditure, and public investment compared to countries that fail to comply with this rule. However, compliance with the debt and expenditure rules imposed by the SGP, or enshrining BBRs at the highest level of law —namely, in national constitutions— does not offer any significant advantage over simple BBRs. Additionally, we show that

simultaneous compliance with all fiscal rules does not ensure long-term fiscal stability.

Our findings have several implications for economic policy, especially in the current context where EU fiscal rules are being redesigned. The results suggest that adopting well-designed, but not necessarily very strict, BBRs can help EU countries maintain fiscal discipline. This adds nuance to the long-standing debate between fiscal discipline and fiscal flexibility: while strict fiscal rules may enforce discipline, they may also limit a government's ability to respond flexibly to economic shocks and are not necessarily optimal. Moreover, they do not seem to yield better fiscal outcomes over the medium and long term. Conversely, excessive flexibility without sufficient discipline can lead to fiscal instability.

While fiscal rules are effective in promoting fiscal discipline, they can also have unintended negative consequences for the economy. For example, our findings indicate that adherence to BB rules reduces public investment. Public investment in areas such as infrastructure, education, and healthcare is essential for long-term economic growth, innovation, and societal well-being. Reducing this investment risks jeopardizing future prosperity, particularly during economic downturns when such spending is most critical.

To address this, adopting "golden rules" in fiscal policy—allowing governments to borrow specifically for productive investment while enforcing strict limits on recurrent expenditures—could help ensure that short-term fiscal constraints do not undermine vital infrastructure and growth-enhancing projects. Additionally, incorporating counter-cyclical flexibility into BB frameworks can provide further support. Tools such as escape clauses or investment stabilization funds would enable governments to sustain or increase public investment during economic downturns, counteracting the pro-cyclicality often associated with rigid fiscal rules.

While our study provides important insights, it is not without limitations. The potential endogeneity of fiscal rule adoption cannot be entirely ruled out, as countries may adopt or comply with rules in response to underlying fiscal conditions that are not fully captured by our specifications. Nonetheless, these concerns are likely mitigated by the fact that we control for past fiscal conditions in all our models. Furthermore, we employ a range of alternative methodologies, each specifically designed to address endogeneity issues. Given that our results remain robust across various alternative specifications—whether through additional control variables, different sample selections, or alternative estimation methods—we are confident in the validity of our conclusions.

Finally, while compliance with BBRs leads to improved fiscal outcomes in the short term, our analysis does not address the broader welfare implications of these rigid rules. Indeed, as we demonstrate, when a government operates under some budget constraints and commits to it, this restricts public expenditure and alters the composition of public spending. Consequently, governments may reduce social or health expenditures, potentially exacerbating inequalities and diminishing quality of life. These are significant issues that warrant further investigation.

# Appendix

Table A-1: Correlation for Compliance and FRSI for country $i$ and all the rest of the countries in the EU

| Country | Compliance | FRSI |
|---|---|---|
| Austria | 0.59*** | 0.96*** |
| Belgium | 0.49*** | 0.93*** |
| Bulgaria | 0.83*** | 0.98*** |
| Croatia | 0.57*** | 0.91*** |
| Cyprus | 0.59*** | 0.95*** |
| Czechia | 0.83*** | 0.90*** |
| Denmark | 0.83*** | 0.81*** |
| Estonia | 0.83*** | 0.88*** |
| Finland | 0.69*** | 0.92*** |
| France | 0.35*** | 0.97*** |
| Germany | 0.49*** | 0.94*** |
| Greece | 0.50*** | 0.96*** |
| Hungary | 0.49*** | 0.96*** |
| Ireland | 0.69*** | 0.95*** |
| Italy | 0.64*** | 0.94*** |
| Latvia | 0.83*** | 0.96*** |
| Lithuania | 0.83*** | 0.96*** |
| Luxembourg | 0.83*** | 0.96*** |
| Malta | 0.45*** | 0.92*** |
| Netherlands | 0.83*** | 0.90*** |
| Poland | 0.83*** | 0.94*** |
| Portugal | 0.49*** | 0.97*** |
| Romania | 0.83*** | 0.94*** |
| Slovak Republic | 0.69*** | 0.97*** |
| Slovenia | 0.59*** | 0.92*** |
| Spain | 0.76*** | 0.98*** |
| Sweden | 0.83*** | 0.96*** |

Note: (a) The table shows the correlation coefficient between country $i$ and the rest of the countries in the EU using averages of the scores over the whole period; (b) *$p < 0.05$, *$p < 0.01$, *$p$*$< 0.001$.

Table A-2: Main coefficients for first-Stage Regressions for IV Model

| | Deficit comp. (1) | Debt comp. (2) | BBR comp. (3) | ER compl. (4) | Full comp. (5) | FRSI (6) |
|---|---|---|---|---|---|---|
| Region's deficit compl. | 0.025*** | -0.001 | 0.002 | 0.005 | | -0.001 |
| | (0.005) | (0.004) | (0.003) | (0.005) | | (0.001) |
| Region's debt compl. | 0.005 | 0.024*** | -0.003 | 0.005 | | -0.001 |
| | (0.005) | (0.004) | (0.004) | (0.008) | | (0.004) |
| Region's BBR compl. | 0.006 | 0.011** | 0.021*** | 0.018* | | 0.000 |
| | (0.005) | (0.004) | (0.002) | (0.008) | | (0.005) |
| Region's expend. compl. | 0.006 | 0.001 | 0.035*** | 0.017*** | | 0.004 |
| | (0.004) | (0.003) | (0.002) | (0.005) | | (0.003) |
| Region's full compl. | | | | | 0.025** | |
| | | | | | (0.007) | |
| Region's mean FRSI | -0.070 | -0.014 | -0.010 | -0.128* | 0.027 | 0.869*** |
| | (0.044) | (0.041) | (0.050) | (0.062) | (0.046) | (0.118) |
| Observations | 637 | 637 | 637 | 637 | 637 | |

Note: (a) Standard errors are presented in parentheses; (b) The models include also control variables as in the second step; (c) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; (d) All the models include country-specific linear trends and fixed effects.

Table A-4: Variables, sources and definitions

| **Variable** | **Source** | **Definition** |
|---|---|---|
| Fiscal Rules' compliance | Calculations based on the IMF's Fiscal Rules Dataset and ECFIN | 1 = country has adopted an FR established by the SGP and complied with a specific rule, zero otherwise |
| FRSI | Fiscal Rules Database. Fiscal governance database, European Commission | Indices on the strength and quality of budgetary rules. |
| BB rule constitutional | see Asatryan et al. (2018) | 1 = country for the country/period after the change in the constitution, zero otherwise |
| Primary balance | IMF | Government primary balance, percent of GDP (% of GDP) |
| Public Expenditure | WB World Economic Outlook | General government final consumption expenditure (% of GDP). |
| Public investment | Calculations based on IMF Investment and Capital Stock | General government investment (gross fixed capital formation), percent GDP |
| Private investment | Calculations based on IMF Investment and Capital Stock | Private investment (gross fixed capital formation), percent GDP |
| Gross debt | IMF | General government gross debt (Percent of GDP) |
| GDP growth rate | WB | GDP deflator growth rate, annual |
| Trade openness | WB | Exports plus imports as percent of GDP |
| Effective number of parties | see Armingeon et al. (2024) | Effective number of parties on the level of the votes |
| Cabinet composition | see Armingeon et al. (2024) | Schmidt-Index: (1) Hegemony of right-wing (and center) parties, (2) dominance of right-wing (and center) parties, (3) balance of power between left and right, (4) dominance of social-democratic and other left parties, (5) hegemony of social-democratic and other left parties. |

Notes: IMF: International Monetary Fund. WB: World Bank.

Table A-3: Scores for the Fiscal Rule Strength Index

| Criterion | Score |
|---|---|
| **Criterion 1**<br>Statutory/legal base | **3**: Constitutional<br>**2**: Legal Act of ordinary nature<br>**1**: Coalition agreement<br>**0**: Political commitment by a given authority or an annual budget law |
| **Criterion 2**<br>Room for setting or revising objectives | **3**: The target of the rule cannot be changed<br>**1**: Subject to parliamentary approval,the Gov. can temporarily change the target or it is mandated to decide on the target<br>**0**: Political commitment by a given authority ;or an annual budget law |
| **Criterion 3a**<br>Body in charge of the monitoring | **3**: Monitoring by an independent authority<br>**2**: Monitoring by the court of auditors and/or parliament<br>**1**: Monitoring only by the ministry of finance or other government body<br>**0**: No regular public monitoring of the rule |
| **Criterion 3b**<br>Real time monitoring | **1**: real-time monitoring takes place and the statutory base of the rule specifies corrective actions in case a risk of non-respect<br>**0.5**: Real-time monitoring takes place but the statutory base of the rule does not specify corrective actions<br>**0**: No real-time monitoring takes place |
| **Criterion 3c**<br>Body in charge of monitoring the correction mechanism in case of deviation | **1.5**: An independent authority<br>**1**: The court of auditors and/or parliament<br>**0**: The ministry of finance or other government body<br>**0**: No specific body in charge of monitoring the correction mechanism<br>**0**: No correction mechanism in place |
| **Criterion 3d**:<br>Independent body providing endorsing macro/budgetary forecasts | **2**: if there is an independent body for both<br>**1**: if there is an independent for either body providing the macroeconomic or the budgetary forecasts<br>**0**: if there is no independent body |
| **Criterion 4**:<br>Correction mechanisms in case of deviation from the rule | **4**: Triggered automatically and there are pre-determined rules of the correction<br>**2**: Triggered automatically or there are pre-determined rules of the correction<br>**1**: The government is obliged to take or present corrective measures before the parliament but without a predefined timeline<br>**0**: The government is not obliged to take or present corrective measures |
| **Criterion 5**:<br>Resilience to shocks or events outside the control of the government | The score is the sum of the following elements defined:<br>Does the rule contain clearly defined escape clauses in line with the SGP? (1/0)<br>Is there a budgetary margin defined in relation to the rule? (1/0)<br>Are targets defined in cyclically-adjusted terms ? (1/0)<br>Are there exclusions from the rule that fall outside authorities' control? (1/0) |

Notes: Criteria for the calculation of the Fiscal Rule Strength Index (FRSI). See the Directorate General for Economic and Financial Affairs for more details.

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# Chapter 2

# On the impact of fiscal policy on inflation: The case of fiscal rules[1]

1. Note: A version of this chapter has been published as "Zoumenou, J.M. (2025).On the impact of fiscal policy on inflation: The case of fiscal rules. *The B.E. Journal of Macroeconomics*, 10, 1515".

*The previous chapter analyzed the role of fiscal rules in ensuring fiscal stability and improving budgetary discipline. However, fiscal policy does not only affect public finances; it also interacts with broader macroeconomic variables, particularly inflation. A crucial question remains: do fiscal rules influence inflation dynamics, and if so, through which mechanisms? This chapter addresses this issue by examining the relationship between fiscal policy and inflation, focusing on the role of fiscal rules as a stabilizing tool.*

## 2.1 Introduction

Inflation is a critical determinant of economic stability, and its effective management relies heavily on sound economic policies. While monetary policy is widely recognized as central to controlling inflation, the role of fiscal policy warrants equal attention. Theories such as Sargent and Wallace (1981)'s unpleasant monetarist arithmetic and the Fiscal Theory of the Price Level (FTPL), advanced by Woodford (1994) and Sims (1994), argue that fiscal policies can have significant implications for inflation dynamics.

In their seminal work, Sargent and Wallace (1981) demonstrate that unsustainable fiscal policies may compel monetary authorities to finance deficits through money creation, ultimately leading to inflation. This framework highlights the inherent interdependence between fiscal and monetary policies, suggesting that inflation is not merely a monetary phenomenon but is also profoundly shaped by the fiscal regime in place. By imposing constraints on government borrowing and spending, fiscal rules can mitigate the risk of deficit monetization, thereby playing a pivotal role in curbing inflationary pressures.

Similarly, the FTPL posits that monetary and fiscal policies determine the price level jointly. Fiscal rules aim to ensure long-term fiscal sustainability by limiting unproductive fiscal behavior that leads to persistent deficits. In doing so, they help stabilize inflation expectations and provide a framework for controlling ac-

tual inflation by preventing structural imbalances in public finances.

Maintaining stable price levels requires fiscal discipline, prompting many nations to adopt fiscal rules (FR) to guide fiscal management. These rules, characterized by numerical limits on fiscal aggregates such as deficits and debt, are designed to ensure long-term fiscal sustainability and prevent imbalances that could fuel inflationary pressures (Lledó et al., 2017). During periods of high inflation, fiscal rules can also help anchor inflation expectations by reducing uncertainty about future government spending and borrowing. By imposing explicit constraints on fiscal policy, fiscal rules provide a foundation for stabilizing expectations, thereby helping to mitigate inflationary risks.

Given the extensive empirical evidence establishing causal relationships between macroeconomic aggregates such as public debt, government spending, and the public deficit (Darvas et al., 2018), and the fiscal rule outcomes[2](e.g., Bouton et al., 2020; Vinturis, 2022), it is reasonable to view efforts aimed at reducing public debt or maintaining fiscal discipline as crucial tools for managing inflation. The central challenge in this context lies in understanding how fiscal policy directly influences inflation dynamics. While numerous studies have explored the relationship between fiscal policy and inflation (Feldstein, 1978; Eaton, 1981; Bianchi and Ilut, 2017; Coibion et al., 2021; Asandului et al., 2021), they typically focus on the longer-term implications of fiscal deficits or fiscal shocks (Rother, 2004). In contrast, this chapter departs from the conventional emphasis on long-term fiscal imbalances, offering a more nuanced examination of how fiscal rules can influence inflation in the short and medium term while also controlling for the potential endogeneity of fiscal policy decisions.

In this chapter, I provide a comprehensive analysis of the impact of fiscal rules on inflation, explicitly accounting for cross-country heterogeneity and addressing potential selection bias. An essential reference in this area is Combes et al. (2014), one

2. See Brändle and Elsener (2024) for a recent review on fiscal rules.

of the few studies investigating fiscal rules and targeting as integral components of budgetary policy, examining their joint effect on inflation dynamics. However, a critical limitation of previous research is that countries adopting fiscal rules tend to differ systematically from those not typically possessing stronger institutions, better governance, and more stable macroeconomic environments. As a result, the observed relationship between fiscal rules and inflation may be confounded by these underlying structural differences, leading to either an overestimation or underestimation of the actual causal effect of fiscal rules on inflation. In addition, Combes et al. (2014) uses the instrumentation technique. Still, even when a valid instrument is available, the fact that the adoption of fiscal rules is non-random could result in poor estimates when using an instrumental variable strategy approach, as pointed out by Ertefaie et al. (2016) and Canan et al. (2017), who stress the relevance of the matching approach in the presence of this specific source of endogeneity.

Thus, entropy balancing allows us to correct this bias, and this method is increasingly used to address the selection bias problems of different treatments (Apeti and Edoh, 2024; Apeti and Ly, 2024).

To investigate this relationship, I employ a panel dataset from 1985 to 2021, encompassing 26 advanced countries, 29 emerging countries, and 24 low-income countries. To address potential endogeneity bias, I utilize matching techniques, specifically adopting entropy balancing (referred to as EB hereafter) as introduced by Hainmueller (2012). This method aims to minimize the entropy, which measures the uncertainty or imprecision within the data. The algorithm facilitates an accurate comparison of propensity scores by striving to achieve comparable distributions of characteristics across different groups. This method is crucial for several reasons.

First, using EB enables me to establish a causal relationship between fiscal rules

and inflation outcomes while effectively isolating the effects of other factors. It is worth noting that there is currently no systematic evidence regarding the direct impact of FRs on inflation. Nevertheless, existing literature suggests that when public debt surpasses a certain threshold, it tends to impede economic growth and elevate inflation (Barro, 1979; Kumar and Woo, 2010; Ostry et al., 2015; Blanchard, 2019). Consequently, economies should exercise prudence in managing their indebtedness to mitigate adverse economic consequences. Some economists and researchers argue that public debt can indeed lead to inflation. For instance, Fisher (1933) postulates that inflation arises from an excess supply of money, which can result from the creation of money to finance public debt. Friedman (1968) similarly develops the monetary debt theory, asserting that creating money to repay public debt can induce inflation. Additionally, Reinhart and Rogoff (2010) support the notion that public debt can lead to inflation, mainly if it is misused to finance non-productive expenditures (Sims, 2014; Romero et al., 2017; Afonso and Ibraimo, 2020). Under this perspective, to limit the evolution of public debt, public authorities often opt to implement fiscal rules, which can help to limit public expenditure and/or budget deficits. A growing body of evidence indicates that well-designed FRs are generally associated with the greater fiscal discipline (Alesina and Perotti, 1995; Alesina et al., 1999; Debrun, 2000; Hallerberg et al., 2009; Lledo et al., 2010; Gollwitzer, 2011; Tapsoba, 2012). Consequently, a connection between FRs and inflation begins to emerge.

Secondly, existing literature attributes global disinflation to factors such as monetary policy (e.g., more credible central banks (Morimoto et al., 2003)), globalization (Rogoff, 2003), or even luck. However, this chapter suggests an alternative explanation: implementing fiscal rules. Considering the extensive literature emphasizing that inflation is influenced by both monetary and fiscal policy, it is plausible that global disinflation is influenced by institutional factors encompassing those governing monetary policy and those associated with fiscal policy. Further-

more, within the examined sample, there is a prevailing trend toward adopting fiscal rules alongside the global disinflation movement. Although this correlation between FRs and inflation may be apparent, the application of EB allows me to control for confounding factors and accurately estimate the strict causal effect of adopting fiscal rules on inflation.

Third, it is essential to acknowledge that the decision to adopt fiscal rules may not be random. While there is no universal rule that applies to all countries, fiscal rules can assist governments in achieving their fiscal targets and enforcing fiscal discipline (Kopits, 2001; Badinger and Reuter, 2017). Indeed, countries may adopt fiscal rules to attain fiscal discipline and reduce inflation. However, the adoption of fiscal rules could be an endogenous choice. Similar to specific monetary regimes, the endogeneity of fiscal rules implies that countries with relatively lower inflation rates are more likely to opt for such rules.

High inflation could increase the fiscal deficit and then make implementing FRs impossible. Firstly, high inflation increases interest rates, increasing the government's borrowing cost (Sargent and Wallace, 1981). This means that the government will have to spend more on interest payments, which can contribute to a higher fiscal deficit.

Low inflation can have a positive impact on fiscal deficit and facilitate the implementation of fiscal rules. Low inflation reduces the pressure on prices and costs, which can help government finances by lowering interest rates and borrowing costs. This can lead to lower interest payments on government debt, thereby improving the overall fiscal deficit (Andolfatto and Spewak, 2018; Cochrane, 2022). Additionally, with lower inflation, the government may find it easier to adhere to fiscal rules as it can more effectively control spending and maintain a balanced budget. Furthermore, low inflation provides stability and predictability to the economy, making it easier for governments to plan and execute their fiscal poli-

cies.

I show that fiscal rules help reduce inflation, but the final impact depends on many factors, such as the economy's structure or the monetary and fiscal policies implemented. More in detail, countries that have adopted fiscal rules have an average inflation level of about 1.92 percentage points (pp.) lower than countries that have not implemented these rules. This result remains robust across different specifications of the entropy balancing method and alternative estimation techniques.

Secondly, I reveal that fiscal rules' influence on inflation is more pronounced when they specifically constrain public debt and/or budget deficits. Furthermore, the impact is more remarkable in developing countries compared to least-developed countries, and the effect is particularly evident in emerging and low-income countries.

Lastly, I provide empirical evidence that fiscal rules induce a decline in inflation rates in the short and medium term. Notably, the effect of fiscal rules on inflation is more potent when the initial level of inflation is not above 15%, and it is found that the combination of central bank credibility and fiscal rules negatively affects inflation rates.

In sum, this chapter builds on the framework laid out by Sargent and Wallace (1981), emphasizing the critical role that fiscal policy plays in conjunction with monetary policy to manage inflation. By addressing key limitations in the existing literature, my work offers novel insights into how fiscal rules can effectively mitigate inflationary pressures, particularly in developing and emerging economies.

The inadvertent effects of fiscal policy on inflation need to be considered in addition to monetary policy to manage inflation levels successfully.

The outline of this chapter is organized as follows: Section 2.2 presents a survey of the related literature, providing a valuable guide for my analysis. Section 2.3

briefly presents the methodology and the data. The results are shown in section 2.4. Section 2.5 presents the robustness checks. The final section 2.6 provides the conclusions.

## 2.2 Literature Review

In this section, I first present the main literature on fiscal rules and public debt. I then turn to the link between public debt and inflation, specifically to the impact of public debt on inflation.

### 2.2.1 Fiscal rules and Public debt

The existing literature extensively investigates the effects of fiscal rules on public debt and a consensus has been reached that fiscal rules are effective in curbing the accumulation of public debt in countries that adopt them (Alesina and Tabellini, 1990; Debrun et al., 2008; Halac and Yared, 2014, Halac and Yared, 2018). For instance, Alesina and Passalacqua (2016) discusses numerical rules and institutional designs that can moderate government debt accumulation. Azzimonti et al. (2016) analyzes explicitly the impact of a balanced budget rule, which requires legislators to refrain from running deficits within a political economy model. Their main finding is that such a rule results in a gradual decrease in government debt.

Furthermore, evidence highlights the effectiveness of fiscal rules in mitigating the burden of public debt when implementing counter-cyclical fiscal policies. Combes et al. (2017) shed light on the positive effects of fiscal rules in alleviating constraints imposed by the debt stock when undertaking counter-cyclical fiscal policies. Similarly, Asatryan et al. (2018) examines the effects of balanced budget rules (BBR) at the constitutional level on fiscal outcomes and concludes that introducing this fiscal rule reduces the probability of experiencing a sovereign debt crisis. Heinemann et al. (2018) conduct a meta-regression analysis based on 30 studies pub-

lished over the last decade, providing empirical evidence pointing to fiscal rules' constraining effect on fiscal aggregates.

In a recent contribution, Piguillem and Riboni (2021) demonstrate that even when fiscal rules are overridden or suspended by public authorities, they remain effective, as fiscal rules directly reduce the temptation to accumulate debt. Additionally, a more recent paper by Vinturis (2022), utilizing estimations based on the entropy balancing method, reveals that fiscal rules significantly reduce total public spending and consumption.

This body of research supports the notion that fiscal rules play a vital role in containing public debt and influencing fiscal outcomes, even in the face of potential challenges or temporary suspensions. The effectiveness of fiscal rules extends beyond their formal implementation, underscoring their significance in curbing debt accumulation and guiding fiscal behavior.

### 2.2.2 Public debt and Inflation

The theoretical relationship between fiscal policy and inflation has been a subject of inquiry among economists for a long time. While the monetarist view posits that inflation is solely caused by monetary aggregates, in a non-Ricardian environment with active monetary and fiscal policies, fiscal policy variables play a crucial role in determining the price level. The non-Ricardian policy framework suggests that changes in the value of government bonds impact household budgets, leading to wealth effects on private consumption demand, which, in turn, affect the price level (Woodford, 1998; Aimola and Odhiambo, 2020). Bhattarai et al. (2014) argues that in a passive monetary and active fiscal policy regime, public debt changes generate wealth effects on households, resulting in an increased response to inflation. On the other hand, in a passive monetary and passive fiscal policy regime, both monetary and fiscal policy parameters influence inflation. The

relationship between public debt and inflation can be direct or indirect, depending on whether central banks or the private sector demand government bonds, as well as the inflation expectations of economic agents due to high levels of public debt (Nastansky and Strohe, 2015).

Empirical research on the relationship between public debt and inflation has been conducted in developed and developing countries, leading to mixed conclusions. Various authors have studied this link using different estimation techniques, aiming to understand these macroeconomic variables and guide policy choices. For example, Taghavi (2001) examines the consequences of debt in the short and long term for major European economies (France, Germany, Italy, and the United Kingdom) and the EU as a whole. His study finds that debt appears to be inflationary in the long run but provides inconclusive evidence for the short run. Kwon et al. (2009) shows a strong association between increased public debt and high inflation in indebted developing countries, although this pattern is less pronounced in other developing countries. Reinhart and Rogoff (2010) analyzes the relationship between debt levels, growth, and inflation and finds differing results for advanced economies and emerging markets, with the latter experiencing a sharper increase in inflation with higher debt levels. Nguyen (2015) studies the effects of government debt on inflation in 15 developing Asian economies, finding statistically positive effects. Lopes da Veiga et al. (2016) analyzes a panel of 52 African countries and finds that high public debt levels increase inflation. More recent research by Dumitrescu et al. (2022) explores the non-linear effects of public debt on inflation in a sample of 22 emerging economies. It identifies threshold effects, indicating that countries with larger shadow economies face higher inflation costs associated with increased public debt.

Despite extensive research on public debt and inflation, limited literature specifically examines the direct impact of fiscal rules on inflation. Combes et al. (2014) and Combes et al. (2018) investigate how the joint implementation of inflation tar-

geting (IT) and fiscal rules affects both inflation and fiscal performance using a large panel of countries. Their studies employ a two-step GMM estimation technique for inflation dynamics and fiscal policy persistence. My study adds to the previous literature by focusing on the direct effect of fiscal rules on inflation, providing valuable insights into this relationship.

## 2.3 Methodology and Data

This section presents the methodology used for the propensity score. I then show the main features of the dataset.

### 2.3.1 Methodology

Entropy balancing is a statistical method used in economics to balance or equalize the distribution of certain variables across different groups or treatment conditions. It aims to create comparable groups by adjusting the weights assigned to each observation based on their characteristics. In other words, entropy balancing is a technique that helps make different groups or treatment conditions more similar by adjusting the weights of individual observations based on their characteristics.

More in detail, let $Z$ be a binary variable indicating the treatment of fiscal rule adoption's status ($Z = 1$ for the country with at least one fiscal rule and $Z = 0$ for the control group), $X$ the covariates matrix and $e$ the propensity score. For each unit, the FRs effect is defined as $Y_i(1) - Y_i(0)$: the difference between the two potential outcomes. The average treatment effect on the treated (ATT) is defined as $E[Y_i(1) - Y_i(0)|Z = 1] = E[Y(1)|Z = 1] - E[Y(0)|Z = 1]$, the expectation for the population of interest (Imbens, 2004). That is, the ATT is the difference in the pair of potential outcomes averaged over the population that constitutes the treatment group, i.e., the countries that adopted fiscal rules.

