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INEQUALITY AND PUBLIC SPENDING: THREE ESSAYS

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À mon grand-père, Louis et son école buissonnière.
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Résumé

Le réchauffement climatique et l'intensification des catastrophes naturelles représentent une menace pour les inégalités de revenus, risquant de les aggraver. Les dépenses publiques apparaissent comme un outil approprié pour lutter contre ces disparités. Parallèlement, les normes sociales liées au genre influencent les comportements des femmes dans la gestion des politiques publiques. Cette thèse vise à analyser empiriquement, à travers trois chapitres, la relation complexe entre politique budgétaire, inégalités de revenus et de genre dans le domaine environnemental. Les conséquences à moyen terme des catastrophes naturelles sur les inégalités de revenus sont peu explorées dans la littérature.

Le premier chapitre de cette thèse considère cette question. La méthode des projections locales est utilisée en mobilisant des données météorologiques couvrant 114 pays entre 1995 et 2014. Les résultats principaux montrent que l'impact des cyclones sur les dynamiques des inégalités, avant et après redistribution, varie selon le niveau de développement et de démocratie des pays. Dans les pays les plus pauvres, les inégalités diminuent grâce à l'afflux d'aides internationales et aux transferts des migrants. En revanche, dans les pays développés, les inégalités avant redistribution baissent, puis augmentent. Cet effet rebond traduit un mécanisme schumpétérien. Davantage touchés par la destruction du capital, les ménages les plus aisés bénéficient de la modernisation de celui-ci pendant la phase de reconstruction, ce qui augmente ainsi leurs revenus et donc les inégalités avant transfert. Cette hausse ne se répercute pas sur la dynamique des inégalités après redistribution. Ce résultat souligne l'importance des politiques redistributives dans les pays développés afin de freiner l'aggravation des inégalités suite à un ouragan.

L'impact du genre est largement documenté dans la littérature microéconomique, mais il demeure sous-exploré au niveau macroéconomique. Le deuxième chapitre explore le lien entre la représentation des femmes au sein des gouvernements et la cyclicité des dépenses publiques. L'étude porte sur une analyse trimestrielle des 27 pays membres de

l'Union Européenne sur la période 2003-2021. Les résultats obtenus avec la méthode des Moindres Carrés Ordinaires à effets fixes montrent que la part des femmes occupant des fonctions économiques au sein des gouvernements est associée à une politique budgétaire plus optimale au sens keynésien, en renforçant sa contracyclicité. Ce résultat est robuste au changement d'estimateurs et de variables mesurant le cycle économique et le solde budgétaire. Cet effet est particulièrement marqué pour les femmes ministres avec des fonctions économiques occupant un siège au conseil des ministres. Le chapitre met en évidence l'importance de la représentation des femmes dans la lutte contre les déficits et la dette en rendant la politique budgétaire plus efficace.

La littérature en économie expérimentale révèle des préférences distinctes selon le genre. Toutefois, l'impact de ces différences sur les politiques environnementales à l'échelle macroéconomique reste largement méconnu. Le troisième chapitre s'intéresse à l'influence de la représentation féminine sur les dépenses publiques environnementales. En analysant les 27 pays de l'Union Européenne entre 2003 et 2022, ce chapitre montre, à partir d'estimations menées avec les Moindres Carrés Ordinaires à effets fixes, qu'une présence accrue des femmes dans les gouvernements est corrélée à une augmentation des dépenses publiques en faveur de l'environnement. Ce résultat est robuste à l'ajout de variables de contrôle, aux changements dans les variables utilisées pour capturer les dépenses environnementales et à l'utilisation d'estimateurs alternatifs. Les femmes occupant des sièges au conseil des ministres ont l'impact le plus important sur les dépenses environnementales. Il apparait que l'effet du genre ne dépend ni du moment où les femmes interviennent dans le processus budgétaire, ni de l'orientation politique du parti au pouvoir. La hausse des dépenses environnementales concerne les secteurs de la recherche & développement ainsi que la gestion des ressources en eau. Ces résultats suggèrent que l'intégration des femmes dans les processus décisionnels pourrait jouer un rôle crucial dans la mise en place de politiques environnementales plus ambitieuses.

Mots-clés : Inégalités de revenus · Représentation des femmes · Catastrophes naturelles · Politique budgétaire · Redistribution · Contracyclicité · Dépenses environnementales

Codes JEL : D63 · J16 · Q54 · Q58 · E62 · H23 · H30 · H61

Abstract

Global warming and the intensification of natural disasters threaten income inequalities, with the risk of exacerbating them. Public spending appears to be an appropriate tool for fighting these disparities. At the same time, gender-related social norms influence women's behavior in the management of public policies. This thesis aims to analyze empirically, through three chapters, the complex relationship between fiscal policy, income and gender inequalities in the environmental field.

The medium-term consequences of natural disasters on income inequalities are little explored in the literature. The first chapter of this thesis considers this question. The method of local projections is used, mobilizing meteorological data covering 114 countries between 1995 and 2014. The main results show that the impact of cyclones on inequality dynamics, before and after redistribution, varies according to countries' level of development and democracy. In the poorest countries, inequalities decrease thanks to the influx of international aid and migrant remittances. In developed countries, on the other hand, inequalities before redistribution fall, then rise. This rebound effect reflects a Schumpeterian mechanism. The wealthiest households, hit hardest by the destruction of capital, benefit from the modernization of their capital during the reconstruction phase, thus increasing their incomes and pre-transfer inequalities. This increase is not reflected in the dynamics of inequality after redistribution. This result underlines the importance of redistributive policies in developed countries to restrain the increase in inequality following a hurricane.

The impact of gender is widely documented in the microeconomic literature but remains underexplored at the macroeconomic level. The second chapter investigates the link between women's representation in government and the cyclicality of public spending. The study focuses on a quarterly analysis of the 27 European Union member countries over the period 2003-2021. The results obtained with the fixed-effects Ordinary

Least Squares method show that the share of women holding economic positions within governments is associated with a more optimal fiscal policy in the Keynesian sense, by reinforcing its countercyclicality. This result is robust to changes in estimators and variables measuring the business cycle and the fiscal balance. This effect is particularly marked for female ministers with economic functions occupying a seat on the cabinet. The chapter highlights the importance of women's representation in combating deficits and debt by making fiscal policy more effective.

The literature in experimental economics reveals distinct preferences according to gender. However, the impact of these differences on environmental policies at the macroeconomic level remains largely unknown. The third chapter looks at the influence of female representation on public environmental spending. By analyzing the 27 countries of the European Union between 2003 and 2022, this chapter shows, using fixed-effects Ordinary Least Squares estimations, that an increased presence of women in government is correlated with increased public spending on the environment. This result is robust to the addition of control variables, changes in the variables used to capture environmental spending, and alternative estimators. Women in cabinet seats have the most significant impact on environmental spending. The gender effect appears to depend neither on the timing of women's involvement in the budgetary process nor on the political orientation of the party in power. The increase in environmental spending was concentrated in the areas of research & development and water resource management. These results suggest that integrating women into decision-making processes could play a crucial role in implementing more ambitious environmental policies.

Keywords : Income inequality · Women's representation · Natural disasters · Fiscal policy · Redistribution · Contra-cyclicality · Environmental expenditure

Codes JEL : D63 · J16 · Q54 · Q58 · E62 · H23 · H30 · H61

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Chapter 1

Introduction Générale : Inégalités et Dépenses Publiques

Les inégalités sociales et économiques se déclinent sous de nombreuses formes : elles concernent les revenus, la géographie, le genre, l'âge, l'origine ethnique, le handicap, l'orientation sexuelle, la classe sociale, voire la religion. Elles ne se limitent pas à une simple disparité économique mais restreignent les libertés réelles et les possibilités offertes aux individus de mener la vie qu'ils souhaitent (Sen, 1993). Les inégalités posent également un problème d'efficacité économique. En présence de marchés imparfaits, l'inégalité d'accès aux ressources, comme le crédit, freine le développement économique. Les politiques publiques, notamment à travers les choix budgétaires de l'État, jouent un rôle primordial. En redistribuant les ressources et en garantissant l'accès aux biens publics essentiels comme la santé et l'éducation, les gouvernements agissent directement sur les inégalités. Ces actions contribuent à promouvoir la justice sociale et l'efficacité économique.

Le changement climatique et l'intensification des catastrophes naturelles ont des conséquences majeures sur l'économie et complexifient les défis auxquels les politiques publiques doivent répondre. Cependant, les effets à long terme sur les inégalités de revenus au niveau macroéconomique restent ambigus. Parallèlement, les inégalités de genre persistent, notamment dans les sphères de pouvoir. Bien que des avancées aient été faites, les femmes continuent d'être sous-représentées dans les postes à responsabilités. Pourtant, la présence de femmes dans les processus décisionnels pourrait avoir un impact significatif sur la gestion des politiques publiques. De nombreuses études montrent que les normes sociales transmises par le genre ont un impact sur les comportements et les préférences des femmes et donc sur les politiques publiques.

Cette thèse s'inscrit au carrefour de ces deux grands champs d'étude : l'analyse des chocs climatiques sur les inégalités de revenus, d'une part, et l'influence de la

représentation féminine sur les politiques publiques, d'autre part.

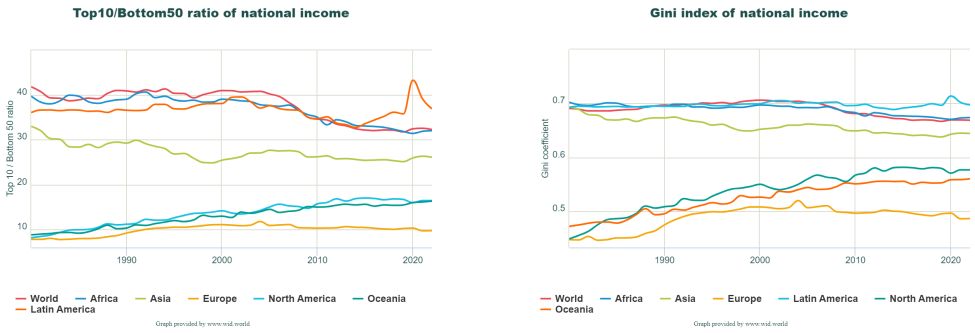
Afin d'introduire le contexte général de la thèse, la première section dressera un portrait des inégalités de revenus mondiales dans le contexte des catastrophes naturelles ; la deuxième section se penchera sur l'état mondial des inégalités de genre et leur effet sur les politiques publiques. Enfin, la troisième section présentera les principaux résultats et contributions de cette thèse.

1.1 Inégalités de revenus, catastrophes naturelles et politiques de redistribution

Cette section examine, d'une part, l'évolution des inégalités de revenus et, d'autre part, des catastrophes naturelles, tout en s'interrogeant sur les potentielles interactions entre les deux.

1.1.1 Dynamiques et déterminants des inégalités de revenus

La richesse d'une nation n'est pas une condition suffisante pour assurer une société égalitaire. L'étude des inégalités de revenus est l'une des premières conditions à l'établissement d'une société socialement juste. Son analyse permet de faire un état des lieux de la répartition des richesses au sein d'une nation. Celles-ci sont mesurées à l'aide de différents indicateurs tels que le coefficient de Gini, variant de 0 (absence d'inégalités) à 1 (société parfaitement inégalitaire), ou le rapport interdécile, qui permet d'identifier les disparités entre le haut et le bas de la distribution des revenus. Au travers de ces deux indicateurs, la figure 1.1 dépeint un état des lieux des inégalités de revenus avant taxes pour les six continents de la planète, entre 1980 et 2022. Au niveau mondial, la tendance est clairement à la baisse. Cette dynamique semble être tirée par l'Asie et l'Afrique, représentant plus de la moitié de la population mondiale. Ces deux continents connaissent sur la période une trajectoire de réduction des inégalités. L'Amérique du Nord, l'Europe et l'Océanie, malgré leur niveau de développement élevé, connaissent une tout autre dynamique avec une forte augmentation des inégalités. Ces continents demeurent malgré tout plus égalitaires comparativement aux autres zones.