Consequently, $E[Y(1)|Z = 1]$ is the inflation rate after the fiscal rule implementation. $E[Y(0)|Z = 1]$ represents the counterfactual outcome for a country having introduced fiscal rules, i.e., the inflation rate in FR's countries if they had not introduced fiscal rules. It is, therefore, a counterfactual that cannot be identified from the available data as $E[Y(1)|Z = 1]$. To get to the bottom of this problem, Rosenbaum and Rubin (1983) propose a selection of observables and an overlap: this is the strong ignorability assumption. This implies that $Y(0) \perp Z|X$ and $Pr(Z = 1|X = x) < 1$ for all $x$ in the support of $f_{X|D=1}(x)$ and so the ATT estimator is defined as follows:

$$\tau = E[Y|Z = 1] - \int E[Y|X = x, Z = 0] f_{X|Z=1}(x) dx$$

where $\tau$ is ATT. The estimation of the term in the integral is done under the condition that the distribution of covariates in the control group is similar to the distribution of covariates in the treatment group. Once this balance is achieved, the FRs effects can be estimated using a standard analysis method (Imbens, 2004).

Several techniques can be used to adjust the distribution of covariates so that there is as close as possible to a balance between the treatment and control groups. One such method is propensity score matching with many variations, such as propensity score weighting and covariates adjustments. However, it is particularly challenging and complex to reach a balance with these methods because the procedure has to be repeated manually until a certain balance in the distribution of covariates is attained. Hainmueller (2012) therefore develops a method, which I use in this chapter, that ensures covariate balance.

The entropy balancing method proposed by Hainmueller (2012) is a generalization of the propensity score weighting method. Unlike the propensity score weighting method, where weights must first be calculated after a logistic regression, entropy balancing allows for creating control groups similar to the treatment groups as

early as the preprocessing phase. The weights are estimated from a large set of balancing constraints.

This method has several advantages according to two specific points. The first one is that it is a method of the maximum entropy family, and it has been shown that minimizing the entropy from uniform base weights provides an estimator that is consistent as well as asymptotically normal and efficient (Ireland and Kullback, 1968). The second is that entropy balancing ensures covariate balance, one of the main keys in observational studies. The quality of a causal effects study is measured essentially by the diagnostic of the balance in the distribution of covariates between the treatment and control groups.

Entropy balancing, like any propensity score method, permits the addressing of potential endogeneity between the outcome of interest and treatment variable. It should be added that there are matching methods that remove and retain participants (here, each observation, that is, each country, each year) in the matching process to present a balance in the covariates (Thoemmes and Ong, 2016). This is not the case with the entropy balancing, which does not exclude any observations. Amusa et al. (2019) assert that the entropy balancing technique is useful and excellent in performance after evaluating its performance using an extended series of Monte Carlo simulations.

Theoretical results and simulations in the literature suggest that entropy balancing is a very attractive alternative to conventional weighting estimators that estimate the propensity score by maximum likelihood. Specifically, I find that the entropy balancing is doubly robust concerning the linear regression of the outcomes and the logistic regression of the propensity scores and that it reaches the asymptotic limit of semi-parametric variance when the two regressions are correctly specified (Zhao and Percival, 2017).

### 2.3.2 Data and Descriptive statistics

This section describes the data used in empirical analysis. Further details on data sources, description, and construction of variables are provided in the Appendix B-5. I employ annual data for a large sample of advanced, emerging, and developing economies[3]. The availability of data on fiscal rules, also only available on an annual basis, restricts our country sample to 79 countries for the period 1985-2021. The sample includes 26 advanced countries, 29 emerging countries, and 24 low-income countries following the IMF's classification. More specifically, I consider the following countries :

- High-income countries: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom, United States.

- Emerging countries: Argentina, Armenia, Azerbaijan, Botswana, Brazil, Bulgaria, Chile, Colombia, Costa Rica, Croatia, Ecuador, Equatorial Guinea, Hungary, India, Indonesia, Iran, Jamaica, Malaysia, Malta, Mauritius, Mexico, Namibia, Pakistan, Paraguay, Poland, Russia, Sri Lanka, Thailand, Uruguay.

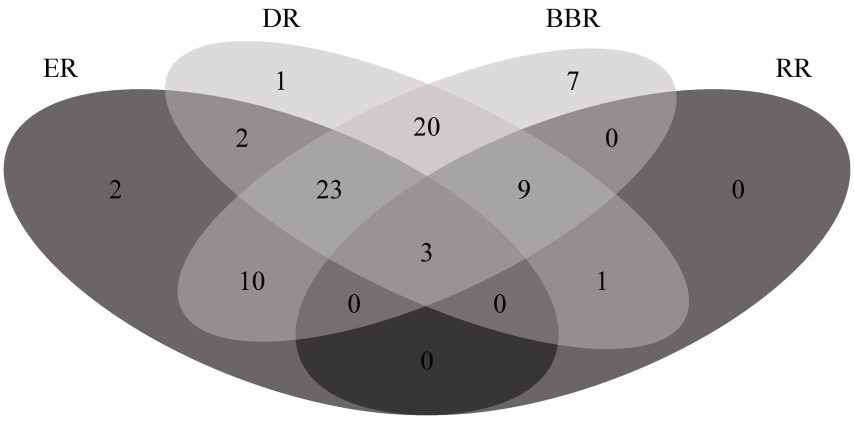
- Low-income countries: Benin, Burkina-Faso, Burundi, Cameroon, Cabo Verde, Central African Republic, Chad, Republic of Congo, Côte d'Ivoire, Dominica, Gabon, Grenada, Guinea Bissau, Kenya, Maldives, Mali, Mongolia, Niger, Nigeria, Rwanda, Senegal, Togo, Uganda, Vietnam.

Data on Fiscal rules comes from the International Monetary Fund Fiscal Affairs Department Fiscal rules dataset (IMF FAD and Davoodi et al., 2022). This dataset compiles cross-national information on fiscal rules from 1985 to 2021 and is the

3. Quarterly data is generally unavailable for fiscal policy indicators for emerging and developing economies.

best data available for comparisons across countries and over time (Ulloa-Suarez and Valencia, 2022). The index is constructed as binary coding with a score of one '1' if a country's fiscal rule had that specific feature and a score of zero '0' otherwise. Fiscal rules are decomposed into expenditure rules (ER), revenue rules (RR), budget balance rules (BBR), and debt rules (DR).

Figure 2.1: Number of countries with fiscal rules in 2021




Notes: ER, RR, DR, and BBR mean respectively Expenditure rules, Revenue rules, Debt rules, and Budget balance rules. Data comes from the IMF Fiscal Rules dataset. There are 78 countries due to Canada.

Expenditure rules set limits on total, primary, or current government expenditures. Debt rules set an explicit anchor or ceiling for public debt, often expressed in percent of GDP. Revenue rules set ceilings or floors on revenues to boost revenue collection and/or prevent an excessive tax burden. Budget balance rules constrain the budget aggregate that primarily influences the debt ratio and are largely under government control[4]. We have a binary entry of '1' if the country has that specific type of fiscal rule or '0' otherwise. Some countries have multiple rules with '1' indicated in each category.

The adoption of fiscal rules has remarkably evolved throughout our study (see figure A-2). For our panel, in 1985, only six economies had adopted fiscal rules, whereas in 2021, there were seventy-seven countries. Figure **??** shows that by 2021,

4. For more details on the characteristics of each rule, see Davoodi et al. (2022).

40 nations had adopted fiscal rules related to expenditures, 72 for rules related to the budget balance, 59 for rules that constrain the public debt, and only 13 for rules related to income.

As seen in table A-2 in the appendix, advanced countries in the panel are much more likely to follow fiscal rules than the other two groups of countries. Indeed, 75.5% of advanced countries have opted for fiscal rules against 50.2% and 50.4%, respectively, for emerging and low-income countries. When I consider the rules by type, budget balance rules followed by debt rules are the most adopted by advanced and non-advanced countries. 72.1% of advanced countries have adopted budget balance rules, and 50.1% adopted debt rules. Also, 41.3% of emerging countries have adopted budget balance rules, and 29.5% acquired debt rules. As for low-income countries, more than 40% of them follow budget balance rules (49.3%) and debt rules (48.5%). Disparities are observed in the dispersion of certain fiscal rules in our panel. Revenue rules are highly favored by low-income countries (25.2%) compared to 6.6% for advanced countries and 1.1% for emerging countries. When it comes to expenditure rules, low-income countries adopt them in meager proportions (2.7%) compared to 39.6% for advanced countries and 19.8% for emerging countries. Regarding inflation, Table A-1 in the appendix shows that inflation is lower on average in countries that have adopted fiscal rules than in those that have not, whether they are advanced, emerging, or low-income countries (see Table 2.1). Note, however, that the average inflation for emerging countries is very high because certain countries, such as Argentina, Armenia, and Brazil, have had episodes of very high inflation.

On the other hand, on average, inflation is higher in countries that have not adopted fiscal rules than countries with fiscal rules, whether I distinguish countries by their exchange rate arrangements. It is important to note that the discrepancy is less significant for advanced countries than for the other groups of coun-

Table 2.1: Average of inflation and public debt following income groups

| | Average of inflation (1985-2021) | | |
|---|---|---|---|
| | **Advanced countries** | **Emerging countries** | **Low-income countries** |
| **Without fiscal rules** | 5.68 | 87.6 | 15.4 |
| **With fiscal rules** | 2.03 | 5.57 | 3.07 |
| | **Average of public debt (1985-2021)** | | |
| | **Advanced countries** | **Emerging countries** | **Low-income countries** |
| **Without fiscal rules** | 53.3 | 47.3 | 67.4 |
| **With fiscal rules** | 60.4 | 44.0 | 51.9 |
| | **Average of inflation (1985-2021)** | | |
| | **Pegged exchange rate regime** | | **Floating exchange rate regime** |
| **Without fiscal rules** | 15.4 | | 9.93 |
| **With fiscal rules** | 3.23 | | 3.62 |

tries in the panel study. So, according to the classification of countries by income level and exchange rate regime, the level of inflation is much higher for countries that have not adopted fiscal rules (see Table 2.1).

The comparison of average inflation between the two groups (FR and non-FR countries), relying solely on the mean, can be deceptive and may need a comprehensive understanding of the distinctions between the groups. This is attributable to the mean's failure to consider the underlying data distribution or potential confounding variables. Conversely, the endogeneity issue complicates comparing inflation values between the two groups (as presented in this table 2.1). Employing entropy balancing addresses this concern by establishing two groups with comparable covariate distributions, diminishing the likelihood of bias and confounding.

As seen in Table A-3 in the appendix, there is not much difference in the occurrence of fiscal rules between countries with fixed and floating exchange rate regimes. 61.8 percent of countries with fixed exchange rate regimes and 55.6 percent with floating exchange rate regimes have opted for fiscal rules. However, there are disparities in the fiscal rules related to revenue and public debt. Less than one percent of flexible exchange rate countries have adopted revenue rules, and only 17.6 percent have adopted fiscal rules related to public debt.

Regarding public debt, there was a downward trend in the 2000s. However, the

2007-08 subprime crisis put debt back on an upward trend (see Figure A-1). Table 2.1 also presents the average debt in countries grouped by income level. As can be seen, the average debt over the period is lower in countries with fiscal rules in place than in countries without. This is apparent in emerging and least-developed countries. Note, however, an inverse tendency for advanced countries (60.4% average debt for those with FRs against 53.3% for those without FRs).

Concerning the outcome variable, the annual growth rate of the Consumer Price Index (CPI) is a key measure of our study. This measure, along with the rest of the variables that enter the estimation, including real GDP per capita growth, public debt, the dependency ratio, a dummy for inflation targeting (IT), political stability, public deficit, trade openness, the political orientation of government, unemployment rate, education, and exchange rate regime, provides a comprehensive view of the factors influencing the adoption of fiscal rules. The annual data come from the World Bank (WDI/WGI) database, ILO for the unemployment rate, and the IMF database for all the considered series.

The control variables in this study are selected from previous literature on the determinants of fiscal rules. Indeed, it is important to note that fiscal rules are predominantly adopted by developed countries, which are characterized by strong macroeconomic performance (IMF, 2009; Tapsoba, 2012). Therefore, we anticipate a positive relationship between real GDP per capita growth and the adoption of fiscal rules. Considering that inflation can complicate the design and implementation of fiscal rules (IMF, 2009), we expect higher inflation to hurt the probability of adopting fiscal rules.

The relationship between debt and the adoption of fiscal rules is uncertain since fiscal rules are often adopted to contain the growth of debt levels (Combes et al., 2019). The impact of the choice of exchange rate regime on the adoption of fiscal rules remains also being determined, despite theories from Mundell-Fleming and

Keynesian perspectives suggesting that a fixed exchange rate regime promotes better fiscal discipline. However, empirical evidence does not consistently support this conclusion (Gavin and Perotti, 1997; Tornell and Velasco, 2000).

Countries with a high dependency ratio face challenges in maintaining fiscal discipline due to high social spending (Calderon and Schmidt-Hebbel, 2008) and are therefore less likely to adopt fiscal rules. Similarly, a high unemployment rate can negatively impact spending, leading us to expect a negative effect of the unemployment rate on the likelihood of adopting fiscal rules. Higher dependency and unemployment rates can negatively affect the likelihood of adopting fiscal rules as they increase government spending pressures. However, these factors can also positively influence fiscal rule adoption if governments recognize the need for long-term fiscal sustainability, using rules to manage rising debt from social spending.

Given that the implementation of fiscal policies often accompanies the adoption of inflation targeting to ensure fiscal discipline (Minea and Tapsoba, 2014; Combes et al., 2018), we anticipate a positive link between the adoption of inflation targeting and fiscal rule adoption.

High levels of trade openness expose a country to external shocks and risks. Governments may increase spending when faced with such shocks, resulting in larger budget deficits. This view, supported by Rodrik (1998), Cameron (1978), and Combes and Saadi-Sedik (2006), suggests a negative impact of terms of trade on the budget balance. As such, we expect countries heavily involved in foreign exchange to be more inclined to adopt fiscal rules, particularly those related to fiscal balance. Trade openness can lead to greater fiscal pressures due to exposure to external shocks, potentially reducing the likelihood of adopting fiscal rules. Conversely, it can also increase the likelihood of fiscal rule adoption, as governments may use rules to enhance credibility and manage external risks, signaling fiscal

discipline to global markets.

Finally, to address potential endogeneity issues, our model specifications include lagged variables that capture time dependence and account for the influence of past values of variables such as public debt or dependency ratio on the contemporary adoption of fiscal rules. Lagged variables serve as "instrumental" variables, helping to mitigate endogeneity concerns.

## 2.4 Estimating Results

### 2.4.1 Baseline results

I first define the treatment as a dummy variable that takes on the value one if a country has adopted at least one fiscal rule for the given year. Table 2.2 presents the average treatment effects on inflation of a country's adoption of fiscal rules. The ATT represents the difference in inflation levels between countries that adopted fiscal rules and those that did not, under the condition that both groups of countries had the potential to adopt fiscal rules. I use a counterfactual in a 'parallel universe' where the same observables assigned the treatment in this universe would not get the treatment. In other words, with ATT, we are comparing countries that got FRs with a comparable group that did not adopt the rule but otherwise share very similar characteristics.

The results in columns (1) and (2) are those obtained by entropy balancing for inflation obtained with the CPI with differences in the consideration of fixed effects. For robustness, the results in the third column are obtained with the GDP deflator as the dependent variable. The results show that countries that adopted fiscal rules have, on average, lower inflation than control observations, the difference being negative and significant at any conventional confidence level.

The table B-6 demonstrates that fiscal rules have a statistically significant and neg-

Table 2.2: ATT for all fiscal rules

| **Benchmark Model** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **ATT** | -1.23*** | - 1.92*** | - 1.46*** |
| | (0.42) | (0.46) | (0.43) |
| **Treated/Total** | 1638/2787 | 1638/2787 | 1638/2787 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denotes the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors in parentheses. The stars, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

ative effect on inflation, even when hyperinflation periods are included in the sample. However, the marginal effects of fiscal rules on inflation are lower when hyperinflation episodes are present compared to baseline estimates without hyperinflation. This suggests that, while fiscal rules still reduce inflation during extreme inflationary periods, their impact is somewhat diminished due to the severity and scale of hyperinflation, which likely requires more comprehensive fiscal and monetary interventions to stabilize fully. This highlights the importance of removing these extreme cases better to understand the average effects in more typical inflationary environments. Hence, the results presented above and in the following sections do not consider hyperinflation episodes.

## 2.4.2 Heterogeneity based on the features of fiscal rules

In this section, I examine the specific characteristics of fiscal rules, explicitly focusing on their types, the combination of multiple rules, and the strength of their enforcement.

### 2.4.2.1 Results according to various types of fiscal rules

In the previous subsection, I considered as a dependent variable the fact that the country has adopted at least one fiscal rule. To assess the influence a particular rule could have, we repeat the two steps of the methodology, considering each

time the specific adoption of one of the four types of fiscal rules. I distinguish four types of fiscal rules: expenditure rules (ER), revenue rules (RR), debt rules (DR), and budget balance rules (BBR). It is helpful to consider the specific effects of each type of fiscal rule in an analysis because the existing literature reveals that, depending on the target of a fiscal rule, heterogeneous effects can be observed (Brzozowski and Siwińska-Gorzelak, 2010; Barbier-Gauchard et al., 2021).

Table 2.3: ATT using various rules

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **ER** | - 2.91*** | - 1.92** | - 2.86*** |
| | (0.98) | (0.87) | (0.87) |
| **Treated/Total** | 597/2787 | 597/2787 | 597/2787 |
| **RR** | - 0.54 | - 0.03 | 0.35 |
| | (0.71) | (0.34) | (0.80) |
| **Treated/Total** | 280/2787 | 280/2787 | 280/2787 |
| **DR** | 1.50 | - 0.57** | 1.03 |
| | (0.75) | (0.24) | (0.69) |
| **Treated/Total** | 1171/2787 | 1171/2787 | 1171/2787 |
| **BBR** | - 0.90*** | - 0.07*** | - 1.19** |
| | (0.26) | (0.17) | (0.36) |
| **Treated/Total** | 1506/2787 | 1506/2787 | 1506/2787 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table 2.3 shows that the fiscal rules, taken separately, reduce inflation. The public expenditures and the balance of budget rules are negatively related to inflation. The robustness of these results can be observed through the significance of the results in all the columns. This could be explained by countries generally adopting more numerical rules that limit budget balance deficits. These results are consistent and strengthen those obtained by considering all fiscal rules.

However, the other two fiscal rules—namely, RR and DR—do not provide evidence that adopting fiscal rules reduces inflation. In many countries, whether

advanced or low-income, rules limiting the evolution of public debt are widely implemented. As a result, the lack of significant effects may be specific to each group of countries, varying with their income levels. Furthermore, fiscal rules related to public revenues do not significantly impact inflation. This may be because revenue-based rules, such as those targeting tax rates or tax revenues, do not directly influence the inflationary process in the same way as expenditure or budget balance-related rules. These revenue-focused rules are designed primarily to ensure fiscal sustainability and enhance revenue mobilization rather than exerting an immediate effect on inflation control.

To go further, I repeat the estimations only for FRs countries (see Appendix 2.6 that present the FRs' effect on the sample of countries that have adopted at least one fiscal rule)[5]. On average, debt rules and budget balance rules hurt inflation. These results are statistically significant (Table B-1). Interestingly, it seems possible that these results are due to a significant interaction between debt rules and budget balance rules observed in Figure 2.1. Countries that adopt debt rules have often adopted joint budget balance rules.

This interaction could be explained by the complementary nature of debt rules and budget balance rules in fiscal policy frameworks. Debt rules typically limit the total public debt a government can accumulate. In contrast, budget balance rules require the government's budget to be balanced over a certain period, usually a fiscal year. When implemented together, these rules can create a reinforcing effect that enhances fiscal discipline and credibility.

Specifically, budget balance rules help to prevent excessive deficits in the short term, ensuring that annual expenditures do not exceed revenues by a large margin. This immediate control of fiscal performance reduces the need for borrowing,

5. By focusing on countries that have adopted at least one fiscal rule, it is possible to isolate and evaluate the specific impact of individual rule types. This subsample analysis allows for a more detailed examination by controlling for the presence of fiscal rules in general, thereby minimizing the confounding effects of hybrid rules that combine multiple types.

directly supporting debt rules' objectives. On the other hand, debt rules impose a long-term constraint on the accumulation of public debt, which indirectly pressures governments to maintain balanced budgets or surpluses over time. This dual approach could be more effective in controlling inflation because it addresses fiscal policy's flow (annual deficits) and the stock (accumulated debt) aspects.

Table 2.4: ATT for numerical and procedural fiscal rules

| **EB for Numerical*Procedural fiscal rules** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **All countries** | -0.11 | - 0.70 | - 0.18 |
| | (0.17) | (1.10) | (0.27) |
| **Treated/Total** | 372/2787 | 372/2787 | 372/2787 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Another way to distinguish between various fiscal rules is by categorizing them as numerical and procedural. Numerical fiscal rules focus on substantive budget outcomes, while procedural rules govern budgeting tasks. In this context, I examined the interaction between numerical and procedural fiscal rules to capture any potential complementarity between these categories of rules.

The findings in table 2.4 suggest that any observed complementarity between numerical and procedural fiscal rules needs to be more robust to controls for broader economic conditions and country-specific heterogeneity. As such, the results do not provide conclusive support for the hypothesis that combining these two types of rules leads to a more pronounced reduction in inflation. Instead, the evidence indicates that the two rule types may operate independently without reinforcing one another meaningfully for inflation control.

#### 2.4.2.2 Results according to combined fiscal rules

Table 2.5 presents the impact of various combinations of fiscal rules—Expenditure Rules (ER), Debt Rules (DR), Revenue Rules (RR), and Budget Balance Rules (BBR)—on inflation. The results demonstrate varying degrees of effectiveness depending on the combination of rules and the inclusion of different control variables.

The interaction between ER and RR shows a positive but statistically insignificant effect, indicating a limited impact on inflation without broader fiscal reforms. Similarly, DR and RR exhibit a negative but inconsistent relationship, reflecting variability in their combined effectiveness.

ER and DR display a significant negative impact in one specification, but this effect diminishes with additional controls, suggesting their influence is context-dependent. In contrast, ER and BBR demonstrate a modest yet occasionally significant adverse effect, highlighting their potential under specific conditions.

The DR and BBR combination consistently shows a robust and significant reduction in inflation across all models, underscoring their effectiveness regardless of added controls. Conversely, RR and BBR yield mixed results, with their impact varying across specifications, likely due to differences in economic and institutional settings.

Higher-order interactions, such as ER*DR*RR and the four-way ER*DR*RR*BBR, lack significant effects across models, suggesting that the comprehensive application of these rules may depend on favorable macroeconomic conditions.

In summary, DR*BBR emerges as a reliable tool for reducing inflation, while the effectiveness of other combinations varies depending on the institutional and economic environment. These findings underscore the nuanced role of fiscal rules in managing inflation.

Table 2.5: ATT for combined fiscal rules

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **ER*RR** | 0.20 | 0.13 | 0.12 |
| | (0.18) | (0.18) | (0.23) |
| **Treated/Total** | 55/2787 | 55/2787 | 55/2787 |
| **ER*DR** | -0.28 | -0.42*** | - 0.09 |
| | (0.21) | (0.16) | (0.24) |
| **Treated/Total** | 392/2784 | 392/2784 | 392/2784 |
| **DR*RR** | - 0.81 | - 1.23 | - 0.28 |
| | (1.24) | (0.81) | (0.52) |
| **Treated/Total** | 271/2787 | 271/2787 | 271/2787 |
| **ER*BBR** | - 0.19 | - 0.26* | - 0.37 |
| | (0.16) | (0.15) | (0.23) |
| **Treated/Total** | 519/2787 | 519/2787 | 519/2787 |
| **DR*BBR** | -1.12*** | -1.58*** | - 1.20*** |
| | (0.38) | (0.34) | (0.43) |
| **Treated/Total** | 1103/2787 | 1103/2787 | 1103/2787 |
| **RR*BBR** | - 0.85 | - 1.13 | 0.38 |
| | (1.33) | (0.82) | (1.75) |
| **Treated/Total** | 269/2787 | 269/2787 | 269/2787 |
| **ER*DR*RR** | - 0.02 | 0.12 | 0.11 |
| | (0.16) | (0.21) | (0.23) |
| **Treated/Total** | 1300/2787 | 1300/2787 | 1300/2787 |
| **DR*RR*BBR** | - 0.90 | - 1.33 | - 0.37 |
| | (1.33) | (0.87) | (1.75) |
| **Treated/Total** | 266/2787 | 266/2787 | 266/2787 |
| **ER*DR*BBR** | - 0.26 | - 0.39** | 0.06 |
| | (0.21) | (0.16) | (0.24) |
| **Treated/Total** | 374/2787 | 374/2787 | 374/2787 |
| **ER*RR*BBR** | 0.20 | 0.13 | - 0.12 |
| | (0.18) | (0.18) | (0.23) |
| **Treated/Total** | 55/2787 | 55/2787 | 55/2787 |
| **ER*DR*RR*BBR** | 0.02 | 0.12 | 0.11 |
| | (0.16) | (0.21) | (0.23) |
| **Treated/Total** | 52/2787 | 52/2787 | 52/2787 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

#### 2.4.2.3 Results according to the strength of fiscal rules

In this section, I examine the strength of fiscal rules, focusing on their credibility and compliance, which are crucial for assessing the effectiveness of these rules in achieving fiscal discipline. I constructed an index following the methodology outlined by Gootjes et al. (2021) to capture this information. I present the results in table 2.6 when considering the interaction between the built index and the fiscal rules's adoption dummy.

Table 2.6: Fiscal Rules Strength Index

| **FRSI*FR** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **All countries** | -0.46 | - 0.77 | - 0.42 |
| | (1.68) | (2.11) | (0.73) |
| **Treated/Total** | 1389/2787 | 1389/2787 | 1389/2787 |
| **Developed Countries** | -0.03 | - 0.15* | - 0.02 |
| | (0.06) | (0.08) | (0.06) |
| **Treated/Total** | 644/936 | 644/936 | 644/936 |
| **Non developed Countries** | -4.70 | - 2.17 | 2.11 |
| | (8.40) | (4.34) | (7.29) |
| **Treated/Total** | 745/1848 | 745/1848 | 745/1848 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

The estimates indicate a non-significant effect of the interaction between the Fiscal Rules Strength Index (FRSI) and fiscal rules on inflation across all countries. This lack of impact holds for both developed and underdeveloped economies.