(a) (b)

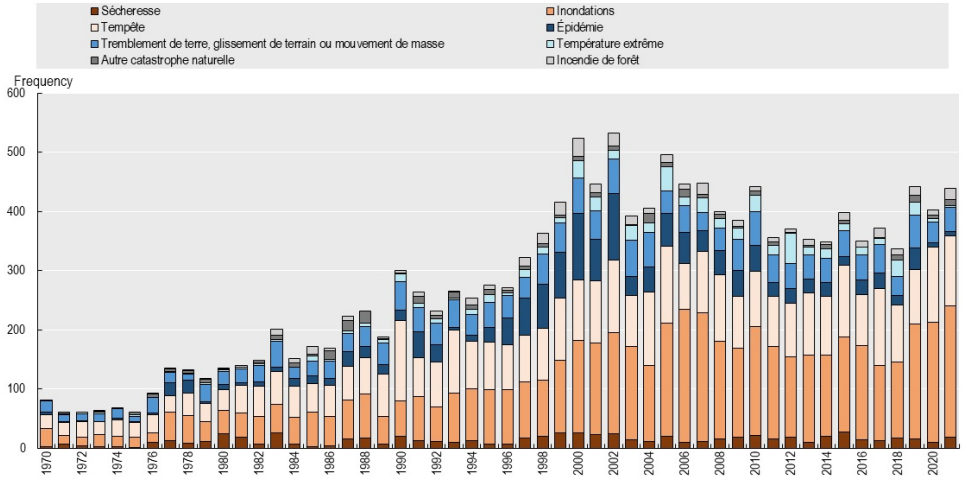
Source: la partie (a) et (b) proviennent du World Inequality Database

Figure 1.1: Évolution des inégalités de revenus pré-taxes de 1980 à 2022

La dynamique mondiale des inégalités sur cette période peut être expliquée en partie par l'intensification du commerce international, le transfert de technologie et la croissance du PIB. Le continent asiatique et, plus récemment, l'Afrique ont accéléré leurs processus de développement au travers d'une plus grande intégration aux échanges mondiaux. L'augmentation du PIB et la transformation de l'économie induites par la globalisation et la diffusion technologique ont permis la réduction de l'extrême pauvreté et l'émergence d'une classe moyenne (Fosu, 2017). Dans les pays développés, l'effet du commerce mondial et de la libéralisation des flux de capitaux a eu un effet positif sur l'économie mais a aussi négativement impacté la distribution des revenus. L'ouverture de l'économie a provoqué des phases de désindustrialisation et de délocalisations impactant majoritairement les emplois moins qualifiés, augmentant ainsi les disparités salariales. Fung (2024) indique que la mondialisation dans les pays développés n'a majoritairement profité qu'aux 10 % les plus riches de la distribution du revenu national. Sur la période, les pays de ces continents ont aussi connu un net ralentissement de la croissance du PIB marqué par de fortes crises financières et économiques, provoquant une augmentation des inégalités (Bodea et al., 2021). En dehors des déterminants purement économiques, des facteurs politiques tel les changements de régime (Haggard and Kaufman, 2012) ou plus exogènes comme les pandémies (Esseau-Thomas et al., 2022) ou les conflits(Bircan et al., 2017) peuvent aussi expliquer la dynamique des inégalités de revenus. Dans le contexte du changement climatique, de plus en plus d'articles s'intéressent aux liens entre inégalités de revenus et catastrophes naturelles.

1.1.2 Les catastrophes naturelles, une menace grandissante

L'accroissement de l'activité économique contemporaine s'est accompagné de l'augmentation des émissions de gaz à effet de serre (GES). Le Groupe d'experts Intergouvernemental sur l'Evolution du Climat (GIEC), dans son rapport de 2022, fait état d'une augmentation de 54 % des GES d'origine anthropique par rapport à leurs niveaux de 1990 (Pathak et al., 2022). L'augmentation des températures impacte également la prévalence et l'intensité des catastrophes naturelles. La figure 1.2 illustre ce propos. Depuis 1970, le nombre d'événements climatiques a été multiplié par quatre, passant d'environ 100 à 400 par an. À l'exception des tremblements de terre, la fréquence de toutes les catastrophes augmente sur la période. Cette hausse est d'autant plus marquée pour les événements climatiques directement liés au réchauffement de la planète, tels que les inondations et les tempêtes.

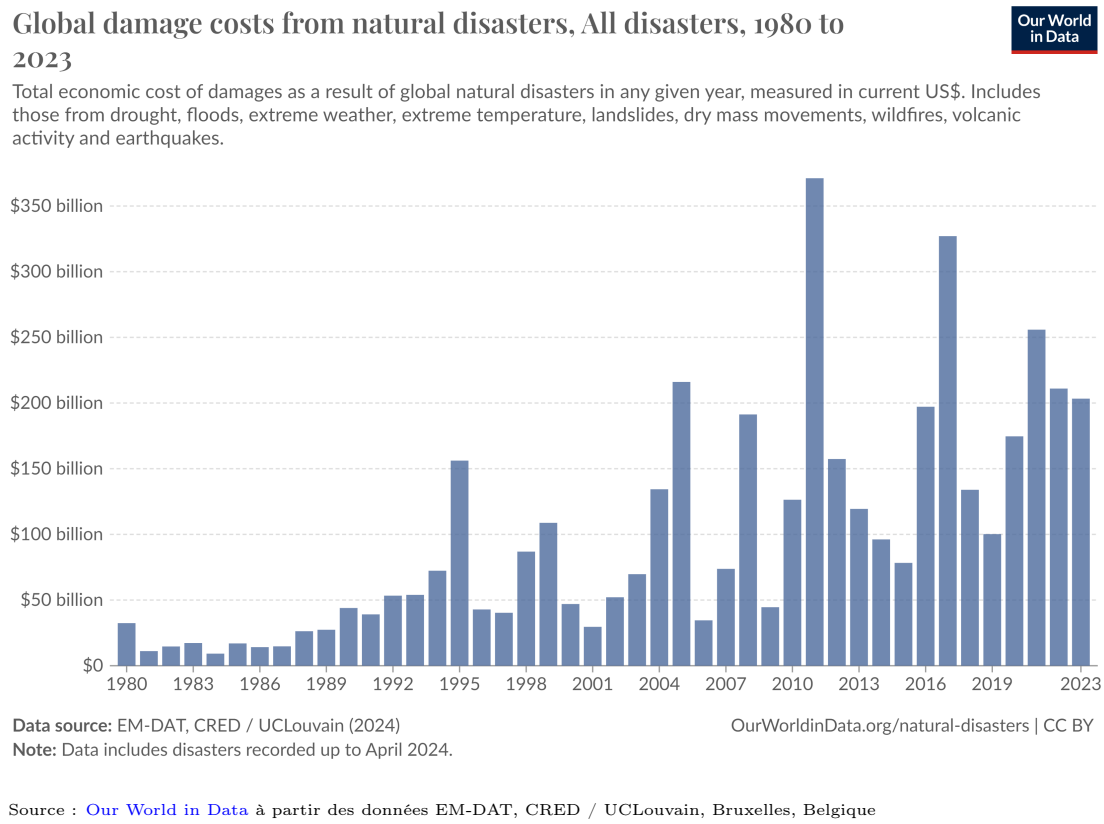


Source : OCDE à partir des données EM-DAT, CRED / UCLouvain, Bruxelles, Belgique

Figure 1.2: Nombre de catastrophes naturelles, de 1970 à 2021, par catégorie

Le bilan humain des catastrophes naturelles est colossal. Selon le World Meteorological Organization (WMO), plus de 2 millions de personnes sont décédées depuis 1970 en raison d'événements extrêmes. Ce sont d'autant plus de personnes blessées ou contraintes de migrer. La figure 1.3 illustre la nette augmentation des dommages matériels causés par les catastrophes naturelles. Avant les années 1990, les coûts associés aux catastrophes naturelles restaient en dessous de 50 milliards de dollars par an. En comparaison avec la situation actuelle, les dommages ont été multipliés par quatre, atteignant environ 200 milliards de dollars par an. Ces chiffres soulignent non seulement une augmentation de la fréquence des catastrophes naturelles, mais

surtout une intensification de leur impact.



Source : Our World in Data à partir des données EM-DAT, CRED / UCLouvain, Bruxelles, Belgique

Figure 1.3: Coût matériel des catastrophes naturelles de 1980 à 2023, en dollars courants

Cette forte hausse des dégâts matériels et humains affecte négativement de nombreux indicateurs économiques tels que le PIB et la croissance (Klomp and Valckx, 2014) ou les finances publiques (Fan et al., 2024). Cependant, Cavallo et al. (2013) montrent que ces effets disparaissent lorsque sont introduits dans l'analyse les potentielles déstabilisations politiques engendrées par les événements climatiques. La stabilité et la force d'un État sont essentiels pour permettre à un pays de surmonter les effets d'une catastrophe naturelle, notamment grâce à une gestion efficace de sa politique budgétaire (Deryugina, 2022).

1.1.3 Les politiques de redistribution face aux cataclysmes

Scheidel (2017), dans son ouvrage The Great Leveler, explique que l'économie basée sur l'accumulation de capital conduit nécessairement à l'émergence de sociétés inégalitaires, concentrant les richesses au sommet de la distribution des revenus. Selon cet auteur, l'économie est incapable, à elle seule, de réduire les inégalités de

revenus. Il avance qu'historiquement, seuls les "Quatre Cavaliers de l'Apocalypse" – que sont les guerres de masse, les pandémies, l'effondrement de l'État et les révolutions – ont profondément et structurellement eu un effet bénéfique sur les inégalités. En France, par exemple, les inégalités ont fortement augmenté durant la "Belle Époque" (1870-1914). La Seconde Guerre mondiale, avec ses destructions massives de capitaux, a provoqué une réduction drastique des inégalités, rééquilibrant la répartition des richesses et du pouvoir. En l'absence de ces bouleversements, l'État ne serait pas assez puissant pour lutter contre les inégalités. L'avènement des "Quatre Cavaliers" permettrait le renouveau de l'État en remplaçant les classes dirigeantes. L'émergence de nouveaux rapports de force dans la société conduirait ainsi à une répartition plus égalitaire des revenus. Compte tenu du contexte actuel, caractérisé par l'augmentation de la fréquence et de l'intensité des catastrophes naturelles, manquerait-il un cavalier à ce quatuor ?

La question est d'autant plus légitime au regard de l'hyper-concentration des richesses. Depuis 2020, les 1 % les plus riches de la planète ont profité de 63 % de la richesse produite (Christensen et al., 2023). Les catastrophes naturelles, par leur caractère erratique et violent, pourraient-elles altérer les rapports de force et conduire à la réduction des inégalités ? Si tel était le cas, quel serait le rôle de l'État et des politiques de redistribution dans ce contexte ?

Le chapitre 2 de cette thèse vise à répondre à ces questions en analysant, au niveau macroéconomique, les dynamiques de moyen terme des inégalités de revenus avant et après redistribution à la suite d'un ouragan.

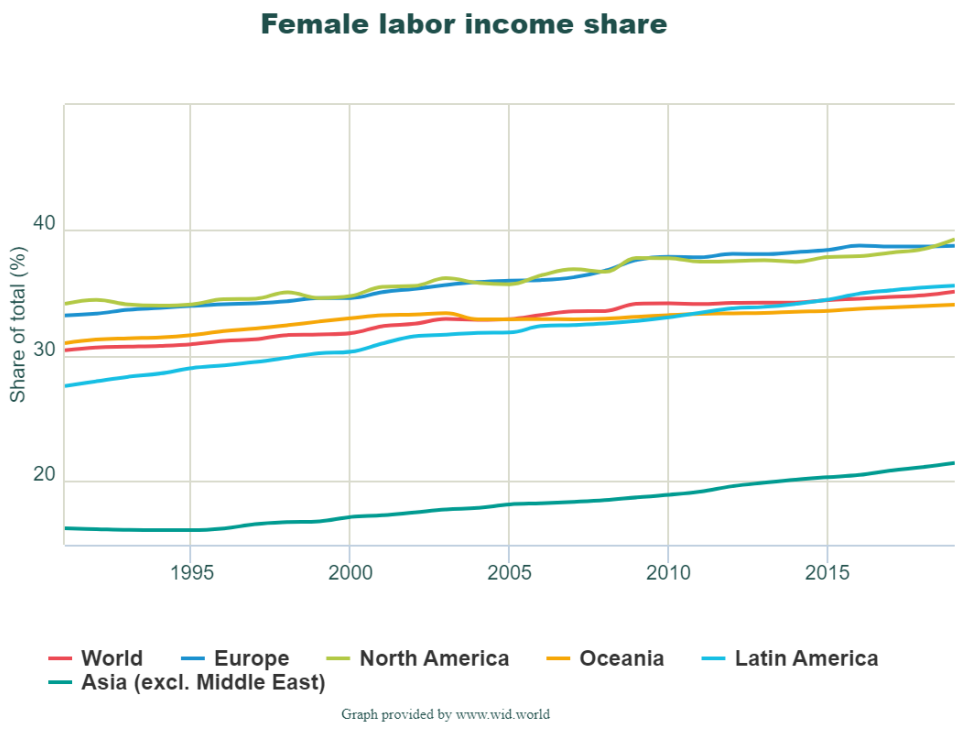
1.2 Inégalités de genre et dépenses publiques

Cette section présente d'abord un état des lieux des inégalités de genre à l'échelle mondiale, puis explore leurs impacts sur les politiques publiques.

1.2.1 Portrait des inégalités de genre dans le monde

La question des inégalités de revenus est étroitement liée à celle des inégalités de genre. Les femmes, bien que représentant la moitié de la population mondiale, se retrouvent généralement plus bas dans la distribution des revenus que les hommes. La figure 1.4 illustre ce constat en présentant la part du revenu du travail des femmes dans le revenu total. Dans un monde idéal, celle-ci devrait être à 50 %. Force est de constater que la parité n'est pas atteinte. Tenir compte des facteurs socio-

économiques, tels que le niveau d'éducation, la classe sociale ou l'état du marché du travail, ne suffisent pas à expliquer ces écarts salariaux. La raison principale réside dans les normes sociétales concernant la place des femmes dans la société et les discriminations auxquelles elles ont dû faire face (Blau and Kahn, 2017). Fort heureusement, l'Histoire n'est pas linéaire, et elles ont su acquérir des droits au fil du temps, mais le péché originel est tenace. Les caractéristiques associées et transmises par la notion de genre restent profondément enracinées. Les études en microéconomie ou en économie comportementale soulignent un effet du genre sur les variables économiques. En raison de ces facteurs socio-culturels, les femmes auraient des préférences différentes de celles des hommes et seraient, par exemple, plus averses au risque (Bertrand, 2011b).



Source : World Inequality Database

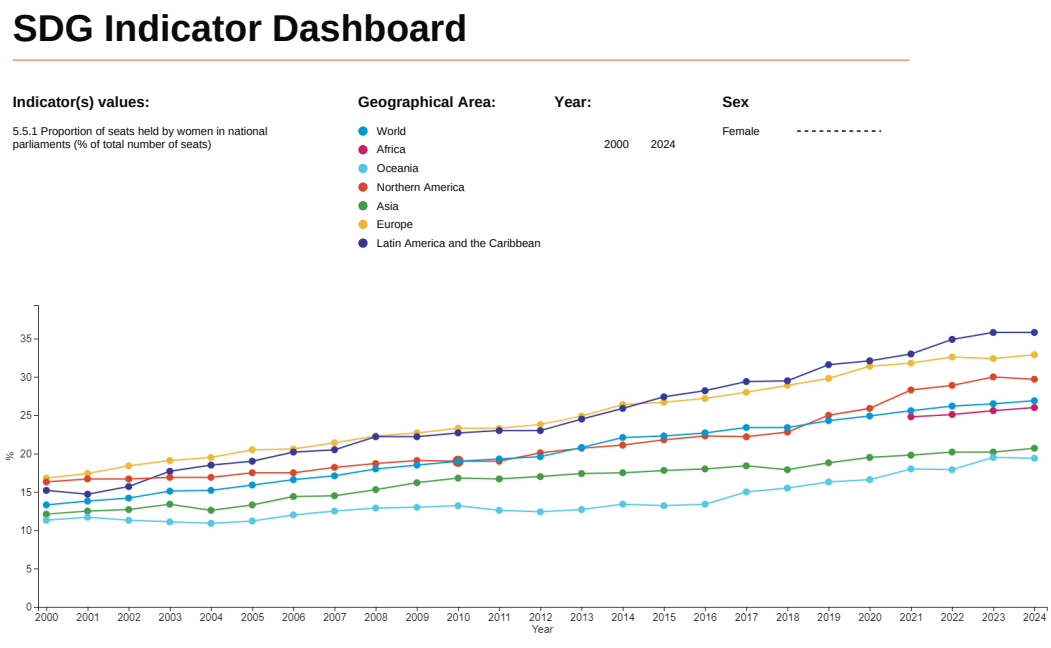
Figure 1.4: Part du revenu du travail avant impôts des femmes de 1980 à 2022

La mise en place de politiques publiques favorables à l'égalité des genres a contribué à réduire les écarts salariaux. Il s'agit, par exemple, d'instauration de quotas de représentation positive, d'une promotion accrue de l'éducation des filles, ainsi que des réformes du marché du travail visant à améliorer la conciliation entre vie professionnelle et vie personnelle. Depuis 1980, sur tous les continents, la part des femmes dans le revenu national est en augmentation. Sur la période, l'Europe

et l'Amérique du Nord sont les continents où cette part est la plus élevée, même s'il reste dix points de pourcentage à gravir pour atteindre l'égalité. En dépit de ces politiques, la parité dans nos sociétés n'est toujours pas atteinte, et les discriminations continuent d'exister. Les femmes gagnent en moyenne, à poste équivalent, moins que leurs collègues masculins et sont sous-représentées dans les postes à responsabilités, plus rémunérateurs.

1.2.2 Femmes au pouvoir et dépenses publiques

Les inégalités de genre ne se limitent pas uniquement aux disparités salariales. L'accès des femmes aux postes à responsabilités constitue un indicateur clé de leur place dans la société. En 2023, dans le secteur privé, les femmes représentaient seulement 23 % des membres des conseils d'administration au niveau mondial (Global, 2024). Cette sous-représentation dans les grandes entreprises se reflète également en politique. La figure 1.5 présente la part moyenne des femmes dans les parlements des différents continents. Bien que la tendance soit à la hausse, les femmes demeurent largement sous-représentées dans ces instances. En 2024, elles ne comptent que pour 26 % des parlementaires dans le monde. Les continents européens et sud-américains affichent les meilleurs résultats, avec environ 35 % de femmes siégeant dans les parlements, mais ils restent encore loin d'une représentation paritaire.



Source : UN Women

Figure 1.5: Part des femmes dans les parlements nationaux de 2000 à 2024

Par ailleurs, le rôle de l'État dans la réduction des inégalités est fondamental. Les pays développés doivent aujourd'hui relever plusieurs grands défis, notamment la lutte contre le changement climatique, l'augmentation des inégalités sociales, la baisse des taux de croissance économique marquée par des crises successives, et l'augmentation des niveaux de dettes publiques. Si les normes sociétales liées au genre influencent les préférences économiques et les comportements des femmes, on peut se demander si la promotion de la diversité dans les instances de pouvoir permet de prendre des décisions plus efficaces.

Un plus grand nombre de femmes au sein du gouvernement pourrait-il améliorer la gestion des dépenses publiques ? Un gouvernement plus paritaire pourrait-il avoir un plus grand impact sur les dépenses environnementales ?

Les chapitres 3 et 4 de cette thèse adresse ces questions en prenant en compte la part des femmes au gouvernement dans les pays de l'Union Européenne. Plus spécifiquement, le deuxième chapitre étudie la relation entre la part des femmes dans le gouvernement et la cyclicité des dépenses publiques. Le chapitre 3 se focalise sur le lien entre représentation féminine et dépenses environnementales, instrument de la préservation de l'environnement.

1.3 Contribution de la thèse

Cette thèse s'inscrit dans deux courants majeurs de la littérature : d'une part, celui portant sur l'impact des catastrophes naturelles sur les inégalités de revenus, et d'autre part, celui traitant de l'incidence du genre sur les politiques publiques. En trois chapitres, elle analyse les dynamiques entre les inégalités de revenus et de genre et les politiques budgétaires dans le domaine environnemental.

Le premier chapitre se concentre sur l'impact macroéconomique des ouragans sur les inégalités de revenus. La méthode des projections locales est utilisée en mobilisant des données météorologiques couvrant 114 pays entre 1995 et 2014. Les résultats principaux montrent que l'impact des cyclones sur les dynamiques des inégalités, avant et après redistribution, varie selon le niveau de développement et de démocratie des pays. Dans les pays les plus pauvres, les inégalités diminuent grâce à l'afflux d'aides internationales et aux transferts des migrants. En revanche, dans les pays développés, les inégalités avant redistribution baissent, puis augmentent. Cet effet rebond traduit un mécanisme schumpétérien. Davantage touchés par la destruction du capital, les ménages les plus aisés bénéficient de la modernisation de celui-ci

pendant la phase de reconstruction, ce qui augmente ainsi leurs revenus et donc les inégalités avant transfert. Cette hausse ne se répercute pas sur la dynamique des inégalités après redistribution. Ce résultat souligne l'importance des politiques redistributives dans les pays développés afin de freiner l'aggravation des inégalités suite à un ouragan.

Le deuxième chapitre explore le lien entre la représentation des femmes au sein des gouvernements et la cyclicité des dépenses publiques. L'étude porte sur une analyse trimestrielle des 27 pays membres de l'Union Européenne sur la période 2003-2021. Les résultats obtenus avec la méthode des Moindres Carrés Ordinaires à effets fixes montrent que la part des femmes occupant des fonctions économiques au sein des gouvernements est associée à une politique budgétaire plus optimale au sens keynésien, en renforçant sa contracyclicité. Ce résultat est robuste au changement d'estimateurs et de variables mesurant le cycle économique et le solde budgétaire. Cet effet est particulièrement marqué pour les femmes ministres avec des fonctions économiques occupant un siège au conseil des ministres. Le chapitre met en évidence l'importance de la représentation des femmes dans la lutte contre les déficits et la dette en rendant la politique budgétaire plus efficace.

Le troisième chapitre s'intéresse à l'influence de la représentation féminine sur les dépenses publiques environnementales. En analysant les 27 pays de l'Union Européenne entre 2003 et 2022, ce chapitre montre, à partir d'estimations menées avec les Moindres Carrés Ordinaires à effets fixes, qu'une présence accrue des femmes dans les gouvernements est corrélée à une augmentation des dépenses publiques en faveur de l'environnement. Ce résultat est robuste à l'ajout de variables de contrôle, aux changements dans les variables utilisées pour capturer les dépenses environnementales et à l'utilisation d'estimateurs alternatifs. Les femmes occupant des sièges au conseil des ministres ont l'impact le plus important sur les dépenses environnementales. Il apparaît que cet effet du genre ne dépend ni du moment où les femmes interviennent dans le processus budgétaire, ni de l'orientation politique du parti au pouvoir. La hausse des dépenses environnementales concerne les secteurs de la recherche & développement ainsi que la gestion des ressources en eau. Ces résultats suggèrent que l'intégration des femmes dans les processus décisionnels pourrait jouer un rôle crucial dans la mise en place de politiques environnementales plus ambitieuses.

En somme, cette thèse insiste sur l'importance des politiques publiques dans la réduction des inégalités, tout en soulignant le rôle crucial que jouent les femmes

dans l'amélioration de la gestion budgétaire. Elle conclut que, face aux défis environnementaux, la promotion de gouvernements plus paritaires pourrait être une des clés pour une politique budgétaire plus efficace et durable.

Chapter 2

The winds of inequalities: How hurricanes affect inequalities at the macro level

This chapter is accepted in *World Development* subject to minor revisions being incorporated into the manuscript.

2.1 Introduction

Today's global environment is undergoing profound transformations, marked by challenges such as global warming, deforestation, pollution on a global scale, and the erosion of biodiversity. Within the scientific community, the anthropogenic origins of these disruptions are widely acknowledged. The significant alterations in our biosphere are attributed to the consequences of economic growth and industrialization. One of the most conspicuous manifestations of the disruption of nature is witnessed through natural disasters, which impact an estimated 3.5 billion people, as Dilley (2005) indicates. The toll exacted by such disasters encompasses a staggering cost in loss of life and property, as well as in shifts in power dynamics within societies.

Since the 1970s, there has been a dramatic surge in the frequency of natural disasters worldwide, paralleled by a notable increase in the economic damage attributed to them, despite advancements in early warning systems (Yamamura, 2015; Coronese et al., 2019). The Intergovernmental Panel on Climate Change (IPCC) warns of an impending escalation in the frequency and intensity of these events due to the rising concentration of greenhouse gases in the atmosphere (IPCC, 2018).

While the economic consequences of natural disasters have stimulated a growing literature in economics, a consensus remains elusive, leading to a lively debate encompassing three distinct perspectives.

The first hypothesis involves a catch-up dynamic based on neoclassical growth theories. It claims that disasters have only a temporary impact on economic activity. According to this view, after a few years, per capita income will have recovered to its initial level, and the economy will have returned to its regular state (Jaramillo, 2009; Cavallo et al., 2013; Brata et al., 2014).

A second perspective argues that a disaster can throw a country into a poverty trap, preventing the economy from recovering to its initial level of GDP (Carter et al., 2008). Diamond (2006) even suggests that natural disasters have contributed to the collapse of societies in the past.

A more optimistic third view sees these upheavals as opportunities for countries to modernize, in line with a Schumpeterian conception of creative destruction. After a few years, per capita income will rise above its initial level, thanks to a "build-back-better" phenomenon leading to increased productivity (Hallegatte and Dumas, 2009; Loayza et al., 2012).

The conflicting conclusions that support these three perspectives underline the high level of heterogeneity of the effects of natural disasters, the analysis of which requires a focused analysis of potential transmission channels.

The impact of disasters on various economic variables, including GDP and growth (Berlemann and Wenzel, 2018; Hsiang and Jina, 2014), international trade (Pelli and Tschopp, 2017), and inequality (Yamamura, 2015; Cappelli et al., 2021; Paglialunga et al., 2022) has been widely studied. However, despite the centrality of inequality in economic discussions, the literature on climate shocks and inequality is dominated by microeconomic studies. Macro-level studies often fail to account for the temporal depth of impacts, rely on potentially biased disaster data, and overlook the descriptions of potential transmission channels. In particular, redistributive policies do not seem to have been sufficiently studied to understand impact on the dynamics of inequality following a macro-level shock. Moreover, macroeconomic studies often overlook the highly differentiated impacts of disasters, which depend on the particular event and country under consideration.

This paper addresses the existing gaps in the macroeconomic literature by posing the following questions: What is the medium-term impact of hurricanes on macro-level income inequality? Does the impact of hurricanes differ between pre-tax/transfer and post-tax/transfer inequality? Do the dynamics of hurricane impact on inequality differ according to a country's level of development? Furthermore, through what channels might hurricanes affect inequality, and do these channels vary across country

development levels?

To answer these questions, we construct a sample of 114 countries from 1995 to 2014, focusing on hurricanes as one of the most frequent and destructive disasters. Our study advances the existing literature by making several substantial contributions. First, we use Jordà (2005)'s local projections (LP) to assess the cumulative impact of hurricanes on inequality up to five years after a shock. Second, we use an exogenous measure of hurricanes developed by Yang (2008), which uses meteorological data to mitigate endogeneity bias. Third, we examine the transmission channels through which hurricanes may affect inequality, providing a deeper understanding of the mechanisms at play.