To delve deeper into this relationship, I applied Entropy Balancing (EB) for continuous treatments, following the methodology of Tübbicke (2022), to assess the effect of the FRSI on inflation. The results, presented in Appendix B-9, were also statistically insignificant.

The findings suggest that stringent fiscal rules do not directly affect inflation. This

underscores the need for public authorities to consider adopting more flexible fiscal frameworks to achieve more effective economic outcomes.

### 2.4.3 Heterogeneity by countries characteristics

In this subsection, I analyze the effects of fiscal rules on inflation, taking into account various economic characteristics at the time of their adoption, namely income level, institutional quality, exchange rate regimes, the duration of rule implementation, inflation levels, and the credibility of the monetary authority.

#### 2.4.3.1 Heterogeneity by income levels

To further investigate on possible heterogeneity, table 2.7 distinguishes between advanced and non-advanced countries.

Table 2.7: ATT according to advanced and emerging and low-income countries

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **Advanced countries** | - 0.16 | - 0.33* | - 0.33 |
| | (0.15) | (0.17) | (0.25) |
| **Treated/Total** | 707/936 | 707/936 | 707/936 |
| **Emerging and low-income countries** | - 4.41*** | - 4.90*** | - 4.30*** |
| | (1.60) | (0.78) | (1.43) |
| **Treated/Total** | 931/1851 | 931/1851 | 931/1851 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

First, in the panel, I compare the inflationary effect of fiscal rules on advanced countries and all other countries (emerging and low-income countries). As seen in Table 2.7, overall, the effect of fiscal rules on inflation remains negative for the non-advanced countries. The results show that for non-advanced countries, the

impact of fiscal rules is harmful and very high. The estimated results show that fiscal rules do not influence inflation in advanced countries.

Secondly, I compare the potential effect of fiscal rules on inflation in emerging and low-income countries. The first group of countries substantially affects fiscal rules on inflation. The results for emerging countries are robust and statistically significant. I find that fiscal rules reduce inflation by at least five percentage points. For low-income countries, the ATT is also negative and significant for emerging countries. However, the effect seems lower than that for emerging economies.

The findings of this study reveal a diminishing effect of fiscal rules on inflation in emerging and low-income countries, while no significant results are observed for advanced countries. Several factors may help explain this result. Firstly, many advanced countries benefit from monetary policy managed by an independent central bank whose primary mandate is to maintain price stability (Cukierman et al., 1992; Alpanda and Honig, 2009). As fiscal rules primarily focus on public financial management and are not directly related to monetary policy, their impact on inflation may be limited in these countries.

Table 2.8: ATT according to emerging and low-income economies

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **Emerging Countries** | - 5.80 | - 5.14*** | - 6.21* |
| | (3.99) | (0.89) | (3.17) |
| **Treated/Total** | 516/1028 | 516/1028 | 516/1028 |
| **Low-income countries** | - 3.88* | - 2.28*** | - 3.16* |
| | (1.95) | (0.74) | (2.64) |
| **Treated/Total** | 415/823 | 415/823 | 415/823 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Secondly, advanced countries often have greater fiscal flexibility, allowing them to

adjust their fiscal policy in response to economic conditions (Davoodi et al., 2022). Even with fiscal rules in place, these countries may choose to deviate temporarily from the targets set to address immediate economic needs. This flexibility can help mitigate the impact of fiscal rules on macroeconomics.

In advanced economies, debt management and inflation dynamics often differ from those in low-income countries. Advanced economies may have more developed financial markets, stronger institutions, and more stable macroeconomic environments, which can mitigate the impact of public debt on inflation. In contrast, low-income countries might experience higher sensitivity of inflation to public debt due to less developed financial markets, weaker institutional frameworks, and more volatile economic conditions. Therefore, the lack of significance in the relationship between debt-related fiscal rules and inflation could reflect these underlying differences in economic structures and institutional capacities across different income groups. This heterogeneity implies that while fiscal rules could aim to control inflation, their effectiveness can vary significantly depending on the country's specific economic and institutional context.

Furthermore, policymakers in advanced countries may prioritize other policy objectives such as social stability, economic growth, or reducing unemployment over strict adherence to budget rules. In some cases, policymakers may be willing to tolerate a specific deficit or public debt to pursue these objectives. As my results show, these factors collectively contribute to fiscal rules' limited or insignificant impact on inflation in advanced countries.

#### 2.4.3.2 Heterogeneity by institutional quality

One crucial factor that may drive heterogeneity in the effectiveness of fiscal rules is countries' institutional quality, including the quality of institutions responsible for monetary policy. In countries with strong institutions, particularly those with well-functioning monetary authorities, the need for fiscal rules to control infla-

tion might be less critical. On the other hand, countries with weaker institutional frameworks may rely more heavily on fiscal rules to maintain fiscal discipline and control inflation.

To assess this potential heterogeneity, I conducted additional estimations based on institutional quality, using Freedom House's classification of countries as Free, Partly Free, and Not Free. The results indicate an evident variation in the effectiveness of fiscal rules across these groups.

In countries classified as Free, fiscal rules show a moderate but statistically significant negative impact on inflation. These findings suggest that even in countries with strong institutions, fiscal rules play a role in controlling inflation, albeit to a lesser extent than in countries with weaker institutional settings.

Table 2.9: ATT for all fiscal rules following level of institutional quality

| **All countries** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **Free** | - 0.46** | - 0.69*** | -0.69** |
| | (0.19) | (0.15) | (0.30) |
| **Treated/Total** | 1020/1536 | 1020/1536 | 1020/1536 |
| **Partly free** | - 12.08* | - 10.21* | - 12.33** |
| | (6.42) | (5.82) | (6.17) |
| **Treated/Total** | 399/711 | 399/711 | 399/711 |
| **Not free** | - 0.74 | - 0.55 | -0.27 |
| | (0.75) | (2.42) | (1.73) |
| **Treated/Total** | 216/523 | 216/523 | 216/523 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

In Partly Free countries, fiscal rules' effect on inflation is significant, with coefficients across different model specifications. This suggests that fiscal rules are particularly effective in reducing inflation in countries with moderate institutional strength because these countries benefit more from the fiscal discipline imposed by such rules.

In contrast, the results are not significant in countries that are not free. The lack of influence of fiscal rules in countries with poor institutional quality could be explained by the fact that such countries often experience extreme inflation.

#### 2.4.3.3 Estimates according to the exchange-rate regimes

This sub-section presents, as the title indicates, the estimates according to the exchange rate regime of the countries. The aim is to take into account the institutional framework involving monetary policy. We compare the estimates obtained for countries with a fixed exchange rate regime and those without one. We use the exchange rate classification of Ilzetzki et al. (2019) to perform this analysis.

The coefficients for countries with a pegged exchange rate regime are statistically significant and robust; thus, this fiscal policy effectively decreases inflation. Nevertheless, we observe that the significance of the coefficients when time and/or individual fixed effects are added is still more important than when no fixed effects are considered. This influence of fiscal rules partly explains why fixed exchange rate regimes are associated with low inflation. Indeed, fixed exchange rates are associated with significantly better inflation outcomes (lower and less variable inflation) (Alogoskoufis and Smith 1991; Alogoskoufis 1992; Obstfeld and Rogoff 1995), and there is some evidence of a relationship between fiscal rules and inflation.

On the other hand, for countries with a floating exchange rate regime, the coefficients are not significant, so there appears to be no effect of fiscal rules on inflation. We find that the coefficients obtained are neither statistically significant nor robust. Therefore, we conclude that fiscal rules do not significantly affect inflation for non-pegged exchange rate regimes.

Thus, arguing that fiscal rules affect inflation in flexible regimes is practically irrelevant. This ineffectiveness of fiscal policy is explained by the fact that flexible

Table 2.10: Exchange rate regimes

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **Fixed exchange rate regime** | - 0.64 | - 0.77*** | - 1.22*** |
| | (0.42) | (0.27) | (0.43) |
| **Treated/Total** | 1112/1798 | 1112/1798 | 1112/1798 |
| **No fixed exchange rate regime** | 0.12 | - 0.17 | - 0.57 |
| | (0.35) | (0.44) | (0.48) |
| **Treated/Total** | 354/637 | 354/637 | 354/637 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

exchange rate regimes are such that they depend on the supply and demand of the foreign exchange market and, thus, on the fluctuations of other currencies. These countries suffer from imported inflation, and because the public authorities have chosen not to intervene, fiscal rules do not affect inflation. One another possible explanation for this impasse is that we are using a *de facto* classification of exchange rates. So, some countries may have been declared fixed exchange rate regimes but, in practice, do not always maintain parity fixity. This could explain the insignificance of the results. Countries that frequently change their exchange rate - while theoretically maintaining a fixed parity - are unlikely to benefit fully from the anti-inflationary advantages of a fixed exchange rate regime (Ghosh et al. 1997).

As a result, fixed exchange rate regimes show some influence of fiscal rules on their inflation, which makes sense since exchange rate fixation goes hand in hand with good inflation performance. However, for flexible exchange rate regimes, the effect of fiscal rules on inflation is uncertain or absent. These results show that monetary and fiscal policies should be implemented to exert downward pressure on inflationary tendencies.

A key factor in evaluating the effectiveness of fiscal rules is the heterogeneity

across countries with different exchange rate regimes, particularly with inflation-targeting (IT) frameworks. Countries with floating exchange rate regimes often adopt IT as part of their macroeconomic strategy, making comparisons with non-targeting countries challenging. To address this, I separated the sample by exchange rate regime, excluding countries with IT, to assess the effects of fiscal rules in non-targeting environments.

The results in table B-2 show that fiscal rules effectively reduce inflation under fixed exchange rate regimes without IT, with significant effects across multiple specifications. These findings align with Sargent and Wallace (1981) theory that fiscal discipline is particularly effective when fixed exchange rates constrain monetary policy.

However, the results are less consistent in floating exchange rate regimes without IT. While some specifications show a significant effect, others do not, suggesting that fiscal rules may be less effective when monetary policy is more flexible, as in floating regimes. In summary, fiscal rules reduce inflation in constrained monetary environments, such as fixed exchange rate regimes. At the same time, their impact is diminished in floating regimes without IT.

#### 2.4.3.4 Credibility of the monetary authority

The source of inflation remains a topic of ongoing debate among economists, with differing viewpoints on whether monetary factors or budgetary phenomena primarily drive inflation. Some economists argue that inflation is purely monetary, as emphasized by Friedman (1968) and many others. On the other hand, Woodford (1998) and others suggest that fiscal policy can also contribute to inflation.

Inflation can have monetary and fiscal origins, highlighting the importance of considering the interplay between monetary and fiscal policies. The combination of these policies has been a subject of debate in economics. Therefore, this part of the

study examines whether the joint implementation of monetary policy, measured by adopting inflation targeting and fiscal policy in budgetary rules, can effectively reduce inflation. By examining the effect of fiscal rules on inflation for countries with credible central banks and those without, I can evaluate the combined influence of monetary and fiscal policies on inflation dynamics. This analysis provides insights into the effectiveness of fiscal rules in reducing inflation under different central bank credibility scenarios.

Table 2.11: Central bank credibility

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **Central Bank credibility** | | | |
| **FR** | - 0.69*** | - 0.65*** | - 0.70*** |
| | (0.08) | (0.07) | (0.17) |
| **Treated/Total** | 446/892 | 446/892 | 446/892 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

To explore this, I assess the impact of fiscal rules on inflation for countries with credible and non-credible central banks. To measure central bank credibility, an index is constructed that reflects the perceived credibility of each country's central bank annually. More in detail, in line with the existing literature (Levieuge et al., 2018; López-Villavicencio and Pourroy, 2022), the credibility of the central bank is measured by the deviation between observed inflation and the central bank's inflation target, squared. This measure serves as the credibility index, where central banks with an index below the median are considered the most credible. Consequently, a dummy variable takes the value of one if the central bank is deemed the most credible and zero otherwise.

The results of this exercise are presented in Table 2.11. The results reveal that

adopting fiscal rules reduces inflation by 0.69% when central banks are deemed credible. This finding aligns with previous literature, such as Combes et al. (2018), which suggests that combining inflation targeting with fiscal rules reduces inflation and produces a more substantial effect than each policy.

#### 2.4.3.5 Duration of FR's adoption

In this subsection, I examine the effects of the duration of adopting fiscal rules on inflation. The duration of adoption is a crucial factor in assessing the impact of fiscal rules on inflation because it allows for capturing both short-term and long-term effects. To investigate this, I construct a set of dummy variables representing different durations of fiscal rule adoption:

1. The first dummy variable represents countries that have recently adopted fiscal rules. This category includes countries that have implemented fiscal rules and have not yet had them in place for a significant period.

2. The second dummy variable represents countries with fiscal rules for less than 3 years. This category captures the short-term effects of fiscal rule adoption on inflation.

3. The third dummy variable represents countries that have maintained fiscal rules for at least 3 years. This duration allows the capture of medium-term effects on inflation.

4. The fourth dummy variable represents countries that have adhered to fiscal rules for at least 5 years. This duration enables assessing the longer-term effects of fiscal rule adoption on inflation.

5. The fifth dummy variable represents countries with fiscal rules in place for over 10 years. This category captures the effects of long-term adherence to fiscal rules on inflation.

The dummies are then:

$$D_i = \begin{cases} 1 & \text{if the condition is satisfied} \\ 0 & \text{otherwise.} \end{cases}$$

Table 2.12: Duration of the rules' adoption

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **Have just adopted the FRs** | | | |
| **FR** | - 5.67 | - 7.13 | - 3.72 |
| | (5.32) | (4.39) | (4.09) |
| **Treated/Total** | 78/2787 | 78/2787 | 78/2787 |
| **Have adopted the FRs for less than 3 years** | | | |
| **FR** | - 8.43** | - 8.90** | - 6.79** |
| | (3.60) | (4.25) | (3.07) |
| **Treated/Total** | 234/2787 | 234/2787 | 234/2787 |
| **Have adopted the FRs at least 3 years** | | | |
| **FR** | - 6.24** | - 6.05** | - 5.12** |
| | (2.88) | (2.78) | (2.51) |
| **Treated/Total** | 311/2787 | 311/2787 | 311/2787 |
| **Have adopted the FRs at least 5 years** | | | |
| **FR** | - 4.14* | - 4.83** | - 3.00 |
| | (2.36) | (1.92) | (1.97) |
| **Treated/Total** | 4630/2787 | 463/2787 | 463/2787 |
| **Have adopted the FRs at least 10 years** | | | |
| **FR** | 0.55 | 0.17 | 0.72* |
| | (0.34) | (0.15) | (0.40) |
| **Treated/Total** | 932/2787 | 932/2787 | 932/2787 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

By considering these different durations of fiscal rule adoption, I can examine how the length of time that countries have maintained fiscal rules influences the impact on inflation. This analysis helps provide insights into the cumulative effects and potential time dynamics associated with adopting fiscal rules.

As seen in Table 2.12, the analysis reveals that fiscal rules hurt inflation for less

than three years and after up to ten years of adoption. Indeed, in the initial years of implementing fiscal rules, inflation doesn't decrease. The decline in inflation begins after the FRs' adoptions year, with reductions of 8.43 percent, 6.24 percent, and 4.14 percent in inflation observed when countries have had fiscal rules in place for less than three years, at least three years and at least five years, respectively[6]. Note, however, that the effect is insignificant for countries with more than 10 years of the regime.

Therefore, it can be concluded that fiscal rules have short—or medium-term effects on inflation. In the short term, implementing fiscal consolidation measures, such as reducing government spending or increasing taxes, can lead to a contraction in aggregate demand, subsequently lowering inflation. However, the long-term impact of fiscal rules on inflation is not significant, indicating that other factors and country-specific characteristics play a more prominent role in determining inflation outcomes over extended periods.

#### 2.4.3.6 Level of inflation

Analyzing the level of inflation is crucial for evaluating the impact of fiscal rules on inflation as it provides a baseline, helps understand inflation dynamics, assesses policy effectiveness, examines interactions with monetary policy, and identifies unintended consequences. This analysis enables policymakers to make informed decisions and adjust fiscal rules to achieve their desired inflation objectives.

Therefore, as a further step, I consider countries according to their inflation level and distinguish between less than 3%, less than 5%, less than 10%, and more than 15%.

6. Note that this negative impact of fiscal rules on inflation remains evident even after accounting for time-fixed effects. However, when individual fixed effects are introduced, the negative effect of fiscal rules on inflation is no longer observed. This suggests that the influence of fiscal rules on inflation is not solely dependent on the duration of their adoption but on the specific characteristics of each country in each year.

Table 2.13: ATT according to levels of inflation

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **Inflation less than 3 percent** | | | |
| **FR** | - 0.43*** | - 0.80*** | - 0.31 |
| | (0.10) | (0.07) | (0.28) |
| **Treated/Total** | 973/2787 | 973/2787 | 973/2787 |
| **Inflation less than 5 percent** | | | |
| **FR** | - 0.83*** | - 1.08*** | - 0.79*** |
| | (0.13) | (0.09) | (0.28) |
| **Treated/Total** | 1295/2787 | 1295/2787 | 1295/2787 |
| **Inflation less than 10 percent** | | | |
| **FR** | - 1.30*** | - 1.86*** | - 1.47*** |
| | (0.28) | (0.26) | (0.34) |
| **Treated/Total** | 1556/2787 | 1556/2787 | 1556/2787 |
| **Inflation more than 15 percent** | | | |
| **FR** | - 110.339 | - 63.70 | - 61.65 |
| | (68.40) | ((56.88) | (60.00) |
| **Treated/Total** | 23/2787 | 23/2787 | 23/2787 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table 2.13 shows that inflation decreases by a few percentage points regardless of the level of inflation considered. The results are statistically significant and robust to adding fixed effects or changes in the variables of interest. The results show that the effect of the rules is practical for moderate and high inflation. When inflation is more than 15%, the results are insignificant with adding time and/or country fixed effects. In conclusion, fiscal rules' effectiveness on inflation is less robust when the inflation rate rises.

The findings of this study provide important insights into the role of fiscal rules in curbing inflationary pressures. When governments implement rules that limit unproductive fiscal behaviors, they prevent the buildup of unsustainable debt levels that could necessitate inflationary financing. In both FTPL and Sargent and Wallace's monetarist framework, the need to monetize deficits is a crucial driver of

inflation, and fiscal rules serve as a safeguard against this outcome by enforcing fiscal discipline. The temporal dynamics of the effects observed in this study are also noteworthy. The results indicate that the impact of fiscal rules on inflation is immediate and persists in the medium term but tends to weaken over time. This pattern requires further examination, as it does not directly align with the sustained effects typically predicted by FTPL.

In conclusion, while the FTPL and Sargent and Wallace (1981)'s unpleasant monetarist arithmetic provide a solid theoretical foundation for understanding the impact of fiscal rules on inflation, the temporal dimension of these effects suggests that the long-term success of fiscal rules depends heavily on sustained political commitment and adaptability to evolving economic conditions. Fiscal rules can effectively restrict unproductive fiscal policies and stabilize inflation expectations, lowering short- and medium-term inflation. Still, their lasting impact requires continuous enforcement and adaptation.

## 2.5 Robustness Checks

As robustness checks below, I provide alternative analyses to test the resilience of my estimates to different model specifications and techniques.

I test the robustness of my estimates by using various tests and graphs. In particular, I rely on the power of standardized mean differences (SMD) to test the absence of selection bias, i.e., the conditional independence assumption. This method involves comparing the average variable for the treatment group with that of the control group—the results in the appendix confirm the achievement of covariate balance. Using standardized mean differences (SMD), I observe that the covariates between the treatment and control groups are effectively balanced after weighting. This successful alignment of the covariate distributions across both groups significantly validates the results drawn from the analysis.

## 2.5.1 Entropy balancing

### 2.5.1.1 Other model specifications

Table 2.14: ATT for all fiscal rules: other model specifications

| **Model 2: Adding compliance with rules** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **ATT** | -1.29*** | - 1.83*** | - 1.34*** |
| | (0.33) | (0.50) | (0.41) |
| **Treated/Total** | 1638/2787 | 1638/2787 | 1638/2787 |
| **Model 3 : Adding openness** | [1] | [2][a] | [3][b] |
| **ATT** | - 1.15*** | - 1.73*** | - 1.39*** |
| | (0.44) | (0.44) | (0.42) |
| **Treated/Total** | 1638/2787 | 1638/2787 | 1638/2787 |
| **Model 4: Adding political orientation of gov.** | [1] | [2][a] | [3][b] |
| **ATT** | - 1.30*** | - 1.93*** | - 1.47*** |
| | (0.44) | (0.47) | (0.46) |
| **Treated/Total** | 1638/2787 | 1638/2787 | 1638/2787 |
| **Model 5 : Adding macroeconomic variables** | [1] | [2][a] | [3][b] |
| **ATT** | - 0.76 | -1.85*** | - 1.30*** |
| | (0.47) | (0.46) | (0.44) |
| **Treated/Total** | 1638/2787 | 1638/2787 | 1638/2787 |
| **Model 6 : Adding exchange rate regime** | [1] | [2][a] | [3][b] |
| **ATT** | - 0.51 | - 0.86*** | - 0.99** |
| | (0.54) | (0.17) | (0.39) |
| **Treated/Total** | 1621/2768 | 1621/2768 | 1621/2768 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

The robustness of the results from the entropy balancing was rigorously tested. At each stage of the methodology, fixed and individual effects were added. All estimates were re-estimated from several econometric model specifications, including the benchmark model, models with added compliance with rules, trade openness, political orientation of government, macroeconomic variables, and exchange rate regimes. This meticulous testing process instills confidence in the reliability of the results. As seen in the table, the models that consider compliance with fiscal rules, trade openness, government policy stance, exchange rate regime, etc., provide sta-

tistically significant results across all columns. These results suggest a negative effect of fiscal rule adoption on inflation. The estimated coefficients associated with each model are roughly equal, showing the robustness of my results.

The robustness of the model's results with the addition of the government's political orientation can be justified by the fact that high inflation is found in nations governed by the left and low inflation is seen in political systems dominated by the center and right parties (Hibbs, 1977).

The results of all model specifications (benchmark model — adding compliance with rules — adding trade openness — adding political orientation of government — adding macroeconomic variables — adding exchange rate regime) are statistically significant when we change the dependent variable to the GDP deflator.

#### 2.5.1.2 Different time samples

In 2000, 40 countries of our sample had already adopted fiscal rules. So, for the test robustness question, I repeat all estimations by distinguishing two periods (see Appendix 2.6). The first set of analyses examined the impact of fiscal rules on inflation from 1985 to 2000. It can be seen from the data in Table B-3 that there was no evidence that fiscal rules influence inflation. This inconsistency may be due to the sample's composition during this period, which included a higher proportion of advanced countries. These results corroborate the previous findings.

Table B-4 shows that fiscal rules have impacted inflation from 2000 to recent times.

To ensure the robustness of my findings, I conducted additional tests by excluding periods that could introduce significant exogenous shocks—specifically, the COVID-19 pandemic (see B-7) and the subprime mortgage crisis (see B-5). These events had substantial global economic impacts and could potentially skew the results by introducing large, temporary fluctuations in inflation and fiscal outcomes. After removing these periods from the dataset, the results remain consistent with

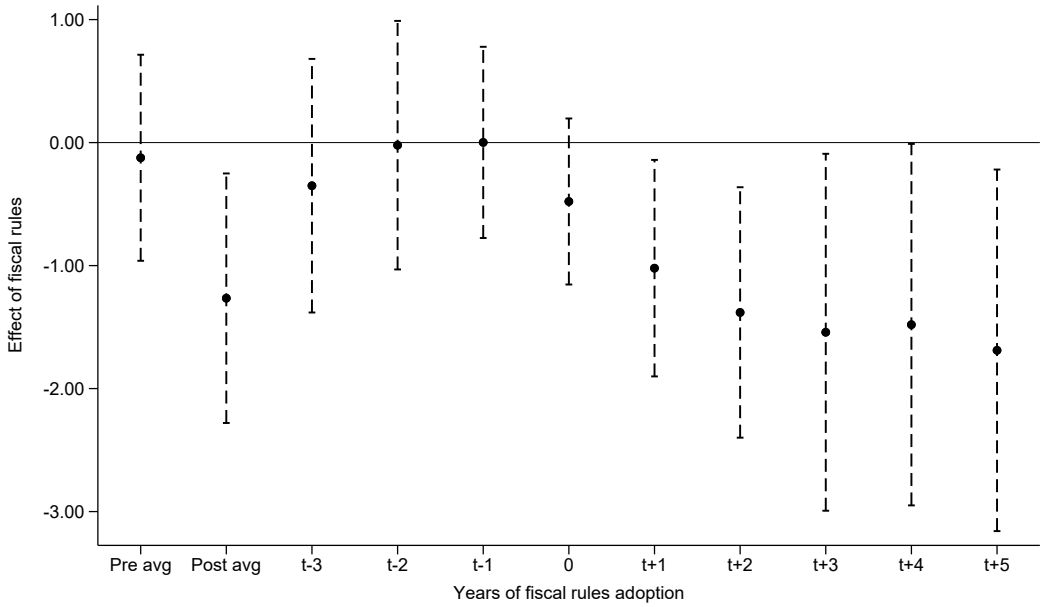
the main findings. Fiscal rules continue to show a statistically significant negative effect on inflation. The robustness of these results indicates that extreme, short-term economic shocks do not drive the observed impact of fiscal rules on inflation but rather reflect more stability.

#### 2.5.1.3 Placebo test: changing outcome variable

To confirm the findings of this study, I run a placebo test where the unemployment rate is used as the outcome variable. The placebo test (see Appendix B-8) confirms that the treatment (FR) does not have a significant impact on unemployment, which is expected, as fiscal rules should not influence unemployment in the same way as the primary outcome of interest (like inflation or debt levels). This reinforces the validity of your main results, as no spurious effects are observed when using an unrelated outcome.

### 2.5.2 Temporal dynamics around fiscal rules

Figure 2.2: Inflation around fiscal rules adoption




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Figure 2.2 illustrates the temporal dynamics surrounding fiscal rule adoption using an event study approach, where $t = 0$ denotes the year of adoption and serves as the reference period. Each point in the figure represents the estimated effect of fiscal rule adoption at time $k$ relative to $t = 0$. The results show no statistically significant trends before adoption ($k < 0$), confirming parallel trajectories between adopting and non-adopting countries and validating the parallel trends assumption.