Our analysis reveals a pattern in which pre-redistributive inequalities tend to rise after one year and decline four years after an event. In particular, post-redistributive inequalities, influenced by taxes and transfers, show a more pronounced and prolonged increase, persisting up to three years after the shock, without a subsequent decline. This result is particularly true when we focus solely on large hurricanes, and it is robust when we exclude the countries most heavily impacted by them in intensity or frequency. It is essential to recognize, however, that these results vary according to a country's levels of development and democracy. Developing countries show a reduction in inequality after redistribution, which can be attributed to the influx of official development assistance (ODA) and remittances. For high-income countries, both market and disposable inequality tend to decrease in the initial years following a hurricane. However, we observe an increase in the market Gini coefficient four and five years after the event, suggesting a possible Schumpeterian effect of creative destruction, where the wealthiest fringe of the population increases its income through a "build-back-better" effect as a result of the hurricane.

The remainder of this article is structured as follows. Section 2.2 presents the literature review. We present the construction of our database and some descriptive statistics in Section 2.3. The methodology is discussed in Section 2.4. Section 2.5 presents our results. The analysis by country subgroup is presented in Section 2.6. We discuss the channels in Section 2.7. Finally, we conclude and offer policy recommendations in Section 2.8.

2.2 Literature review

2.2.1 The impact of natural disasters under debate

In the current era of extreme weather events increasing on a global scale, there is a growing concern worldwide about adapting to climate change. Natural disasters, as emblematic expressions of the disruption of nature 's balance overwhelmingly cause substantial material devastation, primarily targeting capital, with a comparatively lesser impact on human labor. The growing literature on the economic impact of natural disasters seeks to unravel the complex consequences of these events. Despite these efforts, a consensus remains elusive, fostering an ongoing debate around three dominant perspectives.

One strand of the literature finds the presence of a catch-up dynamic in which the impact of disasters diminishes over time. Drawing on neoclassical growth models, proponents argue that if disasters undermine capital per capita in a given period, subsequent increases in savings and investment are expected to restore the economy to its steady state. Empirically, at the macro-level, Jaramillo (2009) and Cavallo et al. (2013) find that natural disasters have no long-term impact. At the regional level, Brata et al. (2014) find that the effects of the 2004 tsunami in North Sumatra faded after several years.

Conversely, another view characterizes natural disasters as shocks that can push a country or region into a situation where per capita income is too low to support an increase in per capita capital, a phenomenon known as the poverty-trap dynamic. Historical evidence, such as the severe droughts experienced by the Mayan civilization between 800 and 910, illustrates how these shocks can lead to significant human loss and societal collapse.[1] Nowadays, poverty traps seem to be observable only at the microeconomic level. For example, Carter et al. (2008)'s examination of droughts in Ethiopia and of hurricanes in Honduras find affected households struggled to recover pre-disaster assets.

In contrast, a third, more optimistic view sees disasters as catalysts for renewal and improved productivity. In line with Schumpeter's idea of creative destruction, this perspective sees the long-term benefits of replacing obsolete technology with more productive capital. A natural disaster destroys machines with obsolete technology, which are replaced by more productive capital, ultimately allowing for a better

[1] Some regions would have known losses of up to 99% of their population, contributing to the decline of this civilization.

productivity source of growth (Hallegatte and Dumas, 2009; Hallegatte and Ghil, 2008; Loayza et al., 2012; Albala-Bertrand, 1993; Benson and Clay, 2004; Okuyama, 2003; Stewart et al., 2001).

However, the ability to turn post-disaster challenges into opportunities is not universal, as financial and technological constraints limit some countries. Moreover, GDP growth, often seen as a sign of shared prosperity, does not always benefit all segments of society equally. As highlighted by Noy (2009), structural shocks tend to favour the ruling classes, especially in developing countries and smaller economies. The impact on different variables varies, as illustrated by Yang (2008)'s findings that official development assistance (ODA) and remittances increase after the hurricane, while foreign direct investments (FDI) and portfolio investments decrease. Given this heterogeneity, focused analysis on specific variables or countries is essential for analytical precision.

2.2.2 The impact of natural disasters on inequality

The growing literature on the relationship between climate shocks and inequality constitutes an empirical discourse, which either validates or challenges the above-mentioned theories. Many studies' findings are consistent with the notion that shocks permanently trap parts of the population in poverty. Lynham et al. (2017) find that wages remained constant after a tsunami hit Hawaii in 1960 but that unemployment increased. Many family businesses went bankrupt, and much of the population was displaced. Bui et al. (2014) show that a series of natural disasters in Vietnam over 60 months resulted in adverse effects on wages, contributing to exacerbating poverty and inequality. Carter et al. (2008) focus on the long-term rebuilding of assets after 1998's Hurricane Mitch in Honduras and the prolonged drought in Ethiopia. The authors report a critical threshold of asset ownership below which recovery is not possible, and poor households are irreparably trapped in poverty. Similar results emerge from studies in other parts of the world, such as Mexico (Rodriguez-Oreggia et al., 2013), rural India (Sedova and Kalkuhl, 2020), and Nepal (Pradhan et al., 2007). Furthermore, in societies with significant income gaps, lack of access to resources pushes households at the bottom of the distribution not to seek insurance but to resort to other means of coping with the shock, such as child labour, the sale of productive assets (Sawada and Takasaki, 2017), changes in agricultural practices and diet, and emigration of varying lengths of time (De Waal, 2005; Mahajan and Yang, 2020). However, these solutions often push households further into poverty (Banerjee et al., 2011; Lybbert and Barrett, 2011).

Conversely, some authors argue for the existence of Schumpeterian creative destruction. Natural disasters can lead to the adoption of adaptive measures such as income diversification (Adger, 2006; Eriksen et al., 2005). In some countries, farmers choose drought-resistant crops or alternative storage strategies (Eakin and Conley, 2002; Thomas et al., 2007) that are effective against one-off events but less so for repeated shocks (Kallis, 2008). Finally, and most importantly, the pressure exerted in the aftermath of a disaster is often fertile ground for collateral effects such as the outbreak of armed conflict (Ide, 2020) and unrest among the civilian population in the struggle for access to humanitarian aid (Hendrix and Salehyan, 2012). However, it should be noted that structural shocks primarily benefit the ruling classes (Klein, 2007; Loewenstein, 2015). In addition, the time required for reconstruction, as well as its effectiveness, may be subject to financial or technical constraints that can widen the gap between those affected (Hallegatte and Przyluski, 2010). Again, there is no consensus, and conclusions differ depending on the country and disasters studied.

At the macro-level, the literature on inequality is rich. Many works in the line of Kuznets (1955) investigate the links between GDP, growth, and inequality. Bodea et al. (2021), Gokmen and Morin (2019), and Baiardi and Morana (2018) focus on the impact of financial crises on income inequality. A growing body of literature also explains the links between pandemics and inequality (Galletta and Giommoni, 2022; Karlsson et al., 2014; Furceri et al., 2020).

Despite extensive research, there remains a significant gap in the literature concerning the impact of natural disasters on inequality. Yamamura (2015) examines this relationship, finding that the Gini coefficient tends to increase in the short run but that these effects dissipate in the long run. Cappelli et al. (2021) identify a vicious cycle, wherein high levels of inequality exacerbate the impact of subsequent inequality-enhancing natural disasters. Both of these studies underscore the importance of addressing endogeneity in macro-level analyses of inequality. While natural disasters are erratic, their measurement can still be endogenous. The literature frequently relies on the EM-DAT database, which records financial losses regarding property damage and deaths based on declarations. Yang (2008) argue that these data can be upwardly biased as countries may inflate figures to secure more financial aid. Moreover, in contrast to Paglialunga et al. (2022), who examine the transmission channels through which natural disasters affect inequality, focusing on adverse effects using an exogenous measure of heat waves and extreme precipitation, few studies focus on describing the transmission channels through which disasters can affect

inequality. Finally, most studies on the subject are limited to a short-term analysis of the impact of disasters on inequality.

To address these gaps, our study adopts a novel approach that integrates the above mentioned issues. We analyze the impact of hurricanes on inequality using meteorological data to ensure exogeneity, examining the cumulative medium-term effects at the macroeconomic level. Our study also differentiates between pre- and post-redistributive inequality and investigates the transmission channels through which hurricanes influence it. By incorporating the development and democracy level of the affected countries, our research provides a more nuanced understanding of these dynamics.

2.3 Data

Our main sample covers 114 countries over 20 years (1995-2014). Our sample selection results from a trade-off between temporal depth and a large sample of countries. Indeed, data on inequality in emerging and developing countries before 1995 are rarely available. In addition, the available data on hurricanes ends in 2014. According to the World Bank's classification of countries by income, we can divide our sample into four groups: 26 countries are low income, 34 are lower-middle income, 24 are upper-middle income, and 30 are high income. This classification allows us to test the differences in impact on countries according to their respective income levels.[2]

2.3.1 Dependent variable: Gini index

Like others in the literature (Baiardi and Morana, 2018; Gokmen and Morin, 2019; Yamamura, 2015; Cappelli et al., 2021), we use the Gini coefficient from the Standardized World Income Inequality Database (SWIID, version 4.1). As Solt (2020) points out, the SWIID, "seeks to maximise comparability while providing the broadest possible coverage of countries and year". The author estimates the relationships between Gini coefficients from multiple sources (e.g. the Global Income Inequality Database) and the baseline Gini from the Luxembourg Income Study (LIS). This methodology allows him to calculate what the LIS Gini, for country years not included, would have been. If Solt does not have enough information on a given

[2]To ensure comparability between income groups over time and to avoid a country moving from one category to another during the five-year analysis subsequent to the shock, we fix the country in its income group in the middle of the period (2005).

relationship for a country, he uses information from other countries in the same region. Therefore, our dependent variable is the market Gini coefficient, calculated by country and year, from income before taxes and transfers. We also use the disposable Gini, calculated with income after taxes and transfers. The availability of these two indicators allows us to compare the potential effect of redistribution policies following a disaster.[3]

Table 2.1 presents descriptive statistics on the two Gini variables. Inequality without redistribution (Market) exceeds that with redistribution (Disposable), underlining the effectiveness of such policies, especially in developed countries. In line with the Kuznets curve theory of inequalities, we observe that these inequalities tend to escalate as income levels rise, before declining in developed countries.

2.3.2 Variable of interest: Hurricane index

Hurricanes, typhoons, and cyclones are the same disasters. The difference in the name comes from the affected areas.[4] As defined by Mahajan and Yang (2020), hurricanes are "storms that originate over tropical oceans with wind speeds greater than 33 knots" (62 km/h). These meteorological phenomena occur when two elements come together. First, the ocean temperature must be at least 26.5 degrees Celsius. The process involves the evaporation of water, followed by its condensation into large thunderclouds. The second condition is the presence of a low wind shear, which makes a storm more powerful. This heat transfer mechanism generates considerable energy, eventually forming the violent winds characteristic of hurricanes.

Hurricanes wreak significant economic impact, primarily by destroying capital and infrastructure through storm surges, high winds, and flooding. According to Hsiang and Narita (2012), these disasters affect approximately 35% of the world's population. The cumulative damage they cause is substantial: estimated at over $280 billion between 1970 and 2002, according to EM-DAT. Unfortunately, future projections are not optimistic; the Intergovernmental Panel on Climate Change (IPCC, 2018) predicts an increase in intensity of hurricanes in the future due to climate change and

[3]It would have been interesting to have information on the breakdown of inequalities by gender, which can significantly impact income inequalities. However, the SWIID database does not provide this level of disaggregation.

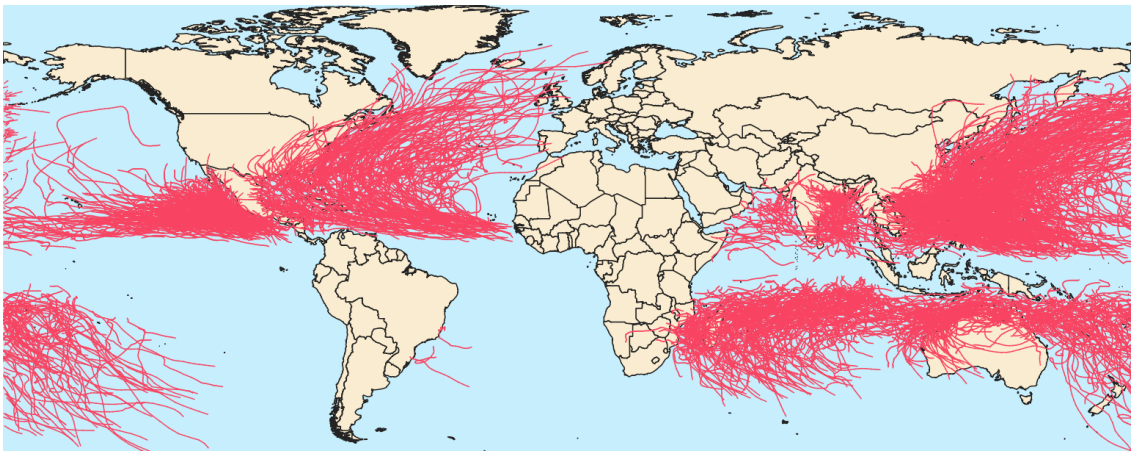
[4]The term "hurricane" is used for North Atlantic and Northeast Pacific storms. The term "typhoon" is used in the northwestern Pacific, while "cyclone" is used for storms in the Indian Ocean and the southern Pacific and Atlantic Oceans.

ocean warming.[5] In addition, Stern and Stern (2007) estimate that the annual cost of hurricanes could rise to 0.5-1% of global GDP by 2050. This projection considers the combined effects of increased economic activity and the expected increase in the intensity of hurricanes.

As mentioned above, the measurement of natural disasters is considered to be potentially endogenous (Yang, 2008). A common source used in the literature for such measurements is the EM-DAT database, which provides information on factors such as death tolls or financial costs associated with disasters. However, this data type can be biased due to potential measurement errors. For example, a country affected by an earthquake might inflate the reported financial costs to attract more financial assistance. In addition, our analysis using this data could face challenges related to reverse causality. Countries facing major hurricanes may experience an increase in income inequality. Conversely, societies characterized by high income inequality may also be disproportionately affected by natural disasters. For example, the poorest households, who live in vulnerable housing conditions and lack access to preventive measures, may be more vulnerable to increased fatalities or financial losses.

To mitigate the challenges associated with measuring natural disasters, we, like others (Belasen and Polachek, 2009; Hsiang, 2010; Hsiang and Jina, 2014; Mahajan and Yang, 2020), have chosen to use the database developed by Yang (2008). This database contains a hurricane index (HI) constructed from meteorological data using the best tracks from the National Oceanic and Atmospheric Administration (NOAA) and the Joint Typhoon Warning Center (JTWC). The best tracks provide details about the center of a hurricane, including maximum wind speed and geographical coordinates at six-hour intervals. Figure 2.1 provides a visual representation of the best hurricane tracks during our period (1995-2014). This approach aims to improve the accuracy and reliability of our natural disaster data, addressing concerns about potential biases and measurement errors inherent in other databases.

[5]It is worth noting that future climate models suggest that increased wind shear is likely to reduce the overall number of hurricanes. However, the warming of ocean waters due to climate change is expected to favour the formation of large thunderclouds. This will increases the likelihood that they will intensify into high-category storms and extend their paths further from the tropics, suggesting a future scenario of fewer but more intense hurricanes.



Source: Author's elaboration from IBTrACS database.

Figure 2.1: World map of hurricane best tracks: 1995–2014

From these best tracks, Yang constructed his index as follows:

$$HI_{i,t} = \frac{\sum_j \sum_s x_{j,s,i,t}}{N_{i,t}} \tag{2.1}$$

$HI_{i,t}$ is the destructive potential of a hurricane for country i the year t. It is the sum of each individual j's "affectedness" ($x_{j,s,i,t}$) by each hurricane s, in the country i, year t and divided by the total population $N_{i,t}$.

In equation 2.1, $x_{j,s,i,t}$ is unknown because there is no data source for the incidence of hurricanes at the individual level. Thus, he used Dilley (2005) model to calculate $pw_{g,s,i,t}$ the predicted wind speed for each 0.25 by 0.25-degree latitude and longitude grid point g. Finally, he obtained $x_{g,s,i,t}$ the hurricane intensity estimate at the grid point as follows:

$$x_{g,s,i,t} = 1\{pw_{g,s,i,t} > 33\} \left\{ \frac{(pw_{g,s,i,t} - 33)^2}{(w^{max} - 33)^2} \right\} \tag{2.2}$$

Yang normalized the index by the maximum wind speed (max) observed in the dataset (166.65 knots), adding a square term to the index to account for the nonlinearity of the impact (i.e., the more serious the wind, the greater the damage).

Finally, he used 1990 gridded population data from the Socioeconomic Data and Applications Center (SEDAC) at Columbia University for each 0.25-degree N_g grid point:

$$HI_{i,t} = \frac{\sum_g \sum_s x_{g,s,i,t} N_{g,1990}}{\sum_g N_{g,1990}} \tag{2.3}$$

This methodology allows for the measurement of hurricane events per capita and weighted by intensity, which could be seen as an exogenous variable.[6]

Table 2.1 presents some descriptive statistics for our HI variable. We note that countries are affected regardless of their income level. Forty-five countries in our sample experienced at least one hurricane between 1995 and 2014.[7] Contrary to expectations, developed countries appear to have a higher hurricane index on average. Looking only at countries that experienced a hurricane in a given year (HI $>$ 0) and categorizing them by country income group, lower-middle income countries have a higher average coefficient. Although developed countries are more frequently affected (N=149), the effect seems a little less pronounced. Furthermore, within the subset of affected countries, the large standard deviation indicates significant heterogeneity in the magnitude of hurricane impact.

2.3.3 Control variables

We use a set of control variables to build a structural model as Bodea et al. (2021) and Reuveny and Li (2003). First, the level of democracy could play a role, as highly democratic states could more easily reduce inequality due to better tax systems and redistributive fiscal policies (Acemoglu et al., 2015). We use the variable POLITY (Marshall et al., 2017), which rates the governance of countries from -10 (complete autocracy) to +10 (complete democracy) based on a set of variables such as the competitiveness of executive recruitment or the constraint on the chief executive. We also include three variables that control for economic openness. First, we control for trade openness, measured as the value of exports and imports divided by GDP (World Bank). Many authors have argued that trade increases (Rodrik, 1998) or decreases (Birdsall, 1998) inequality. Second, we control FDI flows (net FDI flows as a percentage of GDP; World Bank). As with trade, the literature on the effect of FDI on inequality is mixed. Third, we include a variable for portfolio investment flows (net portfolio investment as a percentage of GDP; World Bank). Finally,

[6]It should be noted that we have reintegrated the overseas departments that were not originally part of France in the database (Réunion, Martinique, Guadeloupe, French Guiana and Mayotte) as they are not independent states.

[7]See Table A.2.1 for more details on the sample.

Table 2.1: Descriptive statistics

	N	Mean	SD	Min	Max
			Full sample		
Hurricane index	2280	.001506	.0108932	0	.201552
Hurricane index (>0)	369	.0093052	.0257311	4.04e-10	.201552
Disposable Gini	2280	.3890018	.0911964	.22	.671
Market Gini	2280	.4661487	.0682745	.219	.724
			Low income countries		
Hurricane index	520	.0003882	.0037629	0	.0798339
Hurricane index (>0)	69	.0029253	.0100269	4.04e-10	.0798339
Disposable Gini	520	.4201769	.0622018	.329	.563
Market Gini	520	.4450269	.0611221	.349	.596
			Lower-middle income countries		
Hurricane index	680	.0021058	.0144593	0	.201552
Hurricane index (>0)	107	.0133829	.0344513	4.12e-09	.201552
Disposable Gini	680	.4310338	.0860214	.237	.671
Market Gini	680	.4696	.0838401	.219	.708
			Upper-middle income countries		
Hurricane index	480	.0006016	.0053547	0	.0770514
Hurricane index (>0)	44	.0065626	.0167143	1.07e-07	.0770514
Disposable Gini	480	.3949792	.0971289	.22	.636
Market Gini	480	.4818958	.0694218	.369	.724
			High income countries		
Hurricane index	600	.0025184	.0132704	0	.1634536
Hurricane index (>0)	149	.0101412	.0251975	2.85e-08	.1634536
Disposable Gini	600	.309565	.0562102	.22	.507
Market Gini	600	.467945	.0455365	.31	.563

Notes: Descriptive statistics of hurricane index, disposable Gini (post-tax & transfers), market Gini (pre-tax & transfers) according to subgroup from the World Bank.
Source: Authors' elaboration.

we control for (log) GDP per capita (World Bank). Furthermore, in line with the Kuznets curve, which suggests an inverted U-shaped relationship between income per capita and inequality, we have included a squared term for the GDP per capita variable. This assumption considers that inequality tends to increase with economic development up to a certain threshold, after which it decreases. The squared term allows for a more nuanced representation of the complex dynamics involved in the relationship between income per capita and inequality.

2.4 Empirical strategy

Our empirical strategy is based on ordinary least squares (OLS) estimation of a structural model explaining income inequality with Jordà (2005)'s local projections. LP are constructed as a local impulse response estimated at each time horizon, in contrast to a Vector Autoregression (VAR) model that extrapolates results from data based on a distant horizon. This method has several advantages: (i) it is easy to estimate with OLS; (ii) it is more robust to model misspecification; (iii) it lends itself more readily to point or joint inference; and (iv) it is more amenable to highly non-linear models (Jordà, 2005). This model is increasingly used in the literature and is well suited to our approach, as it could be compared to the impact analysis method in the presence of an orthogonal independent variable (here: the hurricane index). The model is constructed as follows:

$$Y_{i,t+h} - Y_{i,t-1} = \beta^h HI_{i,t} + \omega^h [HI \times GDPcap_{i,t-1}] + \theta^h X_{i,t-1} + \alpha_i^h + \rho_t^h + \Omega_i^h \times t + \epsilon_{i,t+h} \tag{2.4}$$

The LP is made from the year before the hurricane $t-1$ to $h = 0, ..., 5$, time horizon of 5 years after the storm. Given the temporal depth of our sample (20 years), we can only analyze the impact of hurricanes over the medium term. The Left-Hand Side (LHS) variable gives the cumulative change from $t-1$ (before the impact) to $t+h$ of the Gini index. The coefficient associated with the hurricane index is $\beta^h HI_{i,t}$. $HI \times GDPcap_{i,t-1}$ is the multiplicative variable between the hurricane index and the logarithm of GDP per capita, used to test whether the impact is different depending on the wealth level of the affected country. $X_{i,t-1}$ is a set of control variables described above and GDP squared to test the Kuznets inequality curve. All control variables are lagged to minimize a potential reverse causality problem. α_i^h and ρ_t^h are, respectively, the country and time-fixed effects. $\Omega_i^h \times t$ allows us to account for country-specific patterns of inequality growth and its relative inertia (Hsiang and Jina, 2014). Finally, $\epsilon_{i,t+h}$, the idiosyncratic error term for each time horizon, is clustered by country to correct for heteroscedasticity and serial autocorrelation.

2.5 Results

2.5.1 The effect of hurricanes on pre-redistribution inequalities

Table 2.2 presents the results of the impact of hurricanes on the market Gini, providing insight into the impact of inequality without redistribution. The regression results show a cumulative increase in inequality up to one year after the hurricane. To provide a more concrete interpretation, an increase of one standard deviation in HI (Table 2.1: 0.026) corresponds to a cumulative increase of 0.003 in the market Gini one year after the shock.[8] Although seemingly modest, this translates into a cumulative increase of 0.65% in the market Gini.[9] Looking at the time dynamics of this impact, the significance diminishes two years after the hurricane. Interestingly, the cumulative inequalities decrease four and five years after the hurricane.

Introducing the multiplicative variable between HI and GDP per capita allows us to examine heterogeneity across countries, based on income levels. Its significant and positive (negative) coefficient in years with a negative (positive) HI coefficient shows that countries with a higher GDP per capita experience a smaller increase, or even a decrease, in inequality one year after the hurricane. The threshold at which inequality decreases after a hurricane is around $1,750 for the market Gini. Almost 25% of our observations fall below this threshold.

We could interpret this as owing to the fact that the poorest countries are essentially agricultural economies that often have precarious infrastructure and housing that are less resistant to hurricanes. This is particularly true for the poorest sections of the populations of these countries. Therefore, these countries would be more likely to suffer significant damage after a hurricane and adopt adaptation strategies to increase their income in the subsequent years.

Conversely, we find that the increase in market inequalities four years after the shock only affects the richer countries. Indeed, the positive and significant coefficient of the multiplicative variable indicates that above a certain level of GDP per capita, the impact of a hurricane increases inequality for the wealthiest countries four years after the shock. This result is intriguing and would suggest a Schumpeterian effect with a "build-back-better" mechanism: After a hurricane, capital is destroyed. It is then

[8]The coefficient is calculated as follows: $0.112 \times 0.026 = 0.003$.

[9]Given that the average market Gini is 0.466 (Table 2.1).

replaced by more efficient capital, allowing for an increase in capital income, which tends to go to the richest fringe of the population.[10] Indeed, modern economies are more capital intensive. Capital is mainly held by the richest individuals in the population, who likely then experience, a greater reduction in their income from capital in the initial years after a hurricane, which could explain why inequalities tend to decrease in the richest countries.

Like others in the literature (Bodea et al., 2021), we find that few of our control variables have a strong and consistent effect on inequality. This is probably because inequality is highly sticky, and our empirical approach takes into account country-specific patterns of inequality growth.

It would be interesting to observe what happens in the presence of a redistributive policy, to see to what extent it tends to smooth out the evolution of inequalities following a hurricane.

2.5.2 The effect of hurricanes on post-redistribution inequalities

Table 2.3 presents the results of the impact of hurricanes on the disposable Gini for our full sample. The results show a significant cumulative increase in the disposable Gini up to three years after the shock associated with the HI. The magnitude of the coefficients is more substantial compared to the market Gini, with a value of 0.166 compared to 0.112 one year after the shock. Four years after the hurricane, the effect is no longer significant.

These results are, therefore, surprising and counter-intuitive when compared with the Gini market. They tend to suggest that the redistribution policy exacerbates inequalities since, in its absence, market inequalities would have increased less and even decreased four years after the hurricane. There are several potential reasons for this poor redistribution policy: a reduction in social transfers, a reduction in taxes for the richest, and the capture of resources by a section of the population (cartels, corruption).

However, these results must be tempered by the multiplicative variable between HI and GDP per capita. In the regressions for the disposable Gini index, the coefficient

[10]The "build-back-better" effect would mainly concern individuals at the top of the income distribution since they are not only potentially more affected due to the capitalist intensity of their income but also have better access to insurance, which allows them to rebuild more efficiently compared to those at the bottom of the distribution.