After adoption, fiscal rules exhibit an immediate and statistically significant impact at $t + 1$, which persists over subsequent periods, highlighting their enduring influence on targeted outcomes. The absence of significant pre-adoption trends reinforces the validity of causal inferences. At the same time, the pronounced post-adoption effects underscore the role of fiscal rules in shaping policy and economic dynamics.

In the graph, the pre-treatment average (*pre-avg*) represents the mean estimated effects for periods before adoption ($k < 0$). A value close to zero indicates no significant deviations, supporting the assumption of parallel trends. Conversely, the post-treatment average (*post-avg*) captures the mean estimated effects for periods following adoption ($k \geq 1$), where a negative value suggests a sustained adverse impact of fiscal rule adoption on the outcome. The figure highlights the absence of pre-adoption bias and the medium-term effects of fiscal rules after implementation.

### 2.5.3 Propensity score matching

The propensity score is obtained by estimating the probability of adopting fiscal rules for all our sample countries, using a logit model where FR is a dummy that takes one if the government has an FR, zero otherwise. The variables used to estimate the propensity scores are those usually employed in the literature to explain

the probability of adopting an FR (see previous section) (Tapsoba, 2012; Combes et al., 2019; Bamba et al., 2020).

Table 2.15: Propensity scores estimates

| | [1] | [2] | [3] | [4] | [5] | [6] |
|---|---|---|---|---|---|---|
| **Dependent var. = Fiscal rules** | | | | | | |
| Log of real GDP per capita | 0.55*** | 0.58*** | 0.53*** | 0.56*** | 0.56*** | 0.56*** |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| Public debt lagged one year | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Dependency ratio lagged one year | - 0.01** | - 0.01** | - 0.01*** | - 0.01** | - 0.01** | - 0.01*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Inflation lagged one year | - 1.96*** | - 1.92*** | - 1.90*** | - 1.96*** | - 1.99*** | - 1.64*** |
| | (0.12) | (0.12) | (0.12) | (0.12) | (0.12) | (0.12) |
| Inflation targeting (dummy) | 0.62*** | 0.58*** | 0.71*** | 0.63*** | 0.60*** | 1.05*** |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.16) |
| Political stability | 0.06*** | 0.05*** | 0.07*** | 0.07*** | 0.06*** | 0.06*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Deficit under 3% dummy | | 0.52*** | | | | |
| | | (0.13) | | | | |
| Public debt under 60% dummy | | 0.21 | | | | |
| | | (0.15) | | | | |
| Trade openness | | | 0.00*** | | | |
| | | | (0.00) | | | |
| Political orientation of gov. | | | | - 0.20*** | | |
| | | | | (0.05) | | |
| Unemployment rate | | | | | - 0.01 | |
| | | | | | (0.01) | |
| Level of education | | | | | - 0.15*** | |
| | | | | | (0.05) | |
| Flexibility of exchange rate | | | | | | - 0.42*** |
| | | | | | (0.05) | |
| Intercept | - 0.28 | - 1.08** | - 0.87 | - 0.10 | 0.85 | 0.40 |
| | (0.42) | (0.48) | (0.45) | (0.43) | (0.58) | (0.44) |
| Pseudo R2 | 0.35/0.22 | 0.36/0.23 | 0.33/0.21 | 0.33/0.21 | 0.33/0.21 | 0.36/0.23 |
| Number of obs. | 2787 | 2787 | 2787 | 2787 | 2787 | 2768 |

Notes: [1], [2], [3], [4], [5] and [6] respectively denote benchmark model, model adding compliance with rules, model adding trade openness, model adding political orientation of government, model adding macroeconomic variables, model adding exchange rate regime. Standard errors are in parentheses. The stars, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

As seen in table B-1, the coefficients on most variables are significant and consistent with those in the literature. We note that GDP per capita growth, inflation targeting regime, and government stability increase the probability of FR adoption, with opposite effects for the dependency ratio and inflation lagging one year. From the previous literature, a fixed exchange rate regime lowers the probability of adopting fiscal rules.

My main findings were also confirmed when I chose another propensity score

technique: the nearest neighbor algorithm, kernel algorithm, local-linear algorithm, and radius algorithm.

Table 2.16: All fiscal rules

| | Nearest neighbor(1) | Nearest neighbor(2) | Nearest neighbor(5) | Kernel | Local-linear | Radius (.05) | Radius (.01) | Radius (.005) |
|---|---|---|---|---|---|---|---|---|
| ATT | -0.280* | -0.288 | -0.167 | -0.320*** | -0.538*** | -0.336*** | -0.188*** | -0.180 |
| | (-1.75) | (-1.10) | (-0.50) | (-2.73) | (-4.53) | (-2.80) | (-3.38) | (-0.92) |
| *N* | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 |
| Rubin's B | 23.20 | 31.55 | 35.94 | 22.72 | 23.77 | 21.64 | 22.81 | 30.82 |
| Rubin's R | 0.84 | 0.81 | 0.84 | 0.92 | 0.83 | 0.93 | 0.89 | 0.82 |

Notes: Bootstrapped standard errors based on 500 replications are reported in brackets. The stars, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

The results obtained using propensity score matching remain highly consistent with the baseline estimates and those accounting for the heterogeneity of country characteristics (see Appendix B-2). Furthermore, the balancing hypothesis is validated for nearly all estimates across the four matching algorithms employed. This robustness suggests that the estimated effects are not driven by sample selection bias and that the matching procedure effectively reduces differences between treated and control units. These findings reinforce the reliability of the main results and support the validity of the identification strategy.

## 2.6 Conclusion

The focus of the debate on fiscal rules has primarily been on their effectiveness in achieving fiscal discipline, with less attention given to their impact on inflation. This study fills this gap by rigorously examining the effect of fiscal rules on inflation, contributing to a better understanding of the fiscal framework. The empirical findings shed light on an alternative explanation for global disinflation, highlighting the role of fiscal rules as institutional factors that affect monetary and fiscal policies.

Addressing the challenges of counterfactual and endogeneity, this study employs

the entropy balancing methodology to analyze panel data from 79 countries from 1985 to 2021. The results consistently reveal a negative relationship between adopting fiscal rules and inflation. When considering all observations, fiscal rules are found to reduce inflation. Robustness checks conducted by examining different types of fiscal rules further support this result, with expenditure rules, debt rules, and budget balance rules demonstrating a significant impact on lowering inflation even when accounting for fixed effects. The non-significance observed for revenue rules does not bias the overall findings, as these rules are not widely adopted.

Furthermore, when distinguishing between advanced and emerging/low-income countries, the study finds that the effect of fiscal rules on inflation is negative for the latter group but not for the former. These findings are robust across various model specifications, including fixed effects, alternative, dependent variables, and propensity score matching. The implications of this study highlight the importance of tailored policy measures that consider the specific characteristics of individual economies. Policymakers should strive for more significant alignment and coordination between fiscal and monetary authorities to ensure macroeconomic stability. In emerging and low-income countries, implementing and enforcing fiscal rules can serve as an effective strategy for managing inflation and promoting fiscal discipline. Setting clear targets for fiscal deficits, debt levels, and expenditure controls can contribute to these objectives.

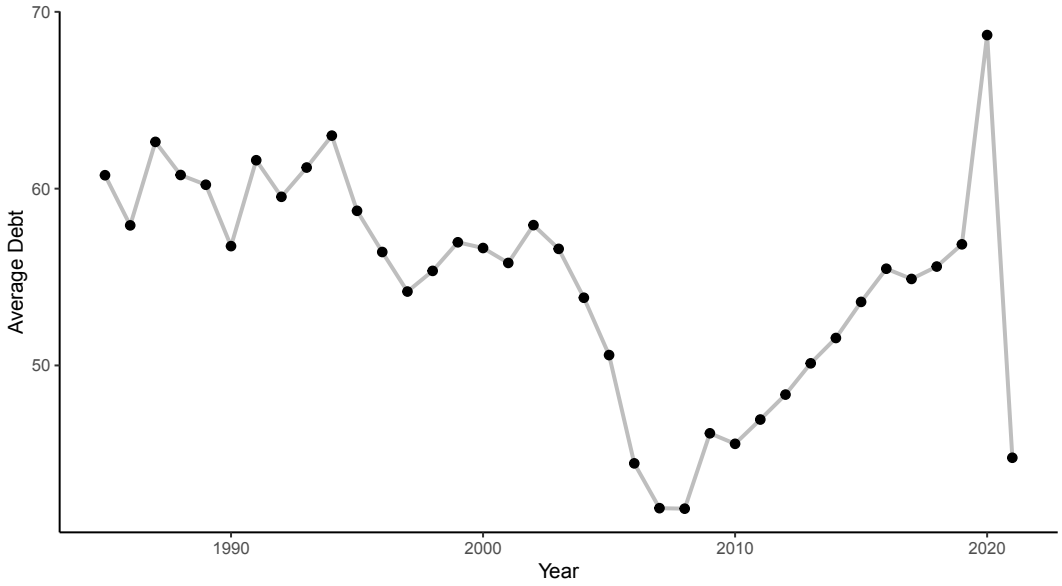
This chapter represents the adoption of Fiscal Rules (FRs) using dummy variables. However, it is essential to acknowledge that a country may legally adopt a Fiscal Rule while not fully complying with it. One potential remedy is to model the rule using a metric that measures the distance between the actual debt (or deficit) values and the stipulated targets. However, to pursue this approach, there is a need to construct a comprehensive database detailing compliance with fiscal rules across advanced, emerging, and least-developed countries. While our study fo-

cuses on the *de jure* adoption of fiscal rules, future research avenues could delve into the robustness and adherence levels of fiscal rule implementations, especially in advanced countries where no significant impact on inflation has been observed. A more nuanced exploration of these dimensions in subsequent studies promises to yield valuable insights into the intricate dynamics of fiscal rules, particularly in advanced economies. It would also be insightful to distinguish between the first-generation fixed rules and the more flexible second-generation ones.

# Appendix

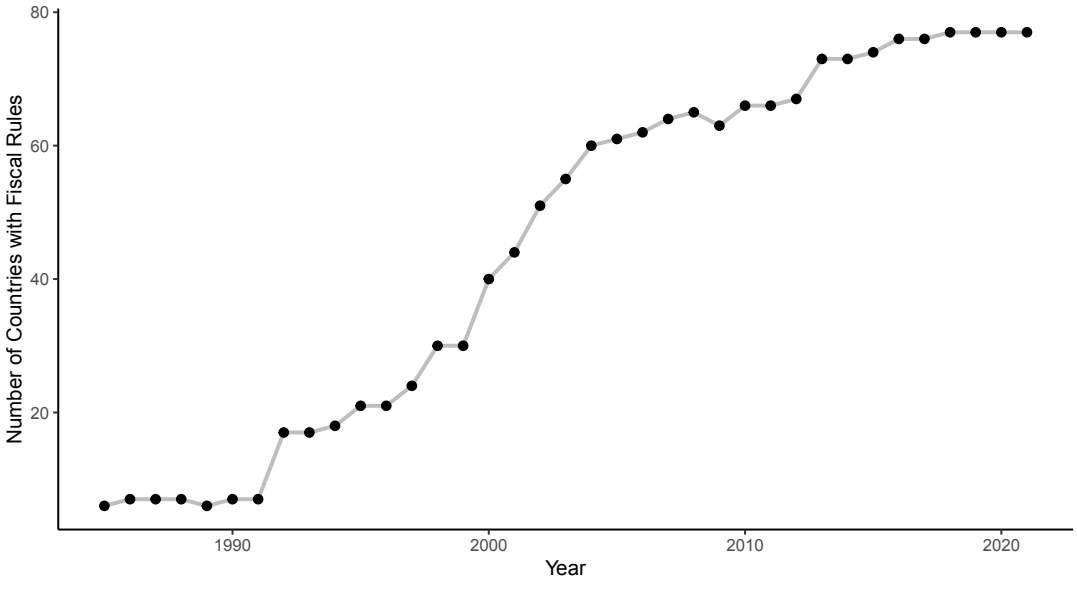
## A - Descriptive statistics

Figure A-1: Evolution of public debt over period




Source: Author based on the data comes from the IMF dataset.

Figure A-2: Number of countries adopting Fiscal rules over time




Source: Author based on the data comes from the IMF dataset.

Table A-1: Average of inflation following FR adoptions'

| | **Average of inflation** |
|---|---|
| **Without fiscal rules** | 38.70 |
| **With fiscal rules** | 3.65 |

Note: The average inflation is very high because certain Emerging countries have had episodes of very high inflation.

Table A-2: Proportion of fiscal rules adoption following income of countries

| | **Advanced countries** | **Emerging countries** | **Low-income countries** |
|---|---|---|---|
| **Fiscal rules all together** | | | |
| **0** | 24.5 | 49.8 | 49.6 |
| **1** | 75.5 | 50.2 | 50.4 |
| **Expenditure rules** | | | |
| **0** | 60.4 | 80.2 | 97.3 |
| **1** | 39.6 | 19.8 | 2.7 |
| **Revenue rules** | | | |
| **0** | 93.4 | 98.9 | 74.8 |
| **1** | 6.6 | 1.1 | 25.2 |
| **Debt rules** | | | |
| **0** | 49.9 | 70.5 | 51.5 |
| **1** | 50.1 | 29.5 | 48.5 |
| **Budget Balance rules** | | | |
| **0** | 27.9 | 58.7 | 50.7 |
| **1** | 72.1 | 41.3 | 49.3 |

Table A-3: Proportion of fiscal rules adoption following exchange rate arrangement

| | **Pegged exchange rate regime** | **Floating exchange rate regime** |
|---|---|---|
| **Fiscal rules all together** | | |
| **0** | 38.2 | 44.4 |
| **1** | 61.8 | 55.6 |
| **Expenditure rules** | | |
| **0** | 80.4 | 79.1 |
| **1** | 19.6 | 20.9 |
| **Revenue rules** | | |
| **0** | 86.2 | 99.5 |
| **1** | 13.8 | 0.5 |
| **Debt rules** | | |
| **0** | 45.1 | 82.4 |
| **1** | 54.9 | 17.6 |
| **Budget Balance rules** | | |
| **0** | 41.9 | 49.9 |
| **1** | 58.1 | 50.1 |

Table A-4: Statistics for IT countries

| | Countries with IT | |
|---|---|---|
| | **Average of inflation** | **Average of public debt** |
| **Without fiscal rules** | 3.72 | 33.4 |
| **With fiscal rules** | 3.20 | 45.2 |

Table A-5: Average of inflation and public debt following each FR type

| **Average of inflation** | **Average of public debt** |
|---|---|
| **Countries with ER** | |
| 3.14 | 57.3 |
| **Countries with RR** | |
| 3.49 | 47.0 |
| **Countries with DR** | |
| 2.90 | 55.0 |
| **Countries with BBR** | |
| 3.13 | 53.9 |

## B. Entropy balancing: Estimates and Standardized Mean Differences

### Estimates

Table B-1: ATT according to various rules for FRs countries

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **ER** | - 0.20 | - 1.56 | - 0.84** |
| | (0.28) | (6.42) | (0.34) |
| **Treated/Total** | 594/1638 | 594/1638 | 594/1638 |
| **RR** | - 0.63 | - 1.01 | - 1.27 |
| | (1.11) | (0.96) | (1.33) |
| **Treated/Total** | 280/1638 | 280/1638 | 280/1638 |
| **DR** | - 0.90** | - 2.27*** | - 1.21*** |
| | (0.37) | (0.44) | (0.44) |
| **Treated/Total** | 1171/1638 | 1171/1638 | 1171/1638 |
| **BBR** | - 0.62** | - 2.49*** | - 0.78** |
| | (0.27) | (0.52) | (0.35) |
| **Treated/Total** | 1506/1638 | 1506/1638 | 1506/1638 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-2: ATT following exchange rate regimes and Inflation targeting

| **ATT** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **Fixed exchange rate regime & No IT** | | | |
| **FR** | - 1.34*** | -1.13*** | - 1.50*** |
| | (0.41) | (0.60) | (0.58) |
| **Treated/Total** | 1034/1708 | 1034/1708 | 1034/1708 |
| **No fixed exchange rate regime & No IT** | | | |
| **FR** | 1.47* | - 0.90 | - 0.98 |
| | (0.78) | (0.81) | (0.90) |
| **Treated/Total** | 135/371 | 135/371 | 135/371 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-3: ATT from 1985 to 2000

| **Data from 1985 to 2000 (40 FR's countries)** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **FR** | 0.25 | - 0.11 | - 0.52 |
| | (0.57) | (0.43) | (0.61) |
| **Treated/Total** | 256/1147 | 256/1147 | 256/1147 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-4: ATT from 2000 to 2021

| **Data from 2000 to 2021** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **FR** | - 1.06*** | - 2.64*** | - 2.16*** |
| | (0.28) | (0.67) | (0.49) |
| **Treated/Total** | 294/1715 | 294/1715 | 294/1715 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-5: ATT for all fiscal rules without the crise of subprimes

| **Excluding the global financial crisis (2007-2008)** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **FR** | - 0.52** | - 2.31*** | - 0.86*** |
| | (0.25) | (0.48) | (0.33) |
| **Treated/Total** | 1512/2628 | 1512/2628 | 1512/2628 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-6: ATT for all fiscal rules including hyperinflation periods

| **Benchmark Model with hyperinflation periods** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **FR** | -0.39*** | - 0.31** | - 0.86*** |
| | (0.11) | (0.15) | (0.28) |
| **Treated/Total** | 1638/2787 | 1638/2787 | 1638/2787 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-7: ATT for all fiscal rules removing Covid-19 crisis

| **Removing the year 2021 (pandemic crisis)** | [1] | [2][a] | [3][b] |
|---|---|---|---|
| **FR** | - 0.55** | - 1.67*** | - 0.79** |
| | (0.24) | (0.36) | (0.32) |
| **Treated/Total** | 1563/2707 | 1563/2707 | 1563/2707 |
| Covariates in the second step | Yes | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* and *b* respectively denote the inclusion of time-fixed effects in the first step, and the use of GDP deflator as the dependent variable. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-8: Placebo test with unemployment rate as outcome

| **Unemployment as outcome** | [1] | [2][a] |
|---|---|---|
| **All countries** | -0.17 | - 0.15 |
| | (0.13) | (0.16) |
| **Treated/Total** | 1638/2787 | 1638/2787 |
| Covariates in the second step | Yes | Yes |
| Year fixed effects in the second step | Yes | Yes |
| Country fixed effects in the second step | Yes | Yes |

Notes: ATT represents average treatment effects on the treated. *a* denotes the inclusion of time-fixed effects in the first step. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-9: ATT of FRSI

| **EB for FRSI** | |
|---|---|
| **All countries** | 0.04 |
| | (0.88) |
| **Developed Countries** | - 0.07 |
| | (0.05) |
| **Non developed Countries** | 4.84 |
| | (3.95) |
| Covariates in the second step | Yes |
| Year fixed effects in the second step | Yes |
| Country fixed effects in the second step | Yes |

Notes: ATT represents average treatment effects on the treated. Bootstrapped standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

**Standardized Mean Differences**

The tables below present the standardized mean differences obtained before and after the weighting stage. The standardized difference in the mean propensity score in the two groups should be near 0 according to Rubin's (2001) criteria. Ensuring a covariate balance between comparison groups is central to causal studies.

Table B-1: Benchmark model

| BENCHMARK MODEL | **Before weighting** | | | **After weighting** | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.95 | 3.54 | 0.589 | 3.95 | 3.95 | <0.001 |
| Lag of debt | 52.35 | 53.83 | 0.041 | 52.35 | 52.35 | <0.001 |
| Lag of dependency ratio | 59.37 | 71.17 | 0.597 | 59.37 | 59.37 | <0.001 |
| Inflation | 0.53 | 0.92 | 0.81 | 0.53 | 0.53 | <0.001 |
| Inflation targeting | 0.24 | 0.07 | 0.459 | 0.24 | 0.24 | <0.001 |
| Political stability | 6.48 | 3.62 | 0.492 | 6.48 | 6.48 | <0.001 |

Table B-2: Adding compliance with rules

| MODEL 2 | **Before weighting** | | | **After weighting** | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.95 | 3.54 | 0.589 | 3.95 | 3.95 | <0.001 |
| Lag of debt | 52.35 | 53.83 | 0.041 | 52.35 | 52.35 | <0.001 |
| Lag of dependency ratio | 59.37 | 71.17 | 0.597 | 59.37 | 59.37 | <0.001 |
| Inflation | 0.53 | 0.92 | 0.81 | 0.53 | 0.53 | <0.001 |
| Inflation targeting | 0.24 | 0.07 | 0.459 | 0.24 | 0.24 | <0.001 |
| Political stability | 6.48 | 3.62 | 0.492 | 6.48 | 6.48 | <0.001 |
| Compliance1 | 0.9 | 0.81 | 0.262 | 0.9 | 0.9 | <0.001 |
| Compliance2 | 0.7 | 0.66 | 0.069 | 0.7 | 0.7 | <0.001 |

Table B-3: Adding trade openness

| MODEL 3 | **Before weighting** | | | **After weighting** | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.95 | 3.54 | 0.589 | 3.95 | 3.95 | <0.001 |
| Lag of debt | 52.35 | 53.83 | 0.041 | 52.35 | 52.35 | <0.001 |
| Lag of dependency ratio | 59.37 | 71.17 | 0.597 | 59.37 | 59.37 | <0.001 |
| Inflation | 0.53 | 0.92 | 0.81 | 0.53 | 0.53 | <0.001 |
| Inflation targeting | 0.24 | 0.07 | 0.459 | 0.24 | 0.24 | <0.001 |
| Political stability | 6.48 | 3.62 | 0.492 | 6.48 | 6.48 | <0.001 |
| Trade | 88.69 | 66.53 | 0.374 | 88.69 | 88.69 | <0.001 |

Table B-4: Adding political orientation of Government

| MODEL 4 | **Before weighting** | | | **After weighting** | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.95 | 3.54 | 0.589 | 3.95 | 3.95 | <0.001 |
| Lag of debt | 52.35 | 53.83 | 0.041 | 52.35 | 52.35 | <0.001 |
| Lag of dependency ratio | 59.37 | 71.17 | 0.597 | 59.37 | 59.37 | <0.001 |
| Inflation | 0.53 | 0.92 | 0.81 | 0.53 | 0.53 | <0.001 |
| Inflation targeting | 0.24 | 0.07 | 0.459 | 0.24 | 0.24 | <0.001 |
| Political stability | 6.48 | 3.62 | 0.492 | 6.48 | 6.48 | <0.001 |
| Political orientation of Gov. | 1.21 | 1.11 | 0.085 | 1.21 | 1.21 | <0.001 |

Table B-5: Adding macroeconomic variables

| MODEL 5 | **Before weighting** | | | **After weighting** | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.95 | 3.54 | 0.589 | 3.95 | 3.95 | <0.001 |
| Lag of debt | 52.35 | 53.83 | 0.041 | 52.35 | 52.35 | <0.001 |
| Lag of dependency ratio | 59.37 | 71.17 | 0.597 | 59.37 | 59.37 | <0.001 |
| Inflation | 0.53 | 0.92 | 0.81 | 0.53 | 0.53 | <0.001 |
| Inflation targeting | 0.24 | 0.07 | 0.459 | 0.24 | 0.24 | <0.001 |
| Political stability | 6.48 | 3.62 | 0.492 | 6.48 | 6.48 | <0.001 |
| Unemployment | 7.34 | 7.05 | 0.061 | 7.34 | 7.34 | <0.001 |
| Education's level | 6.48 | 6.51 | 0.036 | 6.48 | 6.48 | <0.001 |

Table B-6: Adding exchange rate regime

| MODEL 6 | **Before weighting** | | | **After weighting** | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.95 | 3.54 | 0.589 | 3.95 | 3.95 | <0.001 |
| Lag of debt | 52.35 | 53.83 | 0.041 | 52.35 | 52.35 | <0.001 |
| Lag of dependency ratio | 59.37 | 71.17 | 0.597 | 59.37 | 59.37 | <0.001 |
| Inflation | 0.53 | 0.92 | 0.81 | 0.53 | 0.53 | <0.001 |
| Inflation targeting | 0.24 | 0.07 | 0.459 | 0.24 | 0.24 | <0.001 |
| Political stability | 6.48 | 3.62 | 0.492 | 6.48 | 6.48 | <0.001 |
| Flexibility of exchange rate | 1.95 | 2.38 | 0.352 | 1.95 | 1.95 | <0.001 |

Table B-7: Expenditure rules

| ONE TYPE OF RULES: ER | **Before weighting** | | | **After weighting** | | |
|---|---|---|---|---|---|---|
| **Variable** | **ER** | **Non-ER** | **SMD** | **ER** | **Non-ER** | **SMD** |
| Real GDP | 4.23 | 3.67 | 0.924 | 4.23 | 4.23 | <0.001 |
| Lag of debt | 58.03 | 51.58 | 0.176 | 58.03 | 58.03 | <0.001 |
| Lag of dependency ratio | 51.45 | 67.47 | 1.007 | 51.45 | 51.45 | <0.001 |
| Inflation | 0.48 | 0.74 | 0.602 | 0.48 | 0.48 | <0.001 |
| Inflation targeting | 0.33 | 0.13 | 0.48 | 0.33 | 0.33 | <0.001 |
| Political stability | 8.22 | 4.56 | 0.746 | 8.22 | 8.22 | <0.001 |

Table B-9: Debt rules

| ONE TYPE OF RULES: DR | **Before weighting** | | | **After weighting** | | |
|---|---|---|---|---|---|---|
| **Variable** | **DR** | **Non-DR** | **SMD** | **DR** | **Non-DR** | **SMD** |
| Real GDP | 3.89 | 3.71 | 0.249 | 3.89 | 3.89 | <0.001 |
| Lag of debt | 54.25 | 51.99 | 0.063 | 54.25 | 54.25 | <0.001 |
| Lag of dependency ratio | 62.75 | 65.06 | 0.115 | 62.75 | 62.75 | <0.001 |
| Inflation | 0.5 | 0.81 | 0.692 | 0.5 | 0.5 | <0.001 |
| Inflation targeting | 0.18 | 0.17 | 0.024 | 0.18 | 0.18 | <0.001 |
| Political stability | 6.69 | 4.35 | 0.42 | 6.69 | 6.69 | <0.001 |

Table B-8: Revenue rules

| ONE TYPE OF RULES: RR | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **RR** | **Non-RR** | **SMD** | **RR** | **Non-RR** | **SMD** |
| Real GDP | 3.39 | 3.83 | 0.609 | 3.39 | 3.39 | <0.001 |
| Lag of debt | 46.62 | 53.65 | 0.19 | 46.62 | 46.62 | <0.001 |
| Lag of dependency ratio | 79.82 | 62.33 | 0.879 | 79.82 | 79.82 | <0.001 |
| Inflation | 0.47 | 0.71 | 0.513 | 0.47 | 0.47 | <0.001 |
| Inflation targeting | 0.09 | 0.18 | 0.256 | 0.09 | 0.09 | <0.001 |
| Political stability | 5.33 | 5..33 | 0.001 | 5.33 | 5.33 | <0.001 |

Table B-10: Budget balance rules

| ONE TYPE OF RULES: BBR | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **BBR** | **Non-BBR** | **SMD** | **BBR** | **Non-BBR** | **SMD** |
| Real GDP | 3.95 | 3.58 | 0.555 | 3.95 | 3.95 | <0.001 |
| Lag of debt | 53.46 | 52.31 | 0.032 | 53.46 | 53.46 | <0.001 |
| Lag of dependency ratio | 59.89 | 69.27 | 0.473 | 59.89 | 59.89 | <0.001 |
| Inflation | 0.51 | 0.9 | 0.829 | 0.51 | 0.51 | <0.001 |
| Inflation targeting | 0.23 | 0.1 | 0.372 | 0.23 | 0.23 | <0.001 |
| Political stability | 6.49 | 3.9 | 0.45 | 6.49 | 6.49 | <0.001 |

Table B-11: Advanced countries

| ADVANCED COUNTRIES | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 4.38 | 4.17 | 0.414 | 4.38 | 4.38 | <0.001 |
| Lag of debt | 60.41 | 50.42 | 0.286 | 60.41 | 60.41 | <0.001 |
| Lag of dependency ratio | 49.64 | 50.26 | 0.108 | 49.64 | 49.64 | <0.001 |
| Inflation | 0.41 | 0.67 | 0.958 | 0.41 | 0.41 | <0.001 |
| Inflation targeting | 0.29 | 0.18 | 0.265 | 0.29 | 0.29 | <0.001 |
| Political stability | 8.43 | 8.85 | 0.101 | 8.43 | 8.43 | <0.001 |

Table B-15: Countries that have just adopted fiscal rules

| DURATION HAVE JUST ADOPTED | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.78 | 3.79 | 0.012 | 3.78 | 3.78 | <0.001 |
| Lag of debt | 52.41 | 52.96 | 0.015 | 52.41 | 52.41 | <0.001 |
| Lag of dependency ratio | 62.78 | 64.13 | 0.068 | 62.78 | 62.78 | <0.001 |
| Inflation | 0.63 | 0.68 | 0.131 | 0.63 | 0.63 | <0.001 |
| Inflation targeting | 0.16 | 0.17 | 0.039 | 0.16 | 0.16 | <0.001 |
| Political stability | 5.59 | 5.32 | 0.047 | 5.59 | 5.59 | <0.001 |

Table B-12: No-advanced countries

| NO DEVELOPED COUNTRIES | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.58 | 3.4 | 0.306 | 3.58 | 3.58 | <0.001 |
| Lag of debt | 45.65 | 54.64 | 0.255 | 45.65 | 45.65 | <0.001 |
| Lag of dependency ratio | 67.46 | 76.12 | 0.422 | 67.46 | 67.46 | <0.001 |
| Inflation | 0.62 | 0.97 | 0.687 | 0.62 | 0.62 | <0.001 |
| Inflation targeting | 0.19 | 0.05 | 0.45 | 0.19 | 0.19 | <0.001 |
| Political stability | 4.85 | 2.38 | 0.432 | 4.85 | 4.85 | <0.001 |

Table B-13: Emerging countries

| DEVELOPING COUNTRIES | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.84 | 3.6 | 0.472 | 3.84 | 3.84 | <0.001 |
| Lag of debt | 43.14 | 43.94 | 0.027 | 43.14 | 43.14 | <0.001 |
| Lag of dependency ratio | 53.93 | 62.49 | 0.697 | 53.93 | 53.93 | <0.001 |
| Inflation | 0.72 | 1.13 | 0.855 | 0.72 | 0.72 | <0.001 |
| Inflation targeting | 0.33 | 0.09 | 0.627 | 0.33 | 0.33 | <0.001 |
| Political stability | 6.34 | 5.62 | 0.147 | 6.34 | 6.34 | <0.001 |

Table B-14: Low-income countries

| LOW INCOME COUNTRIES | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.22 | 3.12 | 0.17 | 3.22 | 3.22 | <0.001 |
| Lag of debt | 49.21 | 69.27 | 0.51 | 49.21 | 49.21 | <0.001 |
| Lag of dependency ratio | 86.69 | 94.76 | 0.598 | 86.69 | 86.69 | <0.001 |
| Inflation | 0.48 | 0.77 | 0.555 | 0.48 | 0.48 | <0.001 |
| Inflation targeting | 0 | 0 | <0.001 | 0 | 0 | <0.001 |
| Political stability | 2.75 | -2.06 | 0.965 | 2.75 | 2.75 | <0.001 |

Table B-16: Countries that have adopted FRs less than three years

| DURATION LESS THAN 3 YEARS | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.72 | 3.70 | 0.031 | 3.72 | 3.72 | <0.001 |
| Lag of debt | 54.31 | 54.61 | 0.008 | 54.31 | 54.31 | <0.001 |
| Lag of dependency ratio | 62.64 | 64.24 | 0.081 | 62.64 | 62.64 | <0.001 |
| Inflation | 0.64 | 0.70 | 0.144 | 0.64 | 0.64 | <0.001 |
| Inflation targeting | 0.18 | 0.16 | 0.059 | 0.18 | 0.18 | <0.001 |
| Political stability | 5.40 | 5.08 | 0.056 | 5.40 | 5.40 | <0.001 |

Table B-17: Countries that have adopted at least three years

| DURATION AT LEAST 3 YEARS | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.74 | 3.69 | 0.031 | 3.74 | 3.74 | <0.001 |
| Lag of debt | 54.20 | 54.63 | 0.008 | 54.20 | 54.20 | <0.001 |
| Lag of dependency ratio | 62.46 | 64.31 | 0.081 | 62.46 | 62.46 | <0.001 |
| Inflation | 0.63 | 0.71 | 0.144 | 0.63 | 0.63 | <0.001 |
| Inflation targeting | 0.19 | 0.16 | 0.059 | 0.19 | 0.19 | <0.001 |
| Political stability | 5.46 | 5.06 | 0.056 | 5.46 | 5.46 | <0.001 |

Table B-18: Countries that have adopted at least five years

| DURATION AT LEAST 5 YEARS | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.77 | 3.69 | 0.031 | 3.77 | 3.77 | <0.001 |
| Lag of debt | 53.24 | 54.85 | 0.008 | 53.24 | 53.24 | <0.001 |
| Lag of dependency ratio | 62.13 | 64.50 | 0.081 | 62.13 | 62.13 | <0.001 |
| Inflation | 0.63 | 0.71 | 0.144 | 0.63 | 0.63 | <0.001 |
| Inflation targeting | 0.19 | 0.16 | 0.059 | 0.19 | 0.19 | <0.001 |
| Political stability | 5.55 | 5.02 | 0.056 | 5.55 | 5.55 | <0.001 |

Table B-19: Countries that have adopted for more than ten years

| Duration after ten years | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 4.04 | 3.52 | 0.031 | 4.04 | 4.04 | <0.001 |
| Lag of debt | 55.16 | 54.29 | 0.008 | 55.16 | 55.16 | <0.001 |
| Lag of dependency ratio | 57.71 | 67.32 | 0.081 | 57.71 | 57.71 | <0.001 |
| Inflation | 0.45 | 0.82 | 0.144 | 0.45 | 0.45 | <0.001 |
| Inflation targeting | 0.26 | 0.11 | 0.059 | 0.26 | 0.26 | <0.001 |
| Political stability | 7.06 | 4.13 | 0.056 | 7.06 | 7.06 | <0.001 |

Table B-20: Countries that have inflation under three percent

| INFLATION UNDER 3% | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 4.05 | 3.51 | 0.81 | 4.05 | 4.05 | <0.001 |
| Lag of debt | 56.89 | 53.34 | 0.2 | 56.89 | 56.89 | <0.001 |
| Lag of dependency ratio | 58.79 | 66.96 | 0.961 | 58.79 | 58.79 | <0.001 |
| Inflation | 0.32 | 0.90 | 0.919 | 0.32 | 0.32 | <0.001 |
| Inflation targeting | 0.23 | 0.13 | 1.035 | 0.23 | 0.23 | <0.001 |
| Political stability | 6.78 | 4.21 | 0.451 | 6.78 | 6.78 | <0.001 |

Table B-21: Countries that have inflation under five percent

| INFLATION UNDER 5% | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 4.03 | 3.41 | 0.743 | 4.03 | 4.03 | <0.001 |
| Lag of debt | 55.24 | 54.01 | 0.033 | 55.24 | 55.24 | <0.001 |
| Lag of dependency ratio | 58.76 | 68.74 | 0.519 | 58.76 | 58.76 | <0.001 |
| Inflation | 0.41 | 0.95 | 1.244 | 0.41 | 0.41 | <0.001 |
| Inflation targeting | 0.24 | 0.10 | 0.383 | 0.24 | 0.24 | <0.001 |
| Political stability | 6.70 | 3.72 | 0.531 | 6.70 | 6.70 | <0.001 |

Table B-22: Countries that have at least inflation dix percent

| INFLATION LESS THAN 10% | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.97 | 3.36 | 0.709 | 3.97 | 3.97 | <0.001 |
| Lag of debt | 53.82 | 55.55 | 0.047 | 53.82 | 53.82 | <0.001 |
| Lag of dependency ratio | 59.47 | 69.97 | 0.539 | 59.47 | 59.47 | <0.001 |
| Inflation | 0.49 | 0.96 | 0.982 | 0.49 | 0.49 | <0.001 |
| Inflation targeting | 0.24 | 0.07 | 0.463 | 0.24 | 0.24 | <0.001 |
| Political stability | 6.47 | 3.39 | 0.537 | 6.47 | 6.47 | <0.001 |

Table B-23: Central bank credibility

| CENTRAL BANK CREDIBILITY | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 4.10 | 3.94 | 0.229 | 4.10 | 4.10 | <0.001 |
| Lag of debt | 49.06 | 51.98 | 0.083 | 49.06 | 49.06 | <0.001 |
| Lag of dependency ratio | 54.43 | 60.13 | 0.37 | 54.43 | 54.43 | <0.001 |
| Inflation | 0.52 | 0.40 | 0.39 | 0.52 | 0.52 | <0.001 |
| Inflation targeting | 0.52 | 0.50 | 0.04 | 0.52 | 0.52 | <0.001 |
| Political stability | 8.45 | 7.10 | 0.385 | 8.45 | 8.45 | <0.001 |

Table B-24: Fixed exchange rate regime

| FIXED EXCHANGE RATE REGIME | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 3.83 | 3.49 | 0.499 | 3.83 | 3.83 | <0.001 |
| Lag of debt | 54.12 | 59.06 | 0.131 | 54.12 | 54.12 | <0.001 |
| Lag of dependency ratio | 63.4 | 74.23 | 0.533 | 63.4 | 63.4 | <0.001 |
| Inflation | 0.52 | 0.81 | 0.636 | 0.52 | 0.52 | <0.001 |
| Inflation targeting | 0.08 | 0.01 | 0.348 | 0.08 | 0.08 | <0.001 |
| Political stability | 5.88 | 2.62 | 0.535 | 5.88 | 5.88 | <0.001 |

Table B-25: No Fixed exchange rate regime

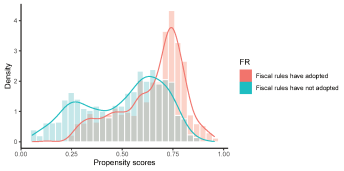
| NON FIXED EXCHANGE RATE REGIME | Before weighting | | | After weighting | | |
|---|---|---|---|---|---|---|
| **Variable** | **FR** | **Non-FR** | **SMD** | **FR** | **Non-FR** | **SMD** |
| Real GDP | 4.18 | 3.73 | 0.81 | 4.18 | 4.18 | <0.001 |
| Lag of debt | 45.29 | 39.81 | 0.2 | 45.29 | 45.29 | <0.001 |
| Lag of dependency ratio | 50.17 | 66.15 | 0.961 | 50.17 | 50.17 | <0.001 |
| Inflation | 0.56 | 0.89 | 0.919 | 0.56 | 0.56 | <0.001 |
| Inflation targeting | 0.62 | 0.17 | 1.035 | 0.62 | 0.62 | <0.001 |
| Political stability | 7.21 | 4.87 | 0.451 | 7.21 | 7.21 | <0.001 |

## 2.7 Robustness

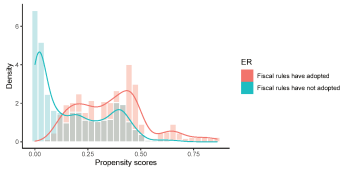
### 2.7.1 Examination of common support regions'

Figure B-1: Common support regions' graphs

(a) All fiscal rules



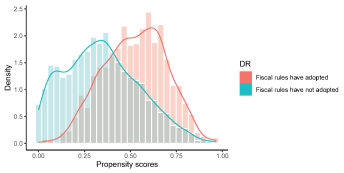

(b) Expenditure rules



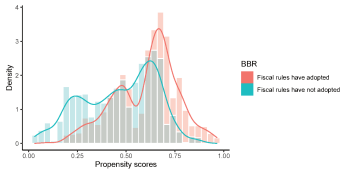

(c) Revenue rules



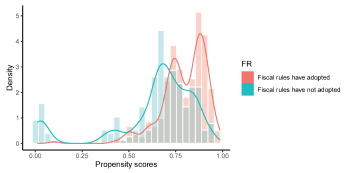

(d) Debt rules



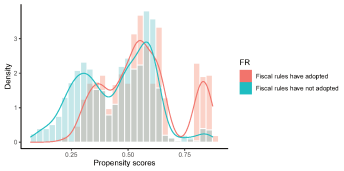

(e) Budget balance rules



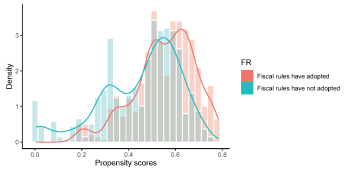

(f) Advanced economies



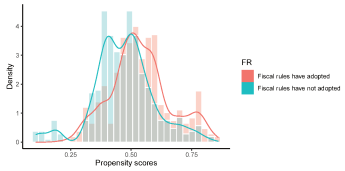

(g) No advanced economies



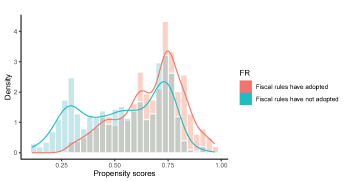

(h) Emerging economies



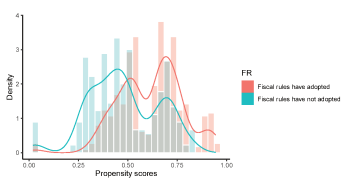

(i) Low-income economies




(j) Fixed exchange rate regimes




(k) No Fixed exchange rate regimes



### 2.7.2 Estimates from propensity score matching

Table B-1: Propensity scores estimates

| | [1] | [2] | [3] | [4] | [5] | [6] |
|---|---|---|---|---|---|---|
| **Dependent var. = Fiscal rules** | | | | | | |
| Log of real GDP per capita | 0.55*** | 0.58*** | 0.53*** | 0.56*** | 0.56*** | 0.56*** |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| Public debt lagged one year | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Dependency ratio lagged one year | - 0.01** | - 0.01** | - 0.01*** | - 0.01** | - 0.01** | - 0.01*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Inflation lagged one year | - 1.96*** | - 1.92*** | - 1.90*** | - 1.96*** | - 1.99*** | - 1.64*** |
| | (0.12) | (0.12) | (0.12) | (0.12) | (0.12) | (0.12) |
| Inflation targeting (dummy) | 0.62*** | 0.58*** | 0.71*** | 0.63*** | 0.60*** | 1.05*** |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.16) |
| Political stability | 0.06*** | 0.05*** | 0.07*** | 0.07*** | 0.06*** | 0.06*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Deficit under 3% dummy | | 0.52*** | | | | |
| | | (0.13) | | | | |
| Public debt under 60% dummy | | 0.21 | | | | |
| | | (0.15) | | | | |
| Trade openness | | | 0.00*** | | | |
| | | | (0.00) | | | |
| Political orientation of gov. | | | | - 0.20*** | | |
| | | | | (0.05) | | |
| Unemployment rate | | | | | - 0.01 | |
| | | | | | (0.01) | |
| Level of education | | | | | - 0.15*** | |
| | | | | | (0.05) | |
| Flexibility of exchange rate | | | | | | - 0.42*** |
| | | | | | (0.05) | |
| Intercept | - 0.28 | - 1.08** | - 0.87 | - 0.10 | 0.85 | 0.40 |
| | (0.42) | (0.48) | (0.45) | (0.43) | (0.58) | (0.44) |
| Pseudo R2 | 0.35/0.22 | 0.36/0.23 | 0.33/0.21 | 0.33/0.21 | 0.33/0.21 | 0.36/0.23 |
| Number of obs. | 2787 | 2787 | 2787 | 2787 | 2787 | 2768 |

Notes: [1], [2], [3], [4], [5] and [6] respectively denote benchmark model, model adding compliance with rules, model adding trade openness, model adding political orientation of government, model adding macroeconomic variables, model adding exchange rate regime. Standard errors are in parentheses. The stars, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Rubin's B is the absolute standardized difference of the means of the linear index of the propensity score in the treated and (matched) non-treated group. Rubin's R is the ratio of treated to (matched) non-treated variances of the propensity score index. Rubin (2001) recommends that B be less than 25 and R be between 0.5 and 2 for the samples to be sufficiently balanced.

Table B-2: PSM estimates by types of fiscal rules

| | Nearest neighbor(1) | Nearest neighbor(2) | Nearest neighbor(5) | Kernel | Local-linear | Radius (.05) | Radius (.01) | Radius (.005) |
|---|---|---|---|---|---|---|---|---|
| **FR** | -0.280* | -0.288 | -0.167 | -0.320*** | -0.538*** | -0.336*** | -0.188*** | -0.180 |
| | (-1.75) | (-1.10) | (-0.50) | (-2.73) | (-4.53) | (-2.80) | (-3.38) | (-0.92) |
| Rubin's B | 23.20 | 31.55 | 35.94 | 22.72 | 23.77 | 21.64 | 22.81 | 30.82 |
| Rubin's R | 0.84 | 0.81 | 0.84 | 0.92 | 0.83 | 0.93 | 0.89 | 0.82 |
| **ER** | -0.261 | -0.406*** | -0.333*** | -0.749* | -1.374*** | -0.752 | -0.306** | -0.278 |
| | (-1.37) | (-9.86) | (-3.43) | (-1.67) | (-2.88) | (-1.48) | (-2.44) | (-1.34) |
| Rubin's B | 23.97 | 19.96 | 17.33 | 14.56 | 23.85 | 14.53 | 17.40 | 18.31 |
| Rubin's R | 0.54 | 0.49 | 0.48 | 0.75 | 0.54 | 0.80 | 0.51 | 0.53 |
| **RR** | -5.730 | -10.46 | -14.92** | -4.287** | -7.931*** | -4.018*** | -11.07*** | -14.80*** |
| | (-0.95) | (-0.73) | (-2.57) | (-2.34) | (-5.81) | (-3.29) | (-72.02) | (-4.45) |
| Rubin's B | 40.90 | 30.63 | 28.56 | 22.72 | 40.33 | 22.62 | 29.42 | 26.59 |
| Rubin's R | 0.58 | 0.56 | 0.57 | 0.68 | 0.60 | 0.71 | 0.51 | 0.48 |
| **DR** | -0.655*** | -0.646*** | -0.600*** | -1.121*** | -1.824 | -1.187** | -0.693*** | -0.671*** |
| | (-2.59) | (-63.60) | (-4.26) | (-5.07) | (-1.63) | (-2.32) | (-353.63) | (-3.11) |
| Rubin's B | 14.73 | 14.67 | 12.91 | 11.24 | 14.69 | 11.12 | 12.12 | 13.99 |
| Rubin's R | 0.47 | 0.59 | 0.69 | 0.79 | 0.47 | 0.80 | 0.71 | 0.73 |
| **BBR** | -0.157 | -0.0849 | -0.102 | -0.362*** | -0.736*** | -0.419* | -0.161* | -0.202*** |
| | (-0.48) | (-0.35) | (-1.19) | (-12.16) | (-7.06) | (-1.92) | (-1.67) | (-4.39) |
| Rubin's B | 30.90 | 31.41 | 31.86 | 24.04 | 23.88 | 20.89 | 22.64 | 27.17 |
| Rubin's R | 0.61 | 0.65 | 0.64 | 0.70 | 0.63 | 0.71 | 0.67 | 0.66 |
| $N$ | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 |

Notes: Bootstrapped standard errors based on 500 replications are reported in brackets. The stars, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-3: PSM estimates by countries's groups

| | Nearest neighbor(1) | Nearest neighbor(2) | Nearest neighbor(5) | Kernel | Local-linear | Radius (.05) | Radius (.01) | Radius (.005) |
|---|---|---|---|---|---|---|---|---|
| **Advanced countries** | 0.0338 | 0.0536 | -0.0466*** | -3.640** | -5.380*** | -4.086 | -0.564 | -0.193 |
| | (0.18) | (0.98) | (-8.34) | (-2.35) | (-2.91) | (-1.54) | (-0.84) | (-0.39) |
| Rubin's B | 74.30 | 67.32 | 62.47 | 61.00 | 74.72 | 61.19 | 61.84 | 64.39 |
| Rubin's R | 0.52 | 0.51 | 0.51 | 0.52 | 0.53 | 0.53 | 0.51 | 0.50 |
| **No advanced countries** | -0.751 | -0.618*** | -0.735*** | -0.814*** | -1.055*** | -0.813*** | -0.726*** | -0.721*** |
| | (-1.26) | (-5.80) | (-2.59) | (-10.46) | (-40.34) | (-24.02) | (-8.06) | (-3.78) |
| Rubin's B | 32.68 | 12.59 | 13.23 | 17.27 | 13.00 | 17.19 | 18.13 | 19.78 |
| Rubin's R | 1.06 | 1.03 | 1.06 | 1.04 | 1.06 | 1.03 | 1.08 | 1.09 |
| **Emerging countries** | -0.873*** | -0.898*** | -0.956*** | -1.311*** | -2.267*** | -1.331*** | -1.196*** | -1.047*** |
| | (-9.00) | (-11.21) | (-2.87) | (-10.72) | (-6.67) | (-8.88) | (-6.17) | (-2.75) |
| Rubin's B | 25.08 | 31.98 | 22.46 | 23.13 | 25.90 | 23.22 | 22.32 | 22.34 |
| Rubin's R | 0.77 | 0.73 | 0.75 | 0.76 | 0.77 | 0.76 | 0.78 | 0.77 |
| **Low-income countries** | -4.081*** | -4.339*** | -4.428*** | -4.855*** | -4.910*** | -4.873*** | -4.475*** | -4.607*** |
| | (-31.57) | (-9.84) | (-21.86) | (-32.33) | (-5.22) | (-40.49) | (-9.88) | (-6302.68) |
| Rubin's B | 27.35 | 26.87 | 25.49 | 27.95 | 27.62 | 28.39 | 24.35 | 25.29 |
| Rubin's R | 0.88 | 0.88 | 0.87 | 0.80 | 0.89 | 0.80 | 0.83 | 0.84 |
| $N$ | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 |

Notes: Bootstrapped standard errors based on 500 replications are reported in brackets. The stars, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-4: PSM estimates by exchange rate regimes

| | Nearest neighbor(1) | Nearest neighbor(2) | Nearest neighbor(5) | Kernel | Local-linear | Radius (.05) | Radius (.01) | Radius (.005) |
|---|---|---|---|---|---|---|---|---|
| **Fixed ERR** | -0.633 | -0.669*** | -0.789*** | -0.782*** | -0.946*** | -0.793*** | -0.740*** | -0.722*** |
| | (-1.61) | (-3.49) | (-35.49) | (-3.84) | (-3.65) | (-12.21) | (-35.70) | (-29.59) |
| Rubin's B | 38.42 | 37.72 | 37.07 | 39.78 | 38.89 | 39.69 | 40.17 | 38.11 |
| Rubin's R | 1.48 | 1.50 | 1.41 | 1.43 | 1.46 | 1.44 | 1.44 | 1.47 |
| **No fixed ERR** | -3.196 | -3.779* | -5.074** | -7.143*** | -10.02*** | -7.466*** | -5.372*** | -5.442*** |
| | (-1.18) | (-1.80) | (-2.03) | (-13.18) | (-33.02) | (-8.16) | (-5.28) | (-10.21) |
| Rubin's B | 32.44 | 34.69 | 33.38 | 36.86 | 33.77 | 37.04 | 35.88 | 35.13 |
| Rubin's R | 0.71 | 0.77 | 0.82 | 0.76 | 0.71 | 0.75 | 0.81 | 0.75 |
| $N$ | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 | 2787 |

Notes: Bootstrapped standard errors based on 500 replications are reported in brackets. The stars, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table B-5: Variables, sources and definitions

| Variable | Source | Definition |
|---|---|---|
| ***Treatment*** | | |
| Fiscal Rules' adoption | IMF Fiscal Rules Dataset | 1 = country has adopted FR, 0 otherwise |
| Fiscal Rules Strength Index | Authors' calculations | Formula based on Gootjes et al. (2021). |
| ***Dependents*** | | |
| Inflation rates | WB A Cross-Country Database of Inflation (version January 2023) | Core consumer price inflation, annual |
| GDP deflator | WB A Cross-Country Database of Inflation (version January 2023) | GDP deflator growth rate, annual |
| ***Covariates*** | | |
| Real GDP per capita | WB | Sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. |
| Debt-to-GDP ratio | IMF Global Debt Database & WB | Gross debt and aims at covering all debt instruments owed by the general and/or central government, as defined in the IMF's Public Debt. |
| Dependency ratio | WB World Development Indicators | Ratio of dependents (people younger than 15 or older than 64) to the working-age population–those ages 15-64. |
| Inflation targeting | National Central Banks | 1 = country with IT, 0 otherwise. |
| Political stability | WB World Governance Indicators & WB Africa Development Indicators | Perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence or terrorism. |
| Public Deficit under 3% dummy | Authors' calculations | 1 = country comply with BBR, 0 otherwise. |
| Public Debt under 60% dummy | Authors' calculations | 1 = country comply with DR, 0 otherwise. |
| Trade openness | WB World Development Indicators | Trade (Imports plus exports) in % of GDP. |
| Political orientation of Govt | Database of Political Institutions (EXECRLC) | 1 = Right; 2 = Center; 3 = Left. |
| Unemployment rate | International Labor Organization | Number of persons who are unemployed as a percent of the labor force (i.e., the employed plus the unemployed). |
| Education | WB World Development Indicators | Percentage of population ages 25 and over that attained or completed lower secondary education. |
| Non-Pegged ERR | Ilzetzki et al. (2019) | 1 = managed float, 0 otherwise. |
| Fiscal council | Davoodi et al. (2022) | 1 = country have fiscal council, 0 otherwise. |
| Level of institutional quality | Freedom House | Combination of the overall score awarded for political rights and the overall score awarded for civil liberties. |

Notes: IMF: International Monetary Fund. WB: World Bank.