Table 2.2: Cumulative effect of Hurricane index on market Gini

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Hurricane index	0.109***	0.112***	0.081	-0.033	-0.231*	-0.234***
	(0.026)	(0.042)	(0.064)	(0.091)	(0.125)	(0.089)
HI × (log) GDP per capita	-0.014***	-0.015***	-0.011	0.003	0.028*	0.029***
	(0.003)	(0.005)	(0.008)	(0.011)	(0.015)	(0.011)
(Log) GDP per capita	-0.029*	-0.063**	-0.098**	-0.131**	-0.164***	-0.176**
	(0.016)	(0.031)	(0.045)	(0.053)	(0.057)	(0.074)
(Log) GDP per capita^2	0.002*	0.004**	0.006**	0.008**	0.010***	0.011**
	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
FDI	0.000	0.000	0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Portfolio investments	-0.000	-0.000	-0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade	-0.000	-0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Polity	0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.406	0.504	0.590	0.659	0.723	0.784
Observations	1,784	1,683	1,582	1,481	1,381	1,282

Notes: Market Gini refers to pre-taxes and transfers Gini index. All the coefficients are expressed in cumulative form. All our variables (except HI) are lagged by one period. Standard errors are in parentheses; *** p <0.01, ** p <0.05, * p <0.1. Source: Authors' elaboration.

of the multiplicative variable is negative and significant for the first three years. This suggests that the higher the GDP per capita of the country, the less significant the impact of storms on the Gini index. Similarly, after a certain level of GDP per capita, the effect seems to be reversed: high income countries tend to experience a decrease in disposable income inequality. It is important to note that the coefficient on the multiplicative variable is higher for the disposable Gini than for the market Gini (-0.021 vs. -0.015), so the poor redistribution would only affect the least wealthy countries.[11]

[11]Tables A.2.2 and A.2.3 display the results of population-weighted regressions for market and disposable Gini. Despite varying significance for some years, the overall post-hurricane dynamics and their coefficients for market and disposable inequality remain consistent.

In developed countries, disposable inequalities decrease more than market inequalities. Thus, redistributive policies are more efficient in wealthier countries, because they have more flexible budget constraints, a better borrowing, capacity, and a better tax system, allowing them to better smooth the shock and sometimes even reduce inequalities.[12]

This global analysis of the results highlights potentially poor redistributive policies, but only in the least wealthy countries in our sample. It would therefore seem worthwhile to analyze subgroups of countries according to their income levels.

Table 2.3: Cumulative effect of Hurricane index on disposable Gini

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Hurricane index	0.160***	0.166***	0.207***	0.174***	-0.024	-0.057
	(0.034)	(0.042)	(0.048)	(0.062)	(0.066)	(0.076)
HI × (log) GDP per capita	-0.020***	-0.021***	-0.026***	-0.022***	0.002	0.007
	(0.004)	(0.005)	(0.006)	(0.007)	(0.008)	(0.009)
(Log) GDP per capita	-0.022	-0.043	-0.062	-0.079	-0.114	-0.148
	(0.019)	(0.039)	(0.056)	(0.066)	(0.072)	(0.093)
(Log) GDP per capita^2	0.001	0.002	0.003	0.005	0.007	0.009*
	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	(0.006)
FDI	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Portfolio investments	0.000	0.000**	0.000**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Polity	0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.373	0.453	0.530	0.594	0.660	0.726
Observations	1,784	1,683	1,582	1,481	1,381	1,282

Notes: Disposable Gini refers to post-taxes and transfers Gini index. All the coefficients are expressed in cumulative form. All our variables (except HI) are lagged by one period. Standard errors are in parentheses; *** p <0.01, ** p <0.05, * p <0.1

[12]More flexible budget constraints are a first-order condition for reducing inequality; the second would be good implementation efficiency, which could be undermined by poor institutional quality or corruption.

2.5.3 Hurricane intensity and frequency

Hurricanes are erratic events. It is difficult to predict the areas that will be affected, the intensity of the disasters, and their frequency. Nevertheless, some countries are affected more frequently because of their geography (large coastal areas, islands) and some countries are less affected but systematically experience high-intensity cyclones. It is, therefore, important to look at the distribution of the cumulative frequency and intensity of shocks.

Yang (2008)'s database provides the number of hurricanes by country and year since 1950, as well as the HI variable. We have summed each variable, by country, between 1950 and 2014. Table 2.4 shows the descriptive statistics for these variables.

Table 2.4: Descriptive statistics of the cumulative occurrence & intensity of hurricanes

	Mean	SD	Min	p50	p75	p90	p95	p99	Max	N
Cumulative occurrence of storms	20.49	60.13	0.00	0.00	5.00	36.00	151.00	320.00	342.00	2280
Cumulative intensity of storms	0.07	0.20	0.00	0.00	0.00	0.17	0.46	1.09	1.17	2280

Notes: Storms from 1950 to 2014 for the countries of our sample. Source: Authors'elaboration

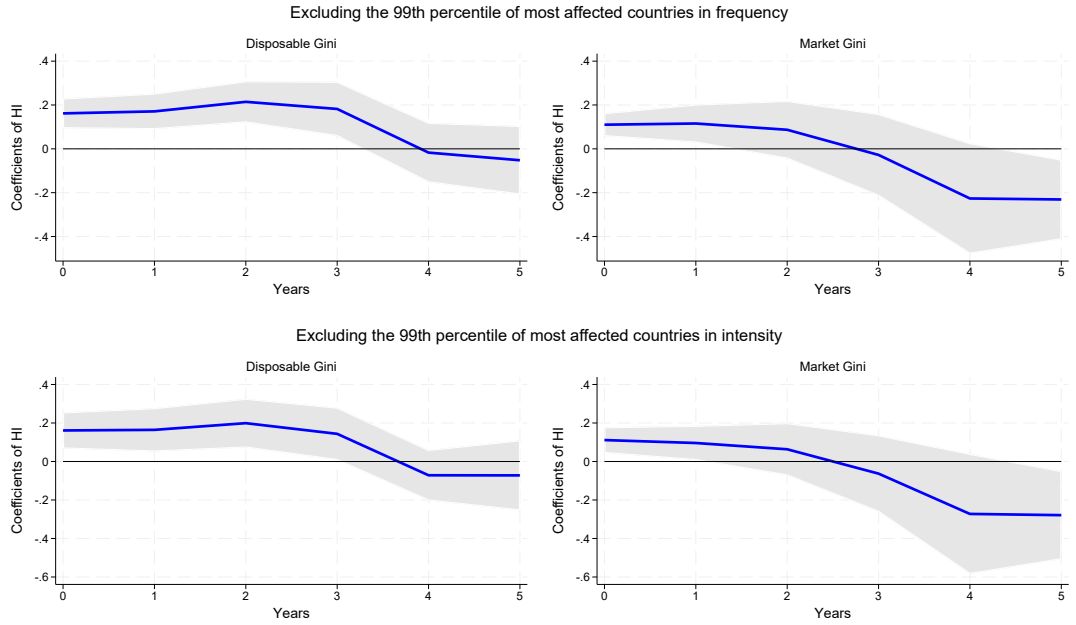
Analyzing the distribution of cumulative hurricane frequency and intensity across countries over the period, we find that the countries in our sample experienced an average of twenty hurricanes. The high standard deviation nuances the previous result and highlights a significant disparity among countries. Furthermore, the countries that experienced more than 320 hurricanes (almost 5 per year) are concentrated at the 99^{th} percentile. The same observation holds for cumulative intensity. These results suggest that hurricanes disproportionately affect the top 1% of our sample in terms of frequency and intensity.

It is therefore logical to believe that there could be unobservable heterogeneity for these countries (i.e., poverty traps, more resilient infrastructure, and better resilience), leading to the dynamics of hurricanes not being the same for all countries.

To ensure this is not the case, we re-estimate our model for disposable and market Gini by excluding from our sample the 99th percentile of the most affected countries and of those that experienced the largest hurricanes. As shown in Figure 2.2, the post-hurricane inequality dynamics remain stable, neither the coefficients nor their magnitudes or significance change.

One possible explanation for this is that countries more affected in frequency or intensity have developed a resilience to hurricanes, so these phenomena no longer

impact inequality.

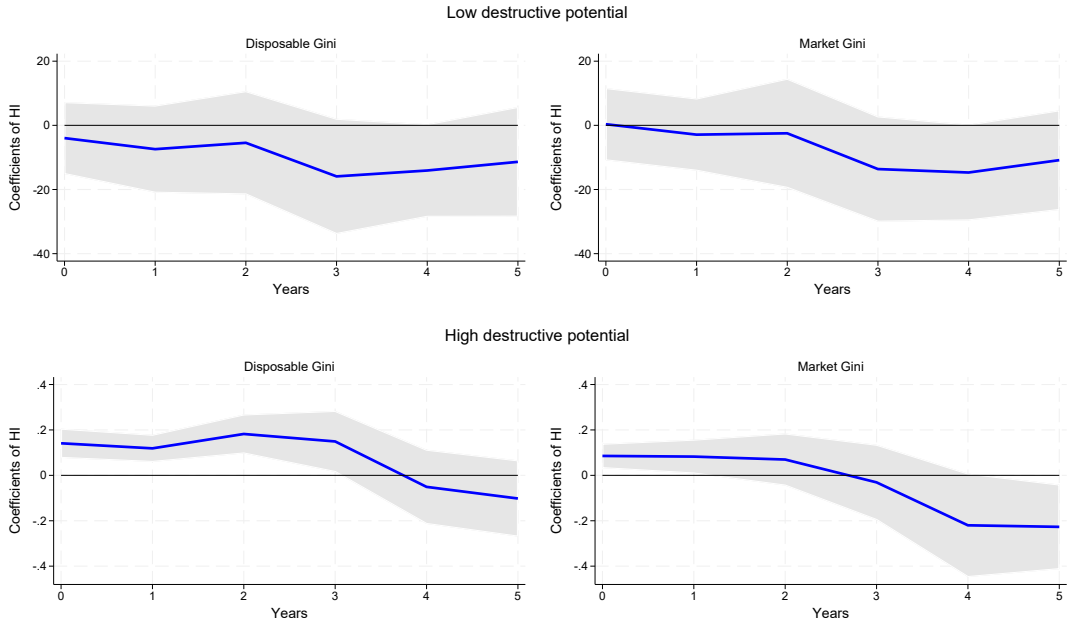


Notes: Full country sample, two-way FE panel regression with controls. Point estimators and 95%-confidence intervals

Figure 2.2: Cumulative effect of hurricane index on disposable and market Gini excluding countries most affected in frequency and intensity

2.5.4 Low versus high destructive potential of hurricanes

It is also possible that a hurricane's impact on inequality varies according to its strength. A hurricane's strength is indicated by the Saffir-Simpson scale, which ranks hurricanes according to wind speed. However, strength alone is not enough to determine a hurricane's impact, as this also depends on the number of people affected. By calculating its destructive potential, Yang's database allows us to identify hurricanes that are considered the most highly destructive. We therefore chose to classify hurricanes into two categories, strong and weak, using the median of the hurricane index for values above zero. Using this threshold, we estimate the impact of hurricanes on disposable and market inequality. The upper (lower) part of Figure 2.3 shows the effects of hurricanes on disposable and market inequality, keeping in our estimate only hurricanes below (above) the median of the hurricane index.



Notes: Country sub sample divided around the median of HI, two-way FE panel regression with controls. Point estimators and 95%-confidence intervals.

Figure 2.3: Cumulative effect of hurricane index on disposable and market Gini by hurricane force

We observe that when a country is hit by a hurricane with low destructive potential, there is no impact on inequality. This result is understandable, as such a hurricane causes little or no material destruction that could affect inequality. On the other hand, when a hurricane has a high destructive potential, we find the results described above. This threshold effect in the destructive power of hurricanes supports the hypothesis described above of a possible Schumpeterian phenomenon in rich countries. Indeed, only a powerful hurricane could cause significant material destruction, especially of capital, which would affect the richest incomes and initially reduce inequality. Subsequently, the richest incomes are likely to rise with reconstruction and a "build-back-better" phenomenon, leading to an ultimate increase in market inequalities.

Thus, post-transfer and tax inequalities increase more after a hurricane than do market inequalities, which tend to decrease after four years. This poor redistribution mainly affects the less wealthy countries, as indicated by our significant multiplicative variable with GDP per capita, which is opposite to the HI coefficient. Conversely, we highlight the possible existence of a "build-back-better" mechanism in high income countries. These results remain robust even when the most affected countries (in frequency and intensity) are excluded and when we focus on hurricanes with a high destructive potential. Given these results, an analysis by subgroups of countries seems highly relevant.