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# Chapter 3

# Keep your hands tied or not? Fiscal rules and household inflation anchoring[1]

1. This chapter has been co-written with Estel Apeti, Associate Professor of Economics at Paris Nanterre University.

*While the previous chapter established a link between fiscal policy and inflation, macroeconomic stability is not solely determined by observed inflation levels. Economic agents, particularly households and financial markets, shape their behavior based on inflation expectations. A key question remains unanswered: can fiscal rules help anchor inflation expectations, especially in an environment of high public debt? This chapter delves into this issue by analyzing how fiscal rules influence the formation and dispersion of household inflation expectations.*

## 3.1 Introduction

The Covid-19 crisis and the subsequent inflation caused by various factors ranging from the effect of fiscal stimuli to the disruption of value chains, commodity price shocks, and geopolitical turmoil (Lane, 2024) provides an excellent opportunity to test Central Banks' monetary policy model. For the first time, all the causes of inflation, including the demand and supply sides, collide, putting Central Banks in an astonishing policy dilemma.

Record economic stimuli pushed many countries' debts to record levels, exceeding 100%, combined with observed short-term inflation de-anchoring. However, inflation anchoring is important for several reasons: monetary policy effectiveness, credibility, and transmission and investment and consumption decisions. For example, in their analysis, Duca-Radu et al. (2021) note that inflation expectations deviation from current levels increases consumption, highlighting the trade-off between consuming today or losing purchasing power if deferred, i.e., if the economic agent adopts a savings dynamic. Expectations, particularly inflation expectations, lay at the heart of macroeconomic theory and monetary policy models. In these models, optimal intertemporal choices rely on inflation expectations to convert nominal values into real values relevant for decision-making and utility (Armantier et al., 2015; Duca-Radu et al., 2021). When nominal interest rates are rigid,

an expected rise in inflation lowers real interest rates due to the well-known Fisher effect and, consequently, stimulates current consumption and aggregate demand by reducing consumers' incentives to save for the future. Moreover, inflation anchoring issues could create self-fulfilling prophecy effects. Indeed, by expecting higher inflation, households may start negotiating higher wages and thus adjust their labor supply. In contrast, firms may start raising the prices of products sold, feeding a spiral of inflationary dynamics (Coibion et al., 2020; Visco, 2023). Several other studies stress the important role inflation anchoring can play in investment, hiring, price-setting decisions, consumption, saving, home-ownership, financing decisions, wage negotiations, and labor supply decisions (Abaidoo, 2016; Coibion et al., 2018; Andrade et al., 2019, 2023).

The Covid-19 crisis pushed the debt of many countries to record levels, making the spillover effects of debt on the Central Bank's ability to contain inflation more likely, given that fiscal policy and monetary policy are intrinsically connected (Combes et al., 2018; Apeti et al., 2023). In the modern history of the world, a group of countries, notably the European Union (EU) zone, provide a relevant case to examine how fiscal policy influences the anchoring of monetary policy. In the EU zone, the need for fiscal rules has been justified by debt externalities between countries, i.e. the negative effects of unsustainable sovereign debt, in one member country on other member countries, either through the fallout from fiscal crises or through the fiscal dominance of monetary policy, forcing the European Central Bank (ECB) to monetize and leading to inflation. Moreover, the political interests of governments can lead to fiscal manipulation, resulting in fiscal myopia. In this sense, some governments could have short horizons and take more debt risks than justified in the context of non-existent or loose fiscal rules (Bibi-Smaghi et al., 1995; James, 2012; Darvas et al., 2018; Blanchard et al., 2021). Although the rationale behind the introduction of fiscal rules in the EU is well known, studies to analyze how the fiscal framework defined by fiscal rules influences the ECB's ability to

anchor inflation expectations remain limited. In a world of excessive debt, where some authors advocate simply abandoning fiscal rules (Blanchard et al., 2021), this analysis provides a framework for documenting whether they help the European Central Bank in its conduct of monetary policy by anchoring household inflation and limiting the risk of fiscal dominance or monetization.

To analyze the role of fiscal rules in anchoring inflation, we use data from the European Central Bank's Consumer Expectations Survey (CES). The interest of focusing on household expectations to determine inflation anchoring is multifold. For a long time, household inflation expectations were not considered to be particularly useful in monetary policy decisions, due to their frequently volatile and dispersed nature. However, the use of survey-based expectations, particularly those of households, improves the empirical performance of the New Keynesian Phillips curve, as demonstrated by several recent studies (Coibion et al., 2018; Adrian, 2023), and the dispersion of household expectations contains information or signals useful for monetary policy formulation and transmission. Specifically, changes in the distribution of household inflation expectations in some major economies determine future inflation. Indeed, changes in one-year-ahead household inflation expectations are predictive of one-year-ahead inflation, and provide additional information to that available from market and professional forecasts. In our analysis, we focus on 1-year or 12-month household inflation expectations, i.e. short-term, for the calculation of the anchoring index. This choice is because short-term inflation is unanchored in the EU countries and determines the dynamics of medium- and long-term inflation (Adrian, 2022; Blot et al., 2022). As Stanisławska et al. (2021) clearly shows, consumers adjust their view of medium-term inflation in response to changes in short-term inflation expectations and, to a lesser extent, to changes in their perception of current inflation. In addition, households may suffer from policy myopia, meaning that their inflation expectations over more than a year are merely an extension of what they observe in the short term (Teglio

et al., 2024).

Based on the ECB's CES database conducted between 2020q1 and 2022q4, and exploiting the variability in exposure to public debt and fiscal rule strength of households between countries, we show the Ordinary Least Squares (OLS) method that public debt diverts inflation expectations away from the Central Bank's target. In other words, public debt worsens the ECB's one-year household inflation expectation anchoring. To overcome the risk that this effect simply reflects the impact of short-term shocks rather than that of public debt, we add a series of variables that absorb the effect of short-term changes, such as fluctuations in the business cycle, terms-of-trade shocks, the Covid crisis, and household characteristics, as well as multiple time, household and country fixed effects to absorb the unobserved characteristics at each of these three levels that can affect the formation of household expectations. Based on this result, we analyze the effect of fiscal rules and conclude that fiscal rules mitigate the adverse effect of public debt on the ECB's household inflation anchoring. Next, we test the robustness of these results with alternative specifications[2] and alternative estimation methods, namely **?** instrumental variable (IV) method and the GMM-system, to contain potential endogeneity and show that the conclusion remains consistent: fiscal rules favor household inflation expectations anchoring. In other words, fiscal rules mitigate the negative spillover of public debt on household inflation expectation anchoring. Then, heterogeneity tests show that the effect—-except the gender of the household, which reveals no visible heterogeneity—may depend on household characteristics such as age, education, income quintile, socio-professional status (i.e. employed or not), as well as on households' level of trust in the ECB.

2. In particular, using 3-year inflation expectations, we find the same results, underlining the relevance of our conclusions for both short- and medium- to long-term inflation, while supporting the view that our baseline results are not the outcome of short-term noises that may fade over the medium and long term, but of the fiscal framework. Indeed, if our results were due to short-term noise, although controlled by comprehensible control variables and multiple fixed effects, we would have found that the effect of debt would exist only in the short term and not in the long term, as this noise would attenuate over time, suggesting that household inflation would naturally be well anchored over medium and long term.

The rest of the chapter is organized as follows. The next section discusses the theoretical considerations. Sections 3 and 4 discuss methodological issues, data, and descriptive statistics, respectively. Sections 5-7 present results, robustness, and possible heterogeneity, respectively. Section 8 concludes.

## 3.2 Theoretical Considerations

The effect of the fiscal framework on anchoring monetary policy may be guided by some mechanisms. Based on the literature, we identify two major ones, namely debt monetization risk and the production cost effect. The monetization channel originates from two theories, namely unpleasant monetarist arithmetic and the fiscal theory of the price level. The theory of unpleasant monetarist arithmetic pioneered by Sargent and Wallace (1981) presents a game of chicken with two players, namely the government and the central bank, in which the loser is always the central bank. Confronted with a conservative price-stability monetary policy from the central bank, the government inevitably encounters a major dilemma: policy-mix behavior, i.e. the development of a sound fiscal policy that avoids jeopardizing the central bank's objective, or a coordination failure that drives the government to choose to assume its stabilizing role, creating a deficit bias and debt accumulation. As Sargent and Wallace (1981) note, in such a game of non-coordination, the loser is always the central bank, which, in response to persistent government deficits unsupported by a primary surplus dynamic *à la* Bohn (1998), sooner or later must finance the deficit by seigniorage, thereby exposing the economy to inflation risk.[3]

However, it is important to note that this dynamic is much more likely to occur in a country with its central bank than in countries forming a union. As such, the risk of monetization may be less likely in a union zone such as the EU, where monetary

3. This relationship between money creation and inflation is in the light of the quantity of money theory, or monetarist theory, which states that additional money creation can feed inflation.

creation must be approved by all members. However, since the unsustainable debt dynamic is not an idiosyncratic problem, but concerns most countries in the union, including heavyweights such as France, it remains a theoretically conceivable option. A corollary of these arguments is that a stricter or more conservative monetary policy may produce lower inflation today, but higher inflation in the future if fiscal policy dominates. The reason is that forward-looking agents sufficiently anticipate the need for a more flexible monetary policy in the future to absorb public debt (Brandao-Marques et al., 2024). Another possible inflation-generating argument is the loose monetary stance that a central bank may adopt in the face of a critical debt situation such as the one we are currently witnessing in the world in general, and in the European Union in particular. Indeed, to avoid a Greek-style scenario, i.e. a default crisis that could affect the viability of the union, monetary policy, instead of following a stricter stance, could take a softer approach, raising interest rates less sharply today to avoid an increase in the debt burden and the risk of a debt crisis, thereby giving inflation an over-cautious sentence for a given period, fueling household inflation expectations. In other words, by projecting an unstable debt dynamic, the central bank can use monetary policy in a sub-optimal way, raising interest rates only marginally in the face of inflationary pressures, thus ineffectively managing the latter.

The second theory, fiscal theory of the price level, is rooted in the fiscal foundation of inflation developed by Leeper (1991); Sims (1994); Woodford (1994); Cochrane (2001); Anderson and Leeper (2023); Barro and Bianchi (2023); Bianchi et al. (2023); Cochrane (2023), and Chancellor (2023). According to this theory, inflation is not caused by a simple increase in the money supply, as the monetarists argue, but has a fiscal origin. Indeed, this theory preaches that deficits not backed by adequate future surpluses must be accompanied by a rise in nominal prices and a corresponding fall in the real value of nominal outstanding debt. As deficit accumulation is not matched by a boost in economic activity to expand the tax base

and thus increase tax revenues for its self-financing, debt sustainability can only be achieved by creating inflation to reduce the real value of the debt, thus adding further inflationary pressure to that already created. This is in line with pre-Covid fiscal behavior, where excessive declines in interest rates—especially with interest rates likely to stay below economic growth rates—and sometimes negative ones prompted discussions (see Blanchard, 2019) that debt sustainability shouldn't be a concern as debt is free in the logic of free launch, but also the huge stimulus packages seen during the Covid-19 crisis with the whatever-it-costs rationale.[4]

Adapting the famous maxim of Milton Friedman, leader of the monetarist movement, proponents of this theory assert that inflation, is always and everywhere a fiscal phenomenon. According to Cochrane (2023), for example, money is just another form of public debt, and inflation occurs when the government's commitments, made up of money and debt, exceed its borrowing capacity. Fiscal theory uses standard asset pricing models to assess the viability of public debt.[5] As investors value stocks and bonds by applying a discount rate to future cash flows, the present value of public debt is calculated by discounting future budget surpluses. As a result, when public debt becomes too large relative to future tax revenues, the government is expected to artificially inflate surplus liabilities. In this way, the government generates inflation and prices adjust until the real value of all public debt, including money, is equal to the present value of current and future public surpluses, thus respecting the government's inter-temporal budget constraint.[6] To further support the argument for the fiscal origin of inflation, Cochrane (2023) stresses that raising interest rates to combat inflation can paradoxically be inflationary. Indeed, an increase in the real interest rate, which represents the inflation-adjusted cost of borrowing, means that the government must spend

4. This approach is used by authors to explain recent surges in inflation (Anderson and Leeper, 2023; Barro and Bianchi, 2023; Bianchi et al., 2023).
5. Applying a HANK model to limit criticisms associated with the fiscal theory of the price level, Angeletos et al. (2024b) also supports the fiscal origin of inflation.
6. In this theory, past inflation is viewed as episodes of debt default.

more to service its debt, an additional fiscal burden that is inflationary.[7]

In light of these discussions, it appears that public debt influences inflation. As this literature shows, the central bank alone cannot manage inflation; the government needs to balance its books, i.e. ensure a prudent fiscal policy. This statement is particularly relevant given that the literature indicates that the effect of debt on inflation is more marked in times of tension or war, as seen in geopolitical tensions in today's world (Bordo and Levy, 2021). Among existing fiscal governance instruments, fiscal rules emerge as an instrument of choice in promoting budgetary discipline, for which the literature provides extensive evidence. For example, recently Apeti et al. (2024) analysis of a large sample of developing countries found that fiscal rules reduced the debt of countries that adopted them. In a sample covering both developed and developing countries, Combes et al. (2018) show that fiscal rules reduce public debt, and public deficit and improve the primary balance. In a survey, Potrafke (2025) shows that fiscal rules reduce budget deficits, public spending, and borrowing costs and increase GDP growth. In the EU context, Hallerberg et al., 2007; Debrun et al., 2008; Bergman et al., 2016; Barbier-Gauchard et al., 2021; Gootjes and de Haan, 2022; López-Villavicencio and Zoumenou, 2025 emphasize that the EU fiscal framework governed by fiscal rules promotes fiscal discipline by reducing deficits and debt, for example. Moreover, the EU fiscal framework includes mechanisms for sanctioning and correcting excessive deficits. For example, even if France runs an excessive deficit, the French government plans to reduce it to the level set by the EU in the coming years. From this perspective, we could say that the existence of fiscal rules authorizes economic recovery plans in the event of a crisis, as observed in the time of COVID-19, creating deficits today but later corrected by tax hikes or spending cuts in the future—as shown by the 2025 budget proposed and discussed in France— to maintain the convergence of

7. The discussion is in line with Angeletos et al. (2024a)'s argument that a surge in inflation erodes the real value of nominal public debt, possibly resulting in debt convergence toward a sustainable level.

debt back to its initial level. From this angle, debt cannot increase indefinitely, as it is immediately or subsequently supported by a policy of primary surplus creation designed to ensure its sustainability, reducing the likelihood of monetization or inflation creation to reduce its real value. Based on this discussion, we can conclude that the governance framework based on fiscal rules can create a robust fiscal environment in which inflation anchoring will be a reality. In other words, fiscal rules would mitigate the negative effect of debt and favor the anchoring of monetary policy or household inflation expectations. In this framework, households can be seen as patient agents who believe in the effectiveness of a sustainable debt under the framework of fiscal rules, allowing them not to anticipate, or less anticipate, excessive inflation.

The second channel, that of production costs, originates from both firms and households. For example, confronted with excessive public debt accumulation, firms may anticipate a future increase in taxes, and hence a rise in production costs. As a result, they raise the price of their goods, feeding the inflationary spiral. Households, on the other hand, see their purchasing power plummet as producers raise the price of their goods and start negotiating higher wages, which can fuel inflation. In addition to this effect of higher producer prices, households may also anticipate a future rise in debt-financing taxes, and therefore lower disposable income, leading them to start negotiating for higher wages, as in the previous case. The literature shows that fiscal rules promote a counter-cyclical or less pro-cyclical fiscal policy. In addition to their discipline power through a debt supported by a primary surplus, which makes future tax increases less violent and thus inflation expectations lower, their countercyclical or less procyclical role would translate into a low-tax dynamic in the event of a recession and a higher tax in the event of a boom, a tax increase that would not necessarily come from a rate hike but simply from the broadening of the tax base following a boom in economic activity.

## 3.3 Methodological Issues

The aim of our analysis is twofold. First, we seek to determine whether public debt affects the inflation anchoring of households. Second, and most importantly, we look at how fiscal rules interact with public debt about inflation anchoring. To do this, we use the following model.

$$Y_{ijt} = \alpha + \beta_1 debt_{it} + \beta_2 rule_{it} + \beta_3 (debt * rule)_{it} + \gamma X_{i(j)t} + \lambda_i + \rho_j + \mu_t + \varepsilon_{ijt} \quad (3.1)$$

where $Y_{ijt}$ is the inflation anchoring index of household j, located in country $i$ in quarter t, $debt_{it}$ is the public debt-to-GDP of country $i$ in quarter t, $rule_{it}$ stands for the fiscal rules of country $i$ in quarter t, $(debt * rule)_{it}$ is the interaction between public debt and fiscal rules. $X_{i(j)t}$ represents a list of control variables divided into two: *i-)* household characteristics: respondent age, income quintile, past credit access, past household spending, and *ii-)* country-level control variables: COVID-19 stringency index, first diff. of NEER, lagged real GDP growth, log terms of trade. $\lambda_i$,$\rho_j$ and $\mu_t$ are respectively the country fixed effect to absorb country specificity which can influence both household inflation expectations and the dynamics of debt accumulation and fiscal rule compliance, the household fixed effect to absorb household characteristics likely to determine their attitude toward inflation, and the time fixed effect to absorb global shocks that may affect both inflation and the fiscal framework. $\varepsilon_{ijt}$ is the error term. $\beta_1$ and $\beta_3$ are our interest coefficients. We expect $\beta_1$ to be negative, underlining that public debt worsens the household inflation anchor, and $\beta_3$ to be positive, reflecting the mitigating effect of fiscal rules.

Two potential problems could threaten our identification, namely the omitted variable and reverse causality. For the former, i.e. the omitted variable, the inclusion of a list of control variables at both household and country levels, and of

multiple fixed effects at country, household, and time levels, mitigates this problem, as is commonly done in the literature. Concerning reverse causality bias, it is reasonable to think that the quality of a country $i$'s anchoring influences its level of fiscal framework. However, our dependent variable is at the household level, and we find no valid reason to believe that the inflation anchoring of household $j$ influences the fiscal framework of an entire country, unless we take the individuals together, which amounts to aggregating the dependent variable, thereby losing valuable information at the household level and the ability to capture household specificity with fixed effects to refine our identification.[8] For these arguments, we use the ordinary least squares (OLS) method to analyze our effects.[9] However, although OLS is our baseline model, we add two robustness methods to test the consistency of our results, namely the Lewbel (2012) instrumental variable model and the GMM system, which above all allows us to control for persistence in the quality of anchoring and hence the past credibility of monetary policy.

## 3.4 Data and Descriptive Statistics

### 3.4.1 Data

In this study, we examine the impact of fiscal rules on the relationship between public debt and inflation expectations, relying on data from the European Central Bank's Consumer Expectations Survey (CES) to measure household inflation expectations. The CES is particularly well-suited for this analysis, providing high-frequency, harmonized, cross-country data that captures household perceptions and expectations of inflation. These features are essential for understanding how

8. See e.g. Paunov and Rollo (2016); Li and Su (2022) who, using firm-level data as the dependent variable and with variables of interest at higher-order levels such as industry and country, didn't worry too much about the endogeneity issue.
9. One possible cause of endogeneity via reverse causality may lie in the central bank's adjustment of the target to facilitate or not its achievement, which may or may not also provide leeway for fiscal policy. However, the virtual stability of the ECB's inflation target rules out this hypothesis.

fiscal rules influence inflation expectations across diverse economic and fiscal contexts.

Our analysis focuses on quarterly and annual data from 11 euro area countries (Belgium, Germany, Spain, France, Italy, the Netherlands, Ireland, Greece, Austria, Portugal, and Finland) from 2020 to 2022. The CES is uniquely valuable for this timeframe, as it is the only dataset offering consistent and comparable survey-based measures of consumer inflation expectations across these countries. This harmonization allows us to investigate cross-country heterogeneity and explore how fiscal rules interact with national characteristics, such as varying debt levels and policy frameworks. Furthermore, the CES dataset enables us to assess the persistence and volatility of inflation expectations at a granular level, shedding light on how fiscal constraints impact household perceptions of price stability over time.

The CES's modular design and mixed-frequency structure further enhance its utility for our study. Monthly data collection provides the granularity needed to analyze short-term fluctuations and trends in inflation expectations. At the same time, aggregation into quarterly intervals aligns the CES data with fiscal and macroeconomic datasets. This alignment supports a robust examination of how fiscal policies shape the relationship between debt and inflation expectations. Notably, the CES's harmonized methodology ensures consistency in inflation expectation measures across countries, allowing for direct cross-country comparisons. This consistency is critical, given the heterogeneity in fiscal rules and institutional structures across the euro area.

In addition to inflation expectations, the CES captures various economic and financial variables, including income, consumption, housing market activity, and credit conditions. These auxiliary variables allow us to situate inflation expectations within a broader macroeconomic framework and account for potential con-

founding factors. This comprehensive coverage enables a deeper understanding of the transmission channels through which fiscal rules influence household inflation expectations. For instance, changes in credit conditions or household income might moderate or amplify the impact of fiscal rules on inflation expectations, offering richer insights into these dynamics.

The CES dataset is regularly updated, with aggregate series published monthly and microdata released quarterly. This commitment to transparency ensures the credibility of our findings, while detailed metadata facilitates accurate and precise use of the dataset. The CES data collection process, managed by IPSOS Public Affairs and subject to ECB confidentiality checks, complies fully with the General Data Protection Regulation (GDPR). This guarantees that the data is anonymized, secure, and ethically sound, ensuring its reliability for academic and policy research.

To examine the degree of inflation expectations anchoring, we construct a country-specific index that aggregates individual anchoring metrics based on consumers' responses to the question: *"How much higher (lower) do you think prices, in general, will be 12 months from now in the country you currently live in?"* This approach follows the methodology outlined in Bems et al. (2021). We focus on 12-month inflation expectations because the quarterly survey gives data for twelve quarters. Using a 12-month horizon ensures alignment with the survey frequency and helps reduce noise in the results, providing more robust estimates.

For each period $t$ in which survey data is available, we calculate two key moments: the average inflation forecast and its standard deviation. These are defined as follows:

$$f_t^{e,h} = \frac{1}{N} \sum_{n=1}^{N} f_{n,t}^{e,h},$$

Where:

- $f_{n,t}^{e,h}$: the inflation forecast of forecaster $n$ at time $t$ for horizon $h$,
- $N$: the total number of forecasters in the sample.

The dispersion of these forecasts is measured using the standard deviation:

$$\sigma_t(f_{n,t}^{e,h}) = \sqrt{\frac{1}{N}\sum_{n=1}^{N}\left(f_{n,t}^{e,h} - f_t^{e,h}\right)^2},$$

Where:

- $f_{n,t}^{e,h}$: the inflation forecast of forecaster $n$ at time $t$ for horizon $h$,
- $f_t^{e,h}$: the mean forecast across all forecasters at time $t$,
- $N$: the total number of forecasters in the sample.

These moments are critical in evaluating the extent to which expectations are anchored to the inflation target set by monetary authorities. For the euro area, the target is assumed to be 2%, consistent with the European Central Bank's inflation objective.

To create the anchoring index for 12-month inflation expectations, we calculate three complementary metrics over two-quarter rolling windows:

- **Metric#1: The absolute deviation of average inflation forecasts from a target —** If inflation expectations are well anchored, beliefs future inflation should be, on average, close to the inflation target pursued by the monetary authority. The root-mean-square deviation of the mean inflation forecast from the inflation target over each rolling window $\omega$ is given by:

$$M_1 = \sqrt{\frac{1}{T}\sum_{t=1}^{T}\left(f_t^{e,h} - f^*\right)^2},$$

Where $f_t^{e,h}$ is the average inflation forecast at time $t$ for horizon $h$, and $f^*$ represents the inflation target set by the monetary authority (e.g., 2% in the euro area). This metric measures how far the mean inflation expectations deviate from the target, with more minor deviations indicating better anchoring. t is the central bank's inflation target for inflation-targeting economies.

- **Metric#2: The variability of average estimates over time —** Stability in inflation expectations is indicative of strong anchoring. We compute the standard deviation of the mean inflation forecast over each rolling window, reflecting how household expectations remain stable despite economic shocks or policy changes.

$$M_2 = \frac{1}{T-1} \sum_{t=1}^{T} \left( f_t^{e,h} - \bar{f}^{e,h} \right)^2,$$

Where:

  - $f_t^{e,h}$: The average inflation forecast at time $t$ for horizon $h$,
  - $\bar{f}^{e,h}$: The overall mean inflation forecast across all periods in the rolling window,
  - $T$: The total periods in the rolling window.

This metric reflects the stability of inflation expectations, with smaller values indicating that average forecasts remain consistent over time, a key characteristic of well-anchored expectations.

- **Metric#3: The dispersion of inflation forecasts across individual consumers —** When expectations are well-anchored, individual forecasts converge around the target. To measure this dispersion, we compute the standard deviation of 12-month-ahead inflation forecasts of individual respon-

dents $n$ at each time $t$, averaged over the rolling window $\omega$:

$$M_3 = \frac{1}{T}\sum_{t=1}^{T}\sqrt{\frac{1}{N-1}\sum_{n=1}^{N}\left(f_{n,t}^{e,h} - f_t^{e,h}\right)^2},$$

where $f_{n,t}^{e,h}$ denotes the inflation forecast of forecaster $n$ at time $t$ for horizon $h$, $f_t^{e,h}$ is the average forecast across forecasters, $N$ is the number of forecasters, and $T$ represents the rolling time window. This metric captures the extent of disagreement among forecasters about future inflation.

Next, we standardize these metrics by pooling observations across countries and time, ensuring that the standardized values have a mean of zero and a standard deviation of one. In other words, observations for each standardized measure are then centered around zero, with a standard deviation of one, a higher (lower) value of the measure indicating a better (worse) anchoring of inflation expectations. We then construct the summary index by taking the simple average of the three standardized metrics and assigning equal weight to each. By leveraging the CES's distinctive features, such as its high-frequency, harmonized data and comprehensive topical coverage, we can robustly analyze the complex dynamics between fiscal rules, public debt, and inflation expectations. The CES thus plays a central role in enabling our examination of these interrelated economic phenomena across the euro area.

Fiscal policy variables are sourced from the Fiscal Governance Database maintained by the Directorate General for Economic and Financial Affairs. This database provides qualitative and quantitative information on fiscal rules, independent fiscal institutions (IFIs), and medium-term budgetary frameworks (MTBFs). The data is updated annually based on responses to a questionnaire completed by Member States and IFIs. Public debt data is obtained from the Quarterly Public Sector Debt (QPSD) database, jointly developed by the World Bank

and the International Monetary Fund. This comprehensive resource compiles detailed quarterly public sector debt statistics.

Apart from our variables of interest, we add variables to ensure that our results do not suffer from the bias of omitted variables. We add respondents' age and household income quintile to account for the effect of socio-demographic characteristics on inflation. Indeed, the young and the elderly are associated with higher inflation, while the working population is associated with lower inflation (Juselius and Takáts, 2021). The dependent people are vulnerable to price rises, as they have fixed incomes and therefore anticipate whether or not prices will rise. As a result, they have a low anchorage, while people of working age have a relatively high anchorage. This can be seen in our sample, where the 18-49 age group has a weaker anchorage than the over-50s, who tend towards retirement(see Table 2.13). Concerning the household's income, we assume that the asset holders are the wealthiest. They are, therefore, more inclined to revise their inflation expectations frequently to preserve the value of their assets (see Table 2.14). We, thus, expect age and income quintile to hurt inflation expectations.

We consider perceived difficulties in past access to credit because Van Wijnbergen (1983) shows that a credit crunch can be stagflationary, even if only in the short term. Households who have previously experienced difficulties in obtaining credit may feel more vulnerable in the event of a credit crunch, which could strongly influence their inflation expectations. Conversely, households who perceived access to credit as relatively easy may have been less financially constrained in the past and, therefore, have a weaker inflation anchor if it is generally more complicated or more manageable for your household to obtain credit or loans.

The households adjust their expectations more sharply in response to variations in spending (D'Acunto et al., 2015; Armona et al., 2019). Those who have experienced increased spending may adjust their inflationary expectations according to

their personal experience of prices.

Armantier et al. (2020), Apergis and Apergis (2021) and Coleman and Nautz (2023) reveal in their studies that households have lost credibility and that their inflation expectations and volatility have been positively affected by the Covid-19 pandemic. Due to our temporal window 2020-2022, we choose to control by the Covid-19 stringency index with an attending negative sign.

The first difference between the nominal effective exchange rate (NEER), terms of trade, and economic growth influences the inflation anchoring index, as these macroeconomic factors could shape expectations and price stability dynamics.

To test the robustness of our baseline model, we add sequentially relevant variables related to fiscal, macroeconomic, and political conditions.

Concerning fiscal conditions, we insert the primary balance to capture the fiscal response of governments to public debt, which is in line with Bohn (1998)'s law. This makes it possible to assess the extent to which debt sustainability influences inflation expectations and to refine the interpretation of the combined effect of debt and fiscal rules. This point is particularly relevant in light of López-Villavicencio and Zoumenou (2025)'s results, which show that the commitment and enforcement of fiscal rules ensure fiscal stability. By incorporating this variable, it becomes possible to evaluate empirically better the extent to which this fiscal discipline contributes to anchoring inflation expectations.

In the case of macroeconomic variables, we consider inflation at a level to capture how observed inflation could affect households' inflation expectations. Then, we add energy and food inflation, which are inflation shocks through the costs. This control is essential in inflation dynamics, causing Milton Friedman's adage that 'inflation is always and everywhere a monetary phenomenon.' There is also a specification for adding commodity prices specifically since the inflation expectations used in this chapter are short-term. Then, commodity prices permit us to

consider the short-term shocks that could affect our results.

As variables related to political country conditions, we use the legislative election dummy, fragmentation, and Geopolitical risk indexes to account for electoral and politico-budgetary cycles. Political fragmentation, reflecting divisions between parties or coalitions, can undermine the credibility of fiscal and monetary policies by weakening the anchoring of inflation. Similarly, geopolitical risk linked to conflict or instability disrupts market confidence, increases risk premiums, and pushes governments to adopt expansionary policies in the short term. These factors increase the risk of monetizing deficits and suggest poor discipline (Alesina and Tabellini, 1990, Bernoth and Wolff, 2008, Ramey, 2011, and Caldara and Iacoviello, 2022), threatening the stability of inflation expectations.

### 3.4.2 Descriptive Statistics

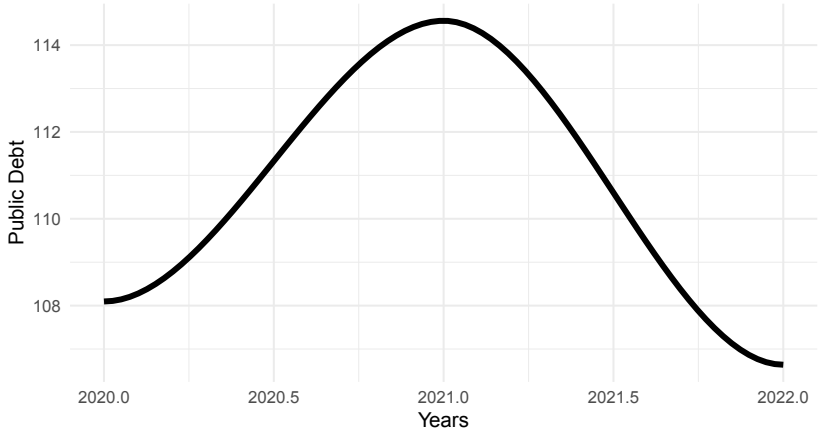
Before moving on to the formal analysis, this section aims to develop a first rough idea about the relationships sought, using descriptive statistics. Table 2.1 summarizes the results. For our discussion, we focus exclusively on the first four lines. First, we find that public debt in the sample countries over the study period averages around 109% of GDP. In terms of fiscal rules, we observe a fiscal rule strength index of 1.6. Expected household inflation, at 5.7%, is well above the ECB's target of 2%, giving an average inflation anchor of -0.04, underscoring the low household inflation expectation anchoring. Although these statistics offer useful information, they do not allow us to put these items together to get an idea of the direction of the correlation. To this end, we complete our analysis with Figures 2.1-2.3. Observation shows that the rise in debt is accompanied by a deterioration in the inflation anchoring. However, from 2021, the observed fall in debt, which coincides with an improvement in the index of the strength of the fiscal rules, is matched by an observation of an improvement in the anchoring of inflation expectations. These various descriptive facts give us an idea of the direction of the relationship we can

expect in the link connecting the inflation expectation anchoring, public debt, and fiscal rules.

Table 2.1: Summary statistics of variables used in the analysis.

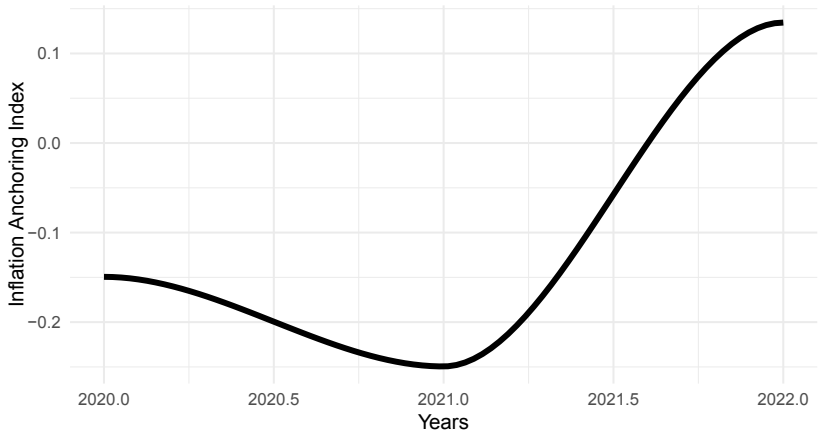
| **Variable** | **Mean** | **Standard Deviation** |
|---|---|---|
| FRSI | 1.637 | (0.484) |
| Anchoring Index (Expect. 12 months) | -0.044 | (0.723) |
| Inflation expectations (12 months ahead) | 5.771 | (9.966) |
| Public debt | 109.423 | (31.975) |
| Respondent age | 2.159 | (0.827) |
| Income quintile | 2.987 | (1.414) |
| Past credit access | 2.674 | (0.855) |
| Past household spending | 3.224 | (1.463) |
| COVID-19 stringency Index | 39.027 | (22.242) |
| First diff. of NEER | -0.375 | (10.867) |
| Lagged Real GDP Growth | 1.016 | (6.394) |
| Log Terms of Trade | 21.995 | (1.328) |
| Legislative election dummy | 0.067 | (0.250) |
| Fragmentation Index | 1.005 | (0.141) |
| Geopolitical Risk Index | 116.193 | (45.814) |
| Food CPI | 114.493 | (8.086) |
| Energy CPI | 132.130 | (29.284) |
| Commodity prices | 74.890 | (23.973) |
| Total of occurrences | 146,758 | |

Figure 2.1: Evolution of public debt over period



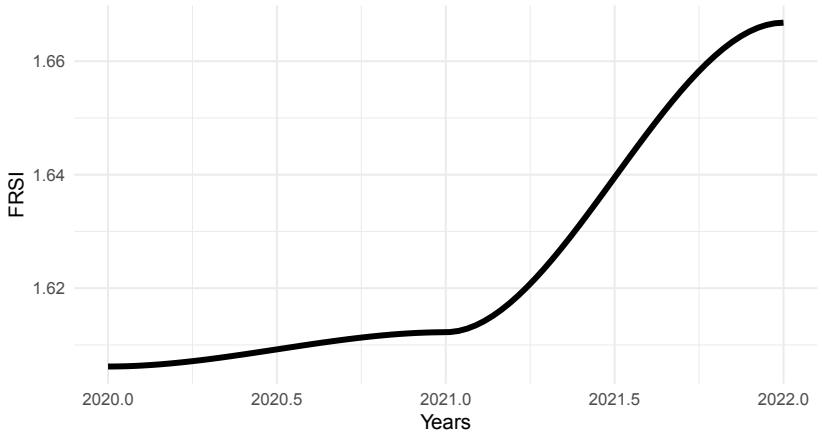

Source: Authors.

Figure 2.2: Evolution of inflation anchoring index over period




Source: Authors.

Figure 2.3: Evolution of FRSI over period




Source: Authors.

## 3.5 Results

Table 2.2 presents regression results examining the relationship between public debt and household inflation expectations. Each specification sequentially incorporates additional controls and fixed effects to estimate this relationship robustly.

The first column establishes the baseline relationship between public debt and inflation anchoring, serving as a diagnostic test. This specification does not include the interaction term between public debt and fiscal policy but includes household-level controls such as age, income quintile, past credit access, and household

spending. Public debt is shown to have a statistically significant negative impact on inflation anchoring, providing initial evidence of its influence.

The progressive addition of fixed effects highlights the necessity of accounting for various sources of heterogeneity to isolate the true impact of public debt. Including country, time, and household fixed effects strengthens the validity of our results. Columns (4), (5), and (6) show coefficients of the same magnitude (for the variables of interest) and, above all, of greater magnitude than those in the first three columns, demonstrating the need to include fixed effects.

In Column (2), we introduce the interaction term between public debt and the Fiscal Rule Strength Index (FRSI) to evaluate the moderating effect of fiscal rules. This addition captures how stricter fiscal rules might reduce the adverse impact of public debt on inflation expectations. The results suggest that fiscal rules significantly offset debt-induced hurting of expectations.

Then, we introduce, for Column (3), country-fixed effects of delving deeper into the analysis of contextual factors. These effects control for unobserved, time-invariant variations across countries, such as institutional quality or cultural norms, that may simultaneously influence public debt levels and inflation expectations. Including these effects eliminates average differences in inflation expectation anchoring across countries, allowing us to focus on the relationship within each country. This specification does not correctly explain households' inflation expectations, and the decrease in $R^2$ could confirm this mispecification.

So, we refine the analysis further by incorporating origination-year fixed effects to account for global temporal trends or shocks that could affect inflation expectations. The specification of Column (4) controls for year-to-year variations that might otherwise bias the relationship under study.

The most stringent specification, presented in Column (5), introduces country-time fixed effects. This model compares households making decisions within

the same country and year, eliminating confounding factors specific to each spatiotemporal context. This approach ensures a precise estimation of the effect of fiscal rules (captured through the interaction between public debt and the FRSI) on inflation expectations. Despite this rigorous adjustment, the interaction term remains significant, underscoring the stabilizing role of fiscal rules in shaping household expectations in the context of high public debt.

Table 2.2: Baseline regression

| **VARIABLES** | **Anchoring Index (General Prices)** | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Public debt | -0.007*** | -0.013*** | 0.011*** | -0.020*** | -0.026*** | -0.023*** |
| | (0.002) | (0.000) | (0.003) | (0.004) | (0.003) | (0.003) |
| Public Debt × FRSI | | 0.010*** | -0.006*** | 0.004** | 0.009*** | 0.008*** |
| | | (0.000) | (0.002) | (0.002) | (0.002) | (0.001) |
| FRSI | | -0.840*** | 1.762** | 2.342*** | 1.180* | 1.386*** |
| | | (0.032) | (0.686) | (0.744) | (0.645) | (0.521) |
| Respondent age | -0.004 | -0.017*** | -0.015*** | -0.015*** | -0.004 | -0.006 |
| | (0.025) | (0.003) | (0.003) | (0.003) | (0.025) | (0.023) |
| Income quintile | -0.019 | -0.029*** | -0.029*** | -0.030*** | -0.012 | -0.005 |
| | (0.016) | (0.002) | (0.002) | (0.002) | (0.016) | (0.014) |
| Past credit access | -0.011*** | -0.045*** | -0.045*** | -0.045*** | -0.011*** | -0.010*** |
| | (0.004) | (0.003) | (0.004) | (0.004) | (0.004) | (0.004) |
| Past household spending | -0.011*** | -0.044*** | -0.045*** | -0.045*** | -0.011*** | -0.011*** |
| | (0.003) | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) |
| COVID-19 stringency Index | -0.006*** | -0.001*** | 0.002*** | -0.007*** | -0.008*** | -0.008*** |
| | (0.001) | (0.000) | (0.000) | (0.001) | (0.001) | (0.001) |
| First diff. of NEER | -0.001*** | 0.002*** | 0.001** | -0.000 | -0.000* | 0.001* |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.001) |
| Lagged Real GDP Growth | 0.026*** | 0.016*** | 0.013*** | 0.036*** | 0.042*** | 0.042*** |
| | (0.004) | (0.001) | (0.001) | (0.006) | (0.005) | (0.003) |
| Log Terms of Trade | 0.009 | -0.163*** | -0.046*** | 0.009 | 0.020** | 0.028*** |
| | (0.009) | (0.003) | (0.010) | (0.012) | (0.009) | (0.009) |
| Constant | 1.249*** | 4.979*** | -1.842* | -1.670 | -0.344 | -1.105 |
| | (0.285) | (0.084) | (1.072) | (1.264) | (1.094) | (0.886) |
| Observations | 38,050 | 46,880 | 46,880 | 46,880 | 38,050 | 38,050 |
| R-squared | 0.702 | 0.268 | 0.285 | 0.291 | 0.702 | 0.717 |
| Country FE | Yes | No | Yes | Yes | Yes | Yes |
| Time FE | Yes | No | No | Yes | Yes | Yes |
| Household FE | Yes | No | No | No | Yes | Yes |

Notes: The last column's specification is based on winsorized data. Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Finally, Column (6) results are obtained by winsorizing the 5th and 99th percentiles. This ensures that extreme values do not unduly influence results. The findings are consistent with prior specifications, reaffirming the importance of fis-

cal rules in stabilizing expectations under high public debt.

Moreover, control variables such as past credit access, household spending, and lagged GDP growth consistently exhibit significant and intuitive effects. Past credit access and household spending show negative coefficients, suggesting that higher financial activity weakens inflation anchoring. Lagged GDP growth positively impacts the Anchoring Index, reflecting the stabilizing role of strong economic performance. Column (5) serves as the baseline model for the remainder of the chapter, offering a comprehensive framework for analyzing the interaction between fiscal rules and public debt. The results suggest that fiscal rules enhance fiscal policy credibility and stabilize inflation expectations, consistent with prior studies (Leeper and Leith, 2016; Coibion et al., 2021; Grigoli and Sandri, 2024).

We extend our model to incorporate additional variables related to macroeconomic and political stability (see Table 2.15 in the Appendix). These results align with our primary findings, further supporting the robustness of the proposed framework.

## 3.6 Robustness Checks

This section presents all the regressions we conducted to ensure the robustness of the previous section's findings.

### 3.6.1 Alternative measures of the main variables

#### 3.6.1.1 Alternative public debt variables

To analyze the effect of fiscal rules tied to public debt on households' inflation expectations, it is crucial to use alternative measures of public debt that capture its underlying dynamics beyond cyclical fluctuations. Gross debt alone can reflect temporary variations driven by the business cycle or exogenous shocks, po-

tentially obscuring the structural component that directly influences household perceptions. By adjusting debt for these factors, we can better distinguish between structural fiscal policies and temporary adjustments. This approach enables a more precise assessment of whether fiscal rules enhance the perceived sustainability of public debt—thereby anchoring inflation expectations—or fail to address concerns about long-term fiscal viability.

Table 2.3: Model with Alternative Variables for Public Debt

| **VARIABLES** | **Anchoring Index (General Prices)** | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Debt adj./primary balance | -0.026*** | | |
| | (0.003) | | |
| Debt adj./primary balance × FRSI | 0.009*** | | |
| | (0.002) | | |
| Debt adj./business cycle | | -0.025*** | |
| | | (0.003) | |
| Debt adj./business cycle × FRSI | | 0.008*** | |
| | | (0.002) | |
| Debt shock | | | -0.020*** |
| | | | (0.002) |
| Debt shock × FRSI | | | 0.003*** |
| | | | (0.000) |
| Observations | 38,050 | 36,048 | 38,050 |
| R-squared | 0.702 | 0.711 | 0.702 |
| Country FE | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes |
| Household FE | Yes | Yes | Yes |
| Baseline control variables | Yes | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

We consider three alternative measures of public debt: public debt adjusted for the primary balance, public debt adjusted for the business cycle (output gap growth), and debt shocks. Table 2.3 summarizes the regression results for these measures, providing consistent evidence of the moderating influence of fiscal rules. Across all specifications, public debt is negatively associated with the Anchoring Index, indicating that higher debt levels weaken the anchoring of inflation expectations. However, the interaction terms with the FRSI are positive and significant, demonstrating the mitigating role of fiscal rules in offsetting the adverse effects of public debt.

Column (1) examines public debt adjusted for the primary balance. The negative and significant coefficient (-0.026) indicates that higher debt levels de-anchor inflation expectations when considered alongside the fiscal policy stance captured by the primary balance. Notably, the positive interaction term with FRSI (0.009) offsets part of this impact, emphasizing the stabilizing role of stringent fiscal rules in mitigating the adverse effects of public debt.

This specification uses public debt adjusted for output gap growth as the explanatory variable. The findings reveal that higher debt levels weaken inflation anchoring, with a negative coefficient of -0.025. This result underscores the destabilizing effect of debt when cyclical fluctuations are accounted for. However, fiscal rules play a mitigating role, as shown by the positive and significant interaction term with FRSI (0.008), highlighting their importance in offsetting the adverse impacts of cyclical variations in debt on inflation expectations.

The analysis focuses on debt shocks, defined as the difference between predicted and realized debt levels. These shocks exhibit a negative and significant effect on inflation anchoring, with a coefficient of -0.020, reflecting their negative influence. Nonetheless, the interaction term with FRSI (0.003) demonstrates the critical role of fiscal rules in alleviating the adverse effects of debt shocks on inflation expectations.

These findings highlight the importance of fiscal rules in mitigating public debt's adverse effects on inflation expectations. The consistent significance of the interaction terms across all specifications underscores the robustness of this relationship.

#### 3.6.1.2 Control of specific effects

In this subsection, we present robustness checks that assess the impacts of public debt and fiscal policy on the Anchoring Index for General Prices, taking into account various expectation horizons and fiscal rule variables (see Table 2.4).

In the first model, lagged public debt is the key independent variable. Its negative and statistically significant coefficient indicates that higher debt levels weaken the anchoring of inflation expectations, even in the short term. However, the positive and significant interaction term between lagged public debt and FRSI suggests that robust fiscal rules help mitigate the adverse impact of debt on inflation expectations, reinforcing the role of fiscal discipline in preserving price stability.

Table 2.4: Robustness Checks on Public Debt, Fiscal Policy, and Inflation Expectations Anchoring

| **Variables** | **Anchoring Index (General prices)** | | | | |
|---|---|---|---|---|---|
| | (Horizon 3 years) | (Horizon 12 months) | (Horizon 12 months) | (Horizon 12 months) | (Horizon 12 months) |
| Lagged public debt | -0.014*** | -0.014*** | | | |
| | (0.000) | (0.000) | | | |
| Public debt | | | -0.026*** | -0.045*** | -0.025*** |
| | | | (0.003) | (0.006) | (0.004) |
| Lagged public debt × FRSI | 0.010*** | | | | |
| | (0.000) | | | | |
| Lagged public debt × Lagged FRSI | | 0.010*** | | | |
| | | (0.000) | | | |
| Public debt × FRSI 2019 | | | 0.009*** | | |
| | | | (0.002) | | |
| Public debt × SIFI | | | | 0.001*** | |
| | | | | (0.000) | |
| Public debt × FRSI | | | | | 0.011*** |
| | | | | | (0.002) |
| Observations | 46,880 | 46,880 | 38,050 | 38,050 | 38,050 |
| R-squared | 0.264 | 0.263 | 0.702 | 0.703 | 0.674 |
| Country FE | Yes | Yes | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes | Yes | Yes |
| Household FE | Yes | Yes | Yes | Yes | Yes |
| Baseline control variables | Yes | Yes | Yes | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

The second model replaces the interaction with lagged FRSI by incorporating the interaction between lagged public debt and the 2019 FRSI variable. The results remain consistent, confirming that higher public debt weakens inflation anchoring. Employing a lagged variable helps address potential endogeneity concerns, ensuring that the estimated relationship more accurately reflects a causal effect rather than being driven by reverse causality or simultaneity bias, as discussed in Apeti et al. (2025) and Jha et al. (2025).

By focusing on 2019's fiscal rule variables, this model reveals a similar pattern. The positive and significant interaction term with the 2019 FRSI suggests that strict fiscal rules, even when temporarily suspended, continue to support economic stability. This finding highlights that the credibility of fiscal frameworks extends be-

yond their active enforcement, shaping expectations even after their suspension.

Additionally, this section examines the Scope Index of Fiscal Institutions (SIFI), which measures the breadth of independent fiscal institutions' responsibilities. The interaction with SIFI yields a statistically significant but small positive moderating effect, indicating that stronger institutional frameworks stabilize inflation expectations, albeit to a limited extent, in the presence of rising public debt.

Finally, the last model extends the expectation horizon to three years, enabling an assessment of long-term inflation expectations anchoring. The results align with the shorter-term models: public debt continues to have a negative and significant effect on inflation anchoring, while fiscal rules (FRSI) serve as a stabilizing force. The positive and highly significant interaction between public debt and FRSI further underscores that the credibility of fiscal frameworks is crucial in the short run and plays a key role in shaping long-term inflation expectations.

### 3.6.2 Alternative samples

Table 2.5 examines the robustness of the relationship between public debt and the Anchoring Index by using two alternative samples: a reduced sample and a post-lockdown sample. The differences between samples emphasize the importance of contextual factors, such as economic conditions and policy environments, in shaping the dynamics of inflation expectations.

In both samples, public debt is negatively associated with the Anchoring Index, but the magnitude and significance vary. In the reduced sample, the coefficient is -0.020, indicating a more pronounced de-anchoring effect than in the post-lockdown sample, where the coefficient is smaller (-0.009) and less significant. However, the interaction term with the FRSI remains positive and significant across both samples, underscoring the consistent mitigating effect of fiscal rules on the hurting impact of public debt.

Table 2.5: Alternatives samples

| **Variables** | **Anchoring Index (General Prices)** | |
|---|---|---|
| | (Sample reduced) | (Post-Lockdown) |
| Public debt | -0.020*** | -0.009* |
| | (0.004) | (0.005) |
| Public debt × FRSI | 0.007*** | 0.008*** |
| | (0.002) | (0.002) |
| Observations | 35,782 | 35,782 |
| R-squared | 0.685 | 0.682 |
| Country FE | Yes | Yes |
| Time FE | Yes | Yes |
| Household FE | Yes | Yes |
| Baseline control variables | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

These findings reinforce the robustness of the previously established negative relationship between public debt and the anchoring of inflation expectations while consistently highlighting the stabilizing role of fiscal rules.

### 3.6.3 Alternative estimation methods

Table 2.6 explores the relationship between public debt, fiscal rules, and the Anchoring Index for General Prices using alternative estimation techniques: Instrumental Variables (IV) and Generalized Method of Moments (GMM). These methods are employed to address potential endogeneity concerns in the analysis.

Under the IV method, public debt has a small but statistically significant adverse effect on the Anchoring Index (-0.003), indicating that higher public debt weakens inflation expectations anchoring. The interaction term between public debt and the Fiscal Rule Strength Index (FRSI) is positive and highly significant (0.003), reinforcing the mitigating role of fiscal rules in offsetting the adverse effects of public debt on inflation expectations.

In contrast, the GMM results show a non-significant coefficient for public debt,

suggesting weaker evidence of a direct effect in this specification. However, the interaction term remains positive and significant (0.010), consistent with the IV findings. Thus, the results support the hypothesis that fiscal rules stabilize inflation expectations despite high public debt.