2.6 Heterogeneity of impact, by democracy and development levels

2.6.1 Hurricanes, democracy and corruption levels

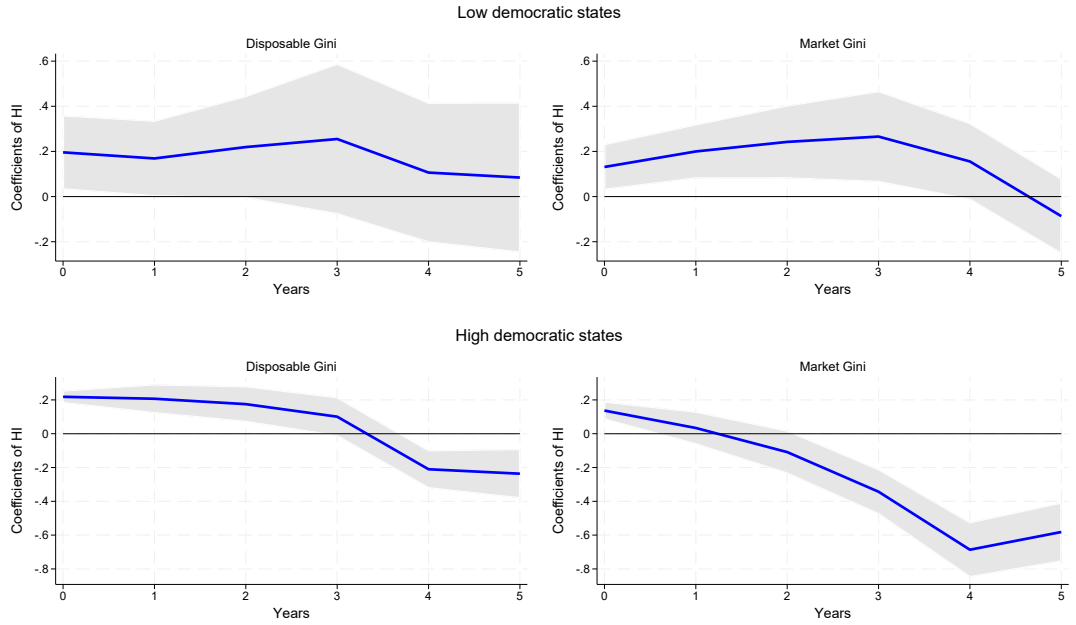
As discussed above, the impact of hurricanes varies according to a country's level of wealth. The literature on inequality also examines the effects of political variables on its evolution. Aidt and Jensen (2009) point out that more democratic countries are better equipped to reduce inequality thanks to higher public spending and a more redistributive tax system. This condition seems particularly relevant to our analysis. After a disaster, a country needs to be able to mobilize its budget for reconstruction and mitigate the potential impact of inequality. Conversely, more authoritarian countries may find it more challenging to implement these policies because of corruption.

To test for this possible heterogeneity of impact, we repeat our regressions using the same model but dividing our sample in two, according to the median of our polity variable. In addition, to strengthen the robustness of our model, we include the World Bank's control of corruption variable, which measures a country's level of corruption. The amount of foreign aid a country can receive and how it is used may depend on this level. Donors may be more reluctant to provide aid when corruption is high, as in the aftermath of Hurricane Nargis in Myanmar or the 2010 earthquake in Haiti. Similarly, high levels of corruption could make redistributive policies less effective because of the monopolization of resources by an elite.

Figure 2.4 shows the results for countries considered less democratic (top) and more democratic (bottom). For the more democratic countries, we observe the effect of our baseline with a more substantial amplitude, underlining the positive impact of democracy on reducing inequality, especially in developed countries.[13] For less democratic countries, however, the dynamic is quite different. Inequality before taxes and transfers increases up to three years after a hurricane. By comparison, disposable inequality rises more sharply in the immediate aftermath of a hurricane, reflecting the difficulty of implementing effective redistributive policies. These results suggest that in addition to a country's level of development, democracy and corruption are essential factors in reducing inequalities. More democratic countries can more easily implement reconstruction and redistribution policies without these funds being

[13]As our interaction variable between the hurricane index and the GDP per capita remains significant and of opposite sign

diverted by high corruption levels.



Notes: Country sub sample divided by their level of democracy, two-way FE panel regression with controls. Point estimators and 95%-confidence intervals

Figure 2.4: Cumulative effect of hurricane index on disposable and market Gini depending on level of democracy

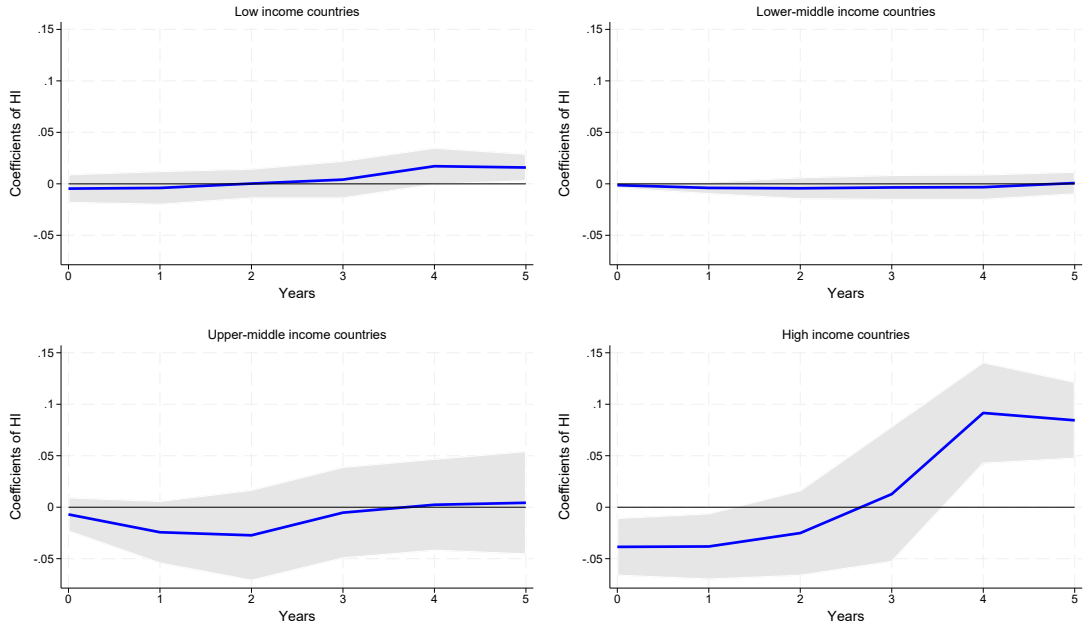
2.6.2 The effect of hurricanes on pre-redistribution inequalities by country subgroup

We use the World Bank country income classification to create four groups: low income, lower-middle income, upper-middle income, and high income countries. As we work on subsamples of countries according to their income, we remove from our model the multiplicative variable between GDP per capita and HI, and GDP squared.

Figure 2.5 presents a subgroup analysis for the market Gini to consider the dynamics of inequality in the absence of redistributive policies. Without redistribution, the hurricane has no effect on inequality for the low income group, except for a slight increase four and five years after the shock. For the upper-middle income group, there is a slight decrease after one year, which can be explained by the inflow of foreign aid. A useful example of the importance of remittances is Puerto Rico. As an unincorporated territory of the United States, Puerto Rico received no official development assistance after Hurricane Maria. In this context, remittances played a

critical role, providing most of the personal assistance to residents who remained on the island.

More interestingly, for high income countries, we see that inequality decreases one year after the hurricane hits and rises four years later. This result could be seen as a Schumpeterian effect of creative destruction, which could explain this inequality dynamic. After the shock, the destroyed capital is replaced by more productive capital, allowing the income of the richest part of the population to rise.



Notes: Point estimators and 95%-confidence intervals. Full country sample, two-way FE panel regression with controls.

Figure 2.5: Cumulative effect of hurricane index on market Gini by level of development

2.6.3 The effect of hurricanes on post-redistribution inequality by country subgroup

Figure 2.6 displays the results for the disposable Gini according to the four groups. We can see that inequality in low income countries decreases cumulatively four to five years after the shock. This result could be explained by an influx of ODA, remittances from migrants who left after the disaster, or the adoption of adaptive strategies such as diversifying crops.[14] We find no hurricane effect on the disposable

[14]Although individual migration mainly affects the middle part of the income distribution (Borjas, 1987), it is also an insurance mechanism at the household and even village levels in developing

Gini for the lower- and upper-middle income groups.

For the high income group, there is a cumulative decline in inequality up to three years after the shock. As noted above, this result may be because rich countries have a highly capital-intensive production system. As the hurricane destroys mostly capital, which is the primary source of income for the richest part of the population, inequality would tend to fall.

In addition, the positive impact of transfers should be emphasized, as the fall in inequality is more remarkable for the disposable Gini than for the market Gini. In addition, transfer policies avoid a surge in inequality, as is the case with the market Gini. Developed countries have the resources to pursue efficient redistribution policies. They also often have an effective redistributive system, because they have fewer budget constraints, a more developed tax system, and a greater capacity to borrow.

Our findings on the impact of hurricanes on post redistribution inequality for high income countries are consistent with Barbieri and Edwards (2017), who examine the effects of Hurricane Katerina in New Orleans. Before Hurricane Katrina, New Orleans had high levels of concentrated poverty and inequality, despite being part of a wealthy nation. Post-Katrina socio-economic restructuring has reduced inequality, supported by a more equitable distribution of skills and income; these changes have contributed to a positive outcome for the post-Katrina New Orleans, making it a more prosperous and less unequal city.

There are different dynamics of inequality at different income levels. For low and high income countries, redistribution and transfers are essential, without which inequalities would remain unaffected or even increase. These conclusions are similar to those drawn for the full sample.[15]

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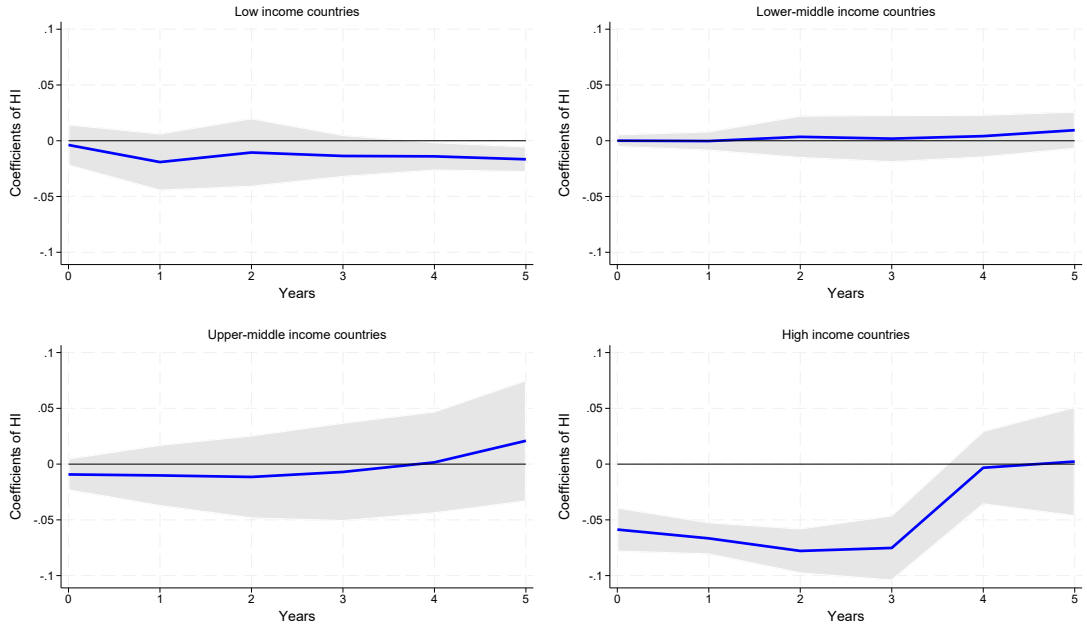
countries (Stark and Bloom, 1985; Chort and Senne, 2015). In the event of a shock, the migrant, who maintains links with those left behind, can play a counter-cyclical role by sending remittances and helping those left behind, who are often lower in the income distribution than they are.

[15]It is worth noting that the results do not change if we allow countries to change their income category during the period. Results are available upon request.



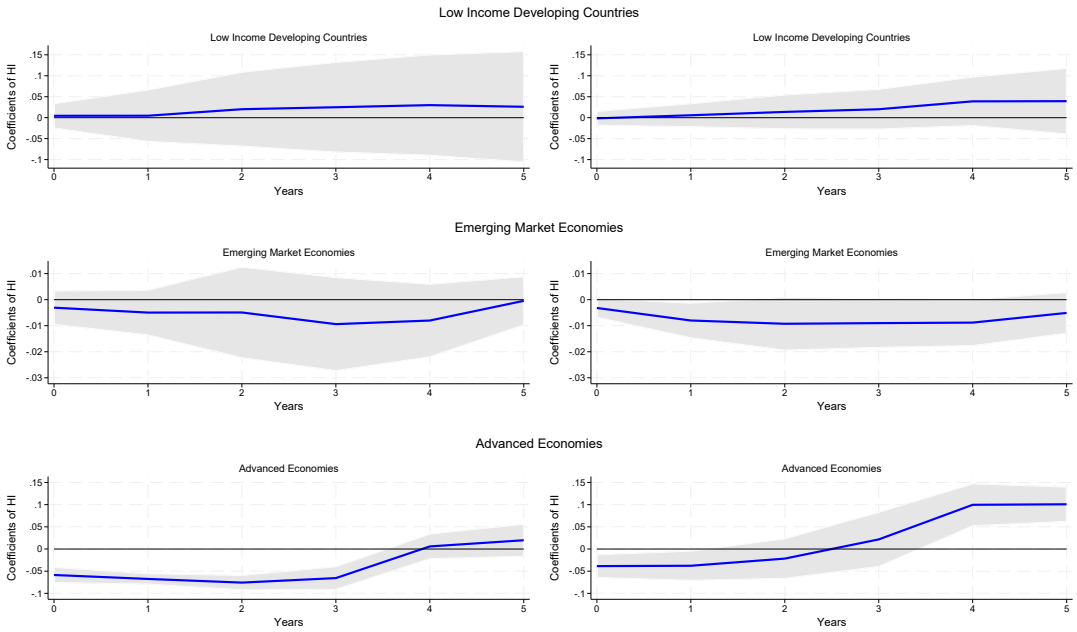
Notes: Country sub sample with World Bank's income groups, two-way FE panel regression with controls. Point estimators and 95%-confidence intervals

Figure 2.6: Cumulative effect of hurricane index on disposable Gini by level of development

2.6.4 Change in classification

Figure 2.7 represents the disposable and market Gini results for which we have replaced the World Bank's country income classification with that of the IMF. This information allows us to test the sensitivity of our results across groups. The IMF classifies countries into three categories: low income developing countries, emerging market economies, and advanced economies. Our sample countries are divided into groups of 27, 52 and 35 countries, respectively.[16] As we can see, this classification change does not alter our results: we find the above effect for the advanced economies group. We can thus conclude that our results are relatively robust to a change in classification.