These results underscore the robustness of the relationship between fiscal rules and inflation expectations anchoring across different estimation techniques. While the direct effect of public debt varies, the interaction with fiscal rules consistently highlights their stabilizing influence, addressing concerns about potential biases or endogeneity in the analysis.

Table 2.6: Alternatives methods

| **Variables** | **Anchoring Index (General Prices)** | |
|---|---|---|
| | (IV method) | (GMM) |
| Public debt | -0.003*** | -0.017 |
| | (0.000) | (0.011) |
| Public debt × FRSI | 0.003*** | 0.010* |
| | (0.000) | (0.006) |
| Observations | 46,880 | 36,324 |
| AR(1) Test | | 0.00600 |
| AR(2) Test | | 0.423 |
| Country FE | Yes | Yes |
| Time FE | Yes | Yes |
| Household FE | Yes | Yes |
| Baseline control variables | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

## 3.7 Heterogeneity

Table 2.7 presents the heterogeneity in the relationship between public debt and inflation expectations across different age groups. The interaction term between public debt and the Fiscal Rule Strength Index (FRSI) is positive and significant for all age groups except individuals aged 50-70, indicating that stronger fiscal rules help counteract the negative effect of public debt. The weakest response in

the 50-70 category may reflect their lower sensitivity to macroeconomic risks due to accumulated financial security. Younger individuals (18-34) also exhibit a lower but still significant response to fiscal rules, potentially due to their limited financial experience and lower direct exposure to public debt concerns.

These findings confirm that while public debt undermines inflation expectations anchoring for all age groups, middle-aged individuals are the most responsive to debt fluctuations and fiscal rule mechanisms, highlighting the importance of robust fiscal policies in stabilizing inflation expectations across the working-age population.

Table 2.7: Estimation results following respondent age (Anchoring index about general prices)

| **VARIABLES** | **Anchoring Index (General Prices)** | | | |
|---|---|---|---|---|
| | [18-34] | [35-49] | [50-70] | 71 and more |
| Public debt | -0.024*** | -0.032*** | -0.019*** | -0.022*** |
| | (0.007) | (0.005) | (0.007) | (0.006) |
| Public debt × FRSI | 0.009*** | 0.011*** | 0.005 | 0.010*** |
| | (0.003) | (0.002) | (0.003) | (0.003) |
| Observations | 8,209 | 17,918 | 9,794 | 7,437 |
| R-squared | 0.707 | 0.689 | 0.720 | 0.723 |
| Country FE | Yes | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes | Yes |
| Household FE | Yes | Yes | Yes | Yes |
| Baseline control variables | Yes | Yes | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Here, we examine whether gender differences influence the relationship between public debt and inflation expectations. The results in table 2.8 indicate that public debt significantly weakens men's and women's inflation expectations. The magnitude of this effect is nearly identical across genders (-0.027 for men and -0.026 for women), suggesting that debt-induced uncertainty is a broadly shared concern.

The interaction term between public debt and fiscal rules is positive and signifi-

cant in both cases, demonstrating that fiscal rules effectively counterbalance the negative impact of debt on inflation expectations regardless of gender. These results imply that men and women perceive fiscal stability similarly when forming inflation expectations.

Overall, the findings do not reveal substantial gender-based heterogeneity in the impact of public debt and fiscal rules on inflation anchoring, supporting the view that inflation expectations are shaped more by macroeconomic fundamentals than gender-specific perceptions.

Table 2.8: Estimation results following respondent gender (Anchoring index about general prices)

| **VARIABLES** | **Anchoring Index (General Prices)** | |
|---|---|---|
| | Male | Female |
| Public debt | -0.027*** | -0.026*** |
| | (0.005) | (0.005) |
| Public debt × FRSI | 0.009*** | 0.009*** |
| | (0.002) | (0.002) |
| Observations | 18,406 | 19,644 |
| R-squared | 0.705 | 0.698 |
| Country FE | Yes | Yes |
| Time FE | Yes | Yes |
| Household FE | Yes | Yes |
| Baseline control variables | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

The estimates of table 2.9 are obtained to investigate how education level influences the relationship between public debt and inflation expectations anchoring. The results show that the negative effect of public debt on inflation expectations anchoring is statistically significant for individuals with higher secondary and higher education. Still, it is weaker and insignificant for those with lower levels of education.

The interaction between public debt and fiscal rules is positive and significant for

respondents with higher secondary and higher education, confirming that fiscal rules play a crucial role in stabilizing inflation expectations for these groups. However, for individuals with lower education levels, fiscal rules do not significantly act on the adverse effects of public debt.

These findings suggest that education enhances financial awareness and sensitivity to macroeconomic risks. More educated individuals adjust their expectations more actively in response to public debt dynamics and fiscal policy changes. In contrast, those with lower education levels may have weaker perceptions of fiscal sustainability and inflation risk.

Table 2.9: Estimation results following respondent level of school (Anchoring index about general prices)

| **VARIABLES** | **Anchoring Index (General Prices)** | | |
|---|---|---|---|
| | Up-Lower Second. | Higher Second. | Higher Level |
| Public debt | -0.014 | -0.031*** | -0.027*** |
| | (0.013) | (0.007) | (0.004) |
| Public debt × FRSI | 0.003 | 0.009*** | 0.011*** |
| | (0.006) | (0.003) | (0.002) |
| Observations | 5,449 | 11,803 | 20,798 |
| R-squared | 0.713 | 0.694 | 0.702 |
| Country FE | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes |
| Household FE | Yes | Yes | Yes |
| Baseline control variables | Yes | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

We explore the relationship between public debt and inflation expectations across different income groups. The results (see table 2.10) confirm that public debt consistently weakens inflation expectations anchoring across all income quintiles, with the effect being most substantial for individuals in the highest income quintile.

The interaction between public debt and fiscal rules is positive and statistically significant for the second through fifth income quintiles, with the most potent effect

observed among the highest earners. However, the interaction term for the lowest income quintile is insignificant, suggesting that fiscal rules do not significantly stabilize inflation expectations for the poorest households.

These findings indicate that wealthier individuals are more responsive to macroeconomic risks and fiscal policy changes, likely due to their greater financial literacy and higher exposure to inflation-sensitive assets. Conversely, lower-income households may exhibit weaker reactions to fiscal policy, possibly due to limited financial engagement or a greater focus on short-term economic conditions rather than macroeconomic stability.

Table 2.10: Estimates results following Household income quintile (Anchoring index about general prices)

| **VARIABLES** | **Anchoring Index (General Prices)** | | | | |
|---|---|---|---|---|---|
| | 1st | 2nd | 3rd | 4th | 5th |
| Public debt | -0.024*** | -0.023*** | -0.023*** | -0.022*** | -0.038*** |
| | (0.008) | (0.009) | (0.009) | (0.006) | (0.007) |
| Public debt × FRSI | 0.006 | 0.007* | 0.008** | 0.010*** | 0.014*** |
| | (0.004) | (0.004) | (0.004) | (0.003) | (0.003) |
| Observations | 7,781 | 7,081 | 7,813 | 7,437 | 7,433 |
| R-squared | 0.722 | 0.707 | 0.652 | 0.723 | 0.687 |
| Country FE | Yes | Yes | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes | Yes | Yes |
| Household FE | Yes | Yes | Yes | Yes | Yes |
| Baseline control variables | Yes | Yes | Yes | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

How does employment status affect the relationship between public debt and inflation expectations anchoring? The answer to this question is indicated in table 2.11, highlighting a potential link to the Phillips Curve. The results show that public debt has a strong and statistically significant negative effect on employed respondents, indicating that higher debt levels contribute to de-anchoring inflation expectations. The interaction between public debt and fiscal rules is positive and significant, suggesting that fiscal rules help reduce the negative impact of

public debt on inflation expectations for employed individuals.

Table 2.11: Estimation results following respondent employment status (Anchoring index about general prices)

| **VARIABLES** | **Anchoring Index (General Prices)** | |
|---|---|---|
| | Employed | Unemployed |
| Public debt | -0.026*** | -0.012 |
| | (0.004) | (0.013) |
| Public debt × FRSI | 0.009*** | -0.001 |
| | (0.002) | (0.006) |
| Observations | 24,154 | 2,696 |
| R-squared | 0.699 | 0.753 |
| Country FE | Yes | Yes |
| Time FE | Yes | Yes |
| Household FE | Yes | Yes |
| Baseline control variables | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

In contrast, for unemployed respondents, the effect of public debt on inflation anchoring is statistically insignificant, and the interaction with fiscal rules is also insignificant. This result suggests that unemployed individuals are less responsive to macroeconomic conditions when forming inflation expectations, likely due to a weaker direct connection to labor market-driven wage dynamics and price expectations.

The results align with the Phillips Curve framework, which posits an inverse relationship between inflation and unemployment. Employed individuals are more likely to adjust their inflation expectations in response to fiscal and macroeconomic conditions, as inflationary pressures directly influence their earnings and purchasing power. Unemployed individuals, by contrast, may have a more static perception of inflation, driven by personal financial constraints rather than macroeconomic trends.

These findings confirm that employment status is key in shaping how individuals interpret the relationship between public debt and inflation expectations consider-

ing fiscal policy. Employer respondents exhibit greater sensitivity to fiscal policy and inflation risks.

Table 2.12: Trust in European Central Bank

| **VARIABLES** | **Anchoring Index (General Prices)** | |
|---|---|---|
| | (1) | (2) |
| Public debt | 0.060 | -0.025*** |
| | (0.063) | (0.003) |
| Public debt × FRSI | -0.011 | 0.008*** |
| | (0.027) | (0.002) |
| Observations | 374 | 30,099 |
| R-squared | 0.857 | 0.733 |
| Country FE | Yes | Yes |
| Time FE | Yes | Yes |
| Household FE | Yes | Yes |
| Baseline control variables | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table 19 evaluates how trust in the European Central Bank (ECB) influences the relationship between public debt and inflation expectations anchoring. The results indicate that public debt does not significantly affect inflation expectations among respondents with high confidence in the ECB, suggesting that these individuals perceive monetary policy as effective in maintaining price stability and, therefore, do not react strongly to variations in public debt.

However, public debt significantly negatively impacts inflation anchoring for respondents with lower trust in the ECB. This finding suggests that these individuals are more skeptical of monetary policy effectiveness and are, therefore, more reactive to fiscal developments when forming their inflation expectations. The interaction between public debt and fiscal rules is positive and significant, indicating that strong fiscal rules help mitigate public debt's harmful effects on inflation expectations for those who distrust the ECB.

These findings highlight the role of institutional trust in shaping inflation expectations. Individuals who fully trust the ECB are less influenced by public debt fluc-

tuations, as they likely expect the central bank to maintain inflation stability. In contrast, those with low trust in the ECB are more sensitive to fiscal risks, suggesting they rely more on direct macroeconomic signals than confidence in monetary authorities.

These results confirm that trust in central banking institutions influences how individuals react to public debt and fiscal policies, reinforcing the importance of maintaining credibility in monetary and fiscal policy frameworks.

## 3.8 Conclusion

Drawing on the ECB's CES database conducted between 2020q1 and 2022q4 and using the ordinary least squares (OLS) method, we find that public debt diverts 12-month household inflation expectations away from the central bank's target. Based on this result, we analyze the effect of fiscal rules and conclude that fiscal rules mitigate the negative effect of public debt on the ECB's household inflation anchoring. Next, we test the robustness of these results with alternative specifications; in particular, using three-year ahead inflation expectations, we find the same results, underlining the relevance of our conclusions for short- and medium-long-term inflation. Additional robustness tests using alternative methods, notably the instrumental variable (IV) method, and the GMM system, to contain potential endogeneity show that our conclusion remains consistent: fiscal rules promote household inflation expectations anchoring. Next, heterogeneity tests show that the— except for household gender, which reveals no noticeable heterogeneity— may depend on household characteristics such as age, education, income quintile, socio-professional status (i.e. employed or not), as well as household's level of trust in the ECB.

Two recommendations can be drawn from our analysis. First, it appears that to empower the ECB to conduct its price stability policy, cooperation between the

governments of the various countries within a framework of economic policy management based on fiscal rules is an important weapon. In other words, inflation management must be a policy-mix option and not the exclusive preserve of the central bank. The second, which may seem antagonistic to the first, stems from the current observation of the causes of inflation, which include both supply and demand factors. While the demand side of the equation can be effectively managed by raising interest rates, the supply side may suffer from an additional rise in financing costs, and hence production costs, which would fuel a new inflationary spiral, while potentially penalizing investment and hence growth and production, thus jeopardizing the recovery of economies already at half-mast following the Covid-19 crisis and the subsequent multiple shocks, notably geopolitical tensions and commodity price shocks. In addition, the recent US election and the protectionist threats of the new administration may add to the disruption of the global value chain, with addictive repercussions on cost-side inflation. An example of the dual-cause inflation management strategy can be seen in the ECB's approach, which began by raising interest rates to absorb the demand component of inflation. Once inflation was close enough to the target, it embarked on an easing monetary policy to boost investment and production, and thus the economy. However, this strategy can set back the fight against inflation in a fast-changing world of crisis and tension. In such an uncertain environment, fiscal policy can play an important role. Our results show that rising debt in the context of fiscal rule does not lead to inflationary pressure or a sharp rise in household inflation expectations. Within the framework of fiscal rules, the inflationary effect of debt seems to be contained. Households see the fiscal rules as a shield against which governments cannot escape to use fiscal policy for their interest. Viewed from this angle, a possible advantage for the EU would consist in opting for a policy mix framework in which monetary policy is used to absorb the demand side of inflation, while fiscal policy is used to manage the supply side through, for example, a

fiscal policy that supports production or is dedicated to an innovative price subsidy. In this way, economic activity can be boosted and the deficit arising from the stimulus financed by broadening the tax base, or simply by the fruits of the recovery of economic activity.

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Table 2.13: Statistics by respondent age group

| **Age** | **[18-34]** | **[35-49]** | **[50-70]** | **71 and more** |
|---|---|---|---|---|
| N | 22.3% | 44.8% | 27.7% | 5.3% |
| Anchoring Index | -0.05 (0.75) | -0.01 (0.74) | -0.09 (0.69) | -0.14 (0.62) |

Table 2.14: Statistics by income quintile

| **Income Quintile** | **1st** | **2nd** | **3rd** | **4th** | **5th** |
|---|---|---|---|---|---|
| N | 20.2% | 20.1% | 20.2% | 19.7% | 19.8% |
| Anchoring Index | 0.06 (0.83) | -0.03 (0.74) | -0.03 (0.71) | -0.10 (0.66) | -0.12 (0.65) |

Table 2.15: Models with additional control variables (Expect. based on general prices)

| VARIABLES | Anchoring Index (General Prices) | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Public debt | -0.026*** | -0.015*** | -0.033*** | -0.015*** | -0.020*** | -0.026*** | -0.027*** |
| | (0.003) | (0.004) | (0.004) | (0.004) | (0.004) | (0.003) | (0.004) |
| Public debt × FRSI | 0.009*** | 0.008*** | 0.011*** | 0.006*** | 0.007*** | 0.009*** | 0.009*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| FRSI | 0.754 | 1.509** | 0.118 | 0.786 | 0.765 | 1.257 | 1.186* |
| | (0.660) | (0.653) | (0.694) | (0.639) | (0.640) | (0.855) | (0.645) |
| Respondent age | -0.004 | -0.003 | -0.004 | -0.003 | -0.004 | -0.004 | -0.004 |
| | (0.025) | (0.025) | (0.025) | (0.025) | (0.025) | (0.025) | (0.025) |
| Income quintile | -0.012 | -0.010 | -0.018 | -0.013 | -0.018 | -0.012 | -0.012 |
| | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) |
| Past credit access | -0.011*** | -0.011*** | -0.011*** | -0.012*** | -0.012*** | -0.011*** | -0.011*** |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |
| Past household spending | -0.011*** | -0.011*** | -0.011*** | -0.011*** | -0.011*** | -0.011*** | -0.011*** |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| COVID-19 stringency Index | -0.008*** | -0.008*** | -0.007*** | -0.006*** | -0.004*** | -0.008*** | -0.008*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| First diff. of NEER | -0.000* | -0.000 | -0.001*** | -0.000 | -0.001** | -0.000 | -0.000* |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Lagged Real GDP Growth | 0.044*** | 0.052*** | 0.035*** | 0.034*** | 0.033*** | 0.043*** | 0.042*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| Log Terms of Trade | | 0.012 | 0.026*** | 0.008 | 0.002 | 0.020** | 0.021** |
| | | (0.009) | (0.010) | (0.009) | (0.009) | (0.009) | (0.009) |
| Primary balance | 0.017** | | | | | | |
| | (0.008) | | | | | | |
| Inflation (at level) | | -0.033*** | | | | | |
| | | (0.006) | | | | | |
| Energy CPI | | | 0.003*** | | | | |
| | | | (0.001) | | | | |
| Food CPI | | | | -0.016*** | | | |
| | | | | (0.003) | | | |
| Fragmentation index | | | | | -2.381*** | | |
| | | | | | (0.740) | | |
| Geopolitical risk index | | | | | 0.015*** | | |
| | | | | | (0.004) | | |
| Legislative election (dummy) | | | | | | -0.004 | |
| | | | | | | (0.035) | |
| Commodity prices | | | | | | | -0.001 |
| | | | | | | | (0.001) |
| Constant | 0.906 | 1.562 | 1.197 | 1.382 | 1.236 | -0.468 | -0.252 |
| | (1.127) | (1.139) | (1.160) | (1.113) | (1.224) | (1.431) | (1.108) |
| Log Terms of Trade | | 0.012 | 0.026*** | 0.008 | 0.002 | 0.020** | 0.021** |
| | | (0.009) | (0.010) | (0.009) | (0.009) | (0.009) | (0.009) |
| Observations | 38,050 | 38,050 | 38,050 | 38,050 | 38,050 | 38,050 | 38,050 |
| R-squared | 0.702 | 0.703 | 0.703 | 0.703 | 0.703 | 0.702 | 0.703 |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Household FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Baseline control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Robust standard errors are shown in parentheses. The symbols, *, **, and *** respectively stand for $p < 0.10$, $p < 0.05$, and $p < 0.01$.

Table 2.16: Variables, sources, and definitions

| Variable | Source | Definition |
|---|---|---|
| FRSI | European Commission, Directorate General for Economic and Financial Affairs | Indices on the strength and quality of budgetary rules. |
| SIFI | European Commission, Directorate General for Economic and Financial Affairs | Scope Index of Fiscal Institutions |
| Public debt | WB and IMF | Quarterly Public Sector Debt, General Gov., All maturities, All instruments, % of GDP. |
| Public debt adjusted to primary balance | According to the authors's calculations | Following Fatás and Mihov (2003) |
| Public debt adjusted to economic cycle | According to the authors's calculations | Following Fatás and Mihov (2003) |
| Public debt shock | WEO, IMF | Difference between predicted and observed public debt |
| Stringency Index | See Roser (2021) | COVID-19 stringency index is a composite measure based on nine response indicators, including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest). |
| NEER | Penn World Table | Nominal Effective Exchange Rate |
| Real GDP growth | WEO, IMF | Gross domestic product. Total value at constant prices of final goods and services produced within a country during a specified period, such as one year. |
| Terms of trade | WB | Capacity to import less exports of goods and services at constant prices. |
| Legislative election dummy | According to the authors' research | 1 if there is a legislative election during the quarter, and zero otherwise. |
| Fragmentation index | Polity IV dataset | Operational existence of a separate polity, or polities, comprising substantial territory and population within the recognized borders of the state and over which the coded polity exercises no effective authority. |
| Geopolitical Risk Index | See Caldara and Iacoviello (2022) | A measure of adverse geopolitical events and associated risks based on a tally of newspaper articles covering geopolitical tensions, and examine its evolution and economic effects since 1900. |
| Food CPI | See Ha et al. (2023) | Food price index, quarterly |
| Energy CPI | See Ha et al. (2023) | Energy price index, quarterly |
| Core CPI | See Ha et al. (2023) | Official core consumer price index, quarterly |
| Commodity prices | WB Commodity Price Data The Pink Sheet | Crude Oil, Average |
| Inflation expectations (12 months ahead) | ECB CES (Version 2) | C1120: Expectation for prices in general next 12 months – open ended |
| Inflation expectations (3 years ahead) | ECB CES (Version 2) | C1220: Expectation for prices in general 3 years ahead - open ended |
| Respondent age | ECB CES (Version 2) | $A1010_AGE_REC_Q$: Age group updated annually |
| Income quintile | ECB CES (Version 2) | $B7040_QUINTILE$: Household disposable income quintiles on monthly weighted distribution by wave |
| Past credit access | ECB CES (Version 2) | C7110: Past credit access |
| Past household spending | ECB CES (Version 2) | C6020: Past household spending - open-ended |
| Gender | ECB CES (Version 2) | $A1020_REC$: Gender |
| Employment status | ECB CES (Version 2) | $Q2021_REC$: Employment situation |
| Level of education | ECB CES (Version 2) | $B2100_ISCED_REC$: Education ISCED |
| Trust in ECB | ECB CES (Version 3) | $C8011_1$: Trust in The European Central Bank |

Notes: IMF: International Monetary Fund. WB: World Bank. ECB CES: European Central Bank Consumers Expectations Survey. WEO: World Economic Outlook.

# Conclusion Générale

Cette thèse s'inscrit dans une réflexion globale sur l'impact des règles budgétaires sur les dynamiques macroéconomiques en Europe, en particulier leur rôle dans la stabilité budgétaire, l'inflation et l'ancrage des anticipations d'inflation. À travers trois chapitres complémentaires, nous avons cherché à comprendre comment ces règles influencent la gestion de la dette publique, renforcent la crédibilité des politiques monétaires et contribuent à la stabilité macroéconomique.

Le premier chapitre *Do Commitment and Enforcement of Fiscal Rules Enhance Fiscal Stability? Evidence from European Union Countries* analyse l'impact de l'engagement et de l'application des règles budgétaires dans le cadre du Pacte de stabilité et de croissance (PSC) de l'Union européenne. L'étude met en évidence que seule la règle d'équilibre budgétaire (Budget Balance Rule – BBR) contribue significativement à la stabilité fiscale, tandis que les règles sur les dépenses et la dette se révèlent moins efficaces lorsqu'elles sont appliquées isolément. Par ailleurs, l'efficacité des règles budgétaires dépend fortement de leur cadre institutionnel, de leur robustesse juridique et de l'existence de mécanismes de surveillance et de sanctions. Ainsi, les règles constitutionnelles sont généralement plus contraignantes et efficaces que les règles ordinaires.

Le deuxième chapitre *On the impact of fiscal policy on inflation: The case of fiscal rules* propose une approche méthodologique innovante en appliquant l' « entropy balancing » pour mesurer l'impact causal des règles budgétaires sur l'inflation.

Contrairement aux techniques traditionnelles comme l'appariement par score de propension, cette méthode permet de mieux équilibrer les caractéristiques des pays étudiés et d'améliorer l'identification des effets des règles budgétaires. L'analyse empirique révèle que l'adoption de ces règles conduit à une réduction significative de l'inflation, en particulier dans les économies émergentes et à faible revenu. Cette méthodologie offre ainsi une alternative robuste pour évaluer les politiques budgétaires et renforcer la validité des résultats empiriques.

Le troisième chapitre *Keep your hands tied or not? Fiscal rules and household inflation* met en lumière le rôle stabilisateur des règles budgétaires sur les anticipations d'inflation des ménages. À partir des données de l'Enquête sur les anticipations des consommateurs (CES) de la Banque centrale européenne, l'étude démontre que la dette publique a un effet de désancrage des anticipations d'inflation, les rendant plus volatiles et éloignées de l'objectif fixé par la banque centrale. Toutefois, la présence de règles budgétaires strictes permet d'atténuer cet effet en renforçant la crédibilité des politiques publiques et en stabilisant les anticipations des ménages. L'analyse révèle également une hétérogénéité importante selon les caractéristiques des ménages, notamment leur âge, leur niveau de revenu et leur confiance dans la Banque centrale européenne.

Les résultats de cette thèse apportent plusieurs enseignements pour les décideurs publics. En effet, dans un contexte de dette publique élevée, les règles budgétaires peuvent renforcer la crédibilité des politiques économiques et soutenir l'ancrage des anticipations d'inflation. Une approche coordonnée entre politique budgétaire et politique monétaire apparaît ainsi essentielle pour garantir la stabilité macroéconomique. De plus, l'efficacité des règles budgétaires dépend de la solidité des institutions chargées de leur mise en œuvre. La surveillance indépendante, l'existence de mécanismes de correction et l'articulation entre les règles nationales et européennes doivent être renforcées pour assurer le respect des engagements budgétaires. En outre, les politiques budgétaires devraient être adaptées aux car-

actéristiques économiques et sociales des pays et des ménages afin d'optimiser leur efficacité. Une approche différenciée permettrait d'améliorer l'adhésion aux règles budgétaires et de minimiser leurs effets potentiellement contraignants.

Bien que cette thèse apporte des contributions significatives, certaines limites méritent d'être soulignées. D'abord, les résultats s'appuient principalement sur des données européennes, ce qui limite leur généralisation à d'autres régions du monde. De futures recherches pourraient étendre l'analyse à des économies en développement ou à d'autres cadres institutionnels. Ensuite, l'interaction entre les règles budgétaires et les marchés financiers constitue une piste de recherche prometteuse. Étudier la manière dont les investisseurs réagissent aux règles budgétaires permettrait d'affiner notre compréhension de leur rôle dans la stabilité macroéconomique. Enfin, l'évolution des règles budgétaires dans le contexte post-Covid-19 soulève de nouvelles questions. Les réformes budgétaires entreprises en Europe offrent une opportunité unique d'évaluer les nouvelles approches en matière de gouvernance fiscale et d'analyser leurs effets à long terme sur la soutenabilité des finances publiques.

En conclusion, cette thèse démontre que les règles budgétaires, lorsqu'elles sont bien conçues et appliquées de manière rigoureuse, jouent un rôle fondamental dans la stabilisation macroéconomique. Elles constituent un levier essentiel pour renforcer la crédibilité des politiques économiques, préserver la stabilité budgétaire et soutenir l'ancrage des anticipations d'inflation. Grâce à une approche méthodologique innovante et à une analyse empirique approfondie, ce travail contribue à une meilleure compréhension des défis et des opportunités liés à la gouvernance budgétaire en Europe. Dans un environnement économique marqué par une incertitude croissante et des niveaux d'endettement élevés, les règles budgétaires apparaissent comme un instrument clé pour garantir une gestion budgétaire durable et une politique économique crédible.

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