[16]As for the World Bank classification, for the whole period, we assign countries to a group according to their classification in 2005.



Notes: Country sub sample with IMF's classification, two-way FE panel regression with controls. Point estimators and 95%-confidence intervals

Figure 2.7: Cumulative effect of hurricane index on disposable & market Gini with IMF's classification

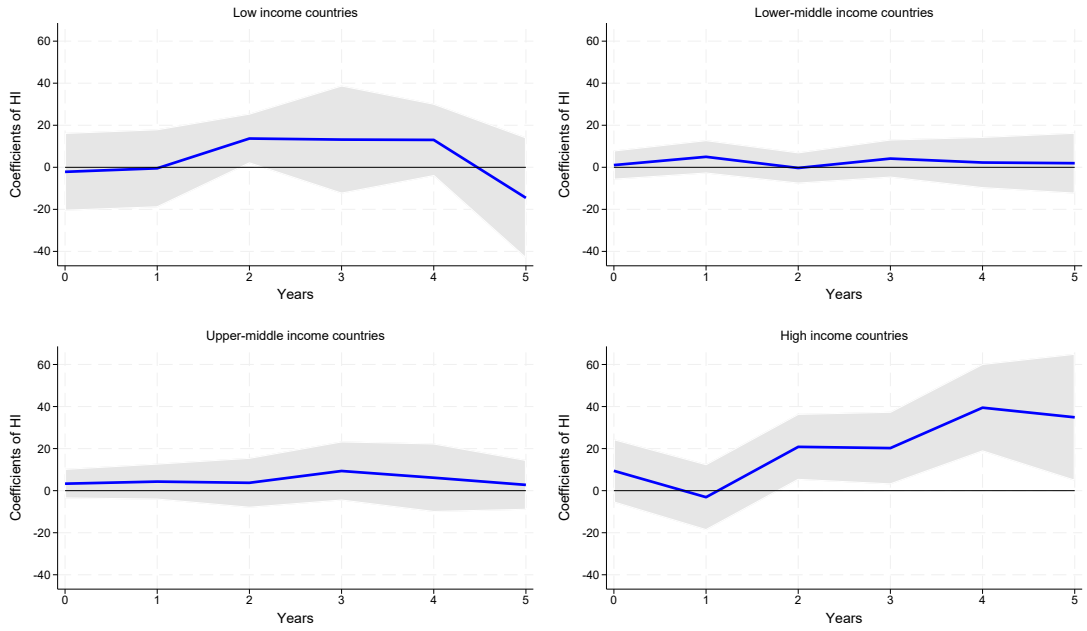
2.7 Transmission channels and discussion

As we have seen, post-tax and post-transfer inequality declines for low and high income countries. However, what are the possible channels through which this decline takes place? We present three different potential channels which can explain this dynamic after a hurricane: social transfers, ODA, and remittances. We maintain the subgroup analysis to consider the specific dynamics of each income level outlined above. To do this, we alternatively change our dependent variable in our structural model to include subsidies and other transfers, remittances, and ODA. These variables are expressed as a percentage of GDP and are taken from the World Bank.

2.7.1 Channel of social transfers

Figure 2.8 displays the correlation between the hurricanes on subsidies and other transfers, for each subgroup. We can see that hurricanes cumulatively increase subsidies two years after they occur, but only in rich countries. We find that this increase coincides with the time when market inequalities increase. This result seems to suggest the "build-back-better" hypothesis, according to which the destroyed

capital after a hurricane mainly affects the richest fringe of the population, leading to a decrease in inequality. In their rebuilding efforts, investors replace the destroyed capital with more productive technologies, thereby increasing their income and market inequalities. Thus, social transfers are correctly used in these economies to avoid increasing inequality. The fact that hurricanes do not affect transfers to other groups is unsurprising. Social transfers are easier to mobilize in countries with looser budget constraints and a sound tax system.



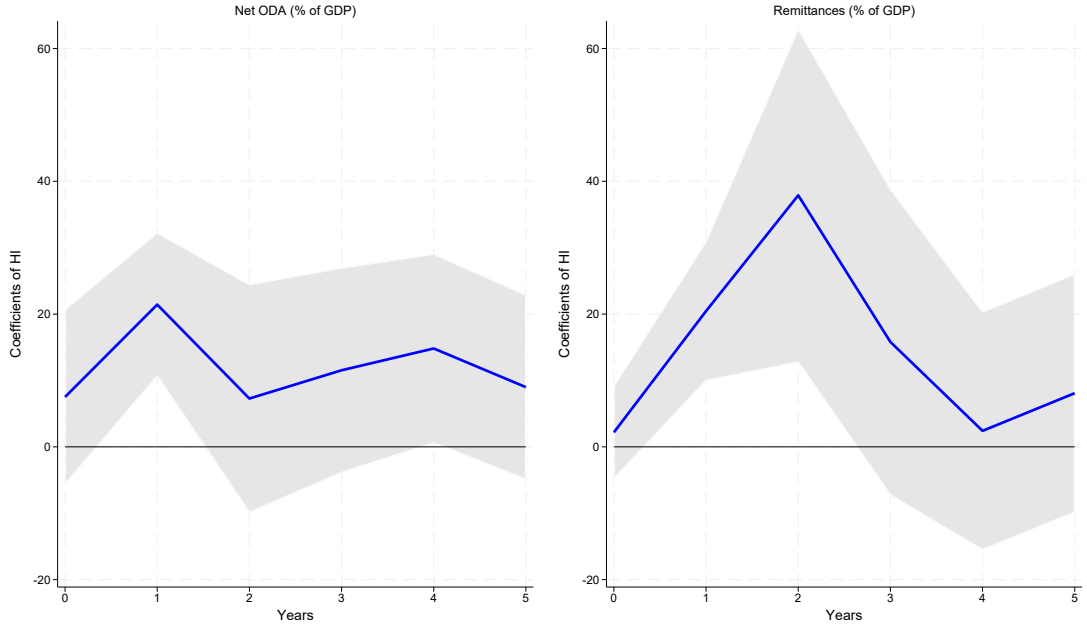
Notes: Country sub samples with World Bank's income groups, two-way FE panel regression with controls Point estimators and 95%-confidence intervals

Figure 2.8: Cumulative effect of hurricane index on subsidies and other transfers

2.7.2 ODA and remittances channel

To explain the decline in disposable income inequality in low income countries, we first analyze the effect of ODA. The left-hand side of Figure 2.9 shows the impact of the hurricanes on ODA. We see that ODA in the affected country increases in the year following the event. This international solidarity smooths out the shock and is mainly directed towards the poorest part of the population. Looking at the right-hand side of Figure 2.9, we see that hurricanes increase remittances during the two years following the hurricane. This counter-cyclical effect can also explain the fall in the Gini coefficient. Indeed, remittances are an essential source of access to finance for developing countries. Migrants have often maintained links with families left behind. In a context where government transfers are highly complicated,

migrants fulfill this function. Thus, this double inflow of international finance could increase the income of individuals in these countries in a sustainable way, leading to a reduction in post-transfer inequalities.



Notes:Low income countries, two-way FE panel regression with controls. Point estimators and 95%-confidence intervals

Figure 2.9: Cumulative effect of hurricane index on ODA & remittances

2.8 Conclusion

While the economic consequences of natural disasters have received increasing attention over the past decade, there is limited understanding of their medium-term impact on inequality at the macro level.

This paper addresses this gap by conducting a comprehensive analysis of the impact of hurricanes on inequality. Using an exogenous hurricane index derived from meteorological data, we present compelling empirical evidence supporting the hypothesis that hurricanes have conditional effects on countries, according to their GDP levels.

We show that pre-redistribution inequalities tend to cumulatively increase the year following a hurricane and decrease four and five years after it strikes. Conversely, hurricanes tend only to cause higher disposable inequalities for up to three years. These results apply mainly to strong hurricanes and are robust to the exclusion of the most affected countries. There is also evidence of a role for the level of democracy in the management of inequality in the aftermath of a hurricane.

However, the significant contribution of the paper is its demonstration that the inequality effects of storms differ substantially among countries with different levels of development. For low income countries, we find that disposable Gini tends to decrease, which could be explained by a surge in remittances and ODA the year following the disaster strikes. For the high income group, market and disposable inequality tend to decrease in the years following a hurricane. We find an increase in the market Gini four and five years later, underlying a possible Schumpeterian effect of creative destruction. We show that subsidies and transfers increase, supporting the hypothesis that redistributive policies are central to smoothing natural disasters.

A possible extension of our work would be to look at the gender impact of hurricanes or natural disasters and how this significantly impacts income inequality in affected populations.

2.9 Appendix to chapter 2

Table A.2.1: Countries of the sample according to their income classification

Country	Number of hurricanes	Income classification	Country	Number of hurricanes	Income classification
Argentina	0	Upper-middle income	Lithuania	0	Lower-middle income
Armenia	0	Low income	Luxembourg	0	High income
Australia	83	High income	Macedonia	0	Lower-middle income
Austria	0	High income	Malawi	0	Low income
Bangladesh	16	Low income	Malaysia	2	Upper-middle income
Barbados	5	Upper-middle income	Mauritania	0	Low income
Belarus	0	Lower-middle income	Mauritius	9	Upper-middle income
Belgium	0	High income	Mexico	121	Upper-middle income
Bolivia	0	Lower-middle income	Moldova	0	Lower-middle income
Botswana	0	Lower-middle income	Mongolia	0	Low income
Brazil	0	Upper-middle income	Morocco	1	Lower-middle income
Bulgaria	0	Lower-middle income	Namibia	0	Lower-middle income
Burkina Faso	0	Low income	Netherlands	0	High income
Canada	43	High income	New Zealand	3	High income
Chile	0	Upper-middle income	Nicaragua	8	Low income
China	136	Low income	Niger	0	Low income
Colombia	1	Lower-middle income	Nigeria	0	Low income
Costa Rica	0	Lower-middle income	Norway	1	High income
Croatia	0	Upper-middle income	Pakistan	4	Low income
Cyprus	0	High income	Panama	0	Lower-middle income
Czech Republic	0	Upper-middle income	Paraguay	0	Lower-middle income
Cote d'Ivoire	0	Low income	Peru	0	Lower-middle income
Denmark	0	High income	Philippines	92	Lower-middle income
Dominican Republic	14	Lower-middle income	Poland	0	Lower-middle income
Ecuador	0	Lower-middle income	Portugal	4	High income
Egypt	0	Lower-middle income	Puerto Rico	11	Upper-middle income
El Salvador	3	Lower-middle income	Romania	0	Lower-middle income
Estonia	0	Lower-middle income	Russia	6	Lower-middle income
Ethiopia	0	Low income	Rwanda	0	Low income
Finland	0	High income	Sierra Leone	0	Low income
France	1	High income	Singapore	1	High income
Gambia	0	Low income	Slovakia	0	Lower-middle income
Georgia	0	Low income	Slovenia	0	Upper-middle income
Germany	0	High income	South Africa	0	Upper-middle income
Ghana	0	Low income	Spain	0	High income
Greece	0	Upper-middle income	Sri Lanka	1	Low income
Guatemala	9	Lower-middle income	St. Lucia	6	Upper-middle income
Honduras	12	Low income	Sudan	0	Low income
Hong Kong	22	High income	Swaziland	0	Lower-middle income
Hungary	0	Upper-middle income	Sweden	1	High income
Iceland	4	High income	Switzerland	0	High income
India	46	Low income	Tajikistan	0	Low income
Indonesia	3	Lower-middle income	Tanzania	0	Low income
Iran	1	Lower-middle income	Thailand	17	Lower-middle income
Ireland	5	High income	Tonga	10	Lower-middle income
Israel	0	High income	Tunisia	0	Lower-middle income
Italy	0	High income	Turkey	0	Lower-middle income
Jamaica	8	Lower-middle income	Uganda	0	Low income
Japan	114	High income	Ukraine	0	Lower-middle income
Jordan	0	Lower-middle income	United Kingdom	5	High income
Kazakhstan	0	Lower-middle income	United States	90	High income
Kenya	0	Low income	Uruguay	0	Upper-middle income
Korea	22	High income	Venezuela	1	Lower-middle income
Kyrgyzstan	0	Low income	Vietnam	59	Low income
Laos	23	Low income	Yemen	1	Low income
Latvia	0	Lower-middle income	Zambia	0	Low income
Lesotho	0	Lower-middle income	Zimbabwe	3	Low income

Notes: Countries of the samples according to the World Bank's classification and the numbers of hurricanes during the period (1995-2014. Source: Authors'elaboration)

Table A.2.2: Cumulative effect of Hurricane index on market Gini (Population Weighted regressions)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Hurricane index	0.090***	0.050	0.020	-0.096*	-0.283***	-0.261***
	(0.030)	(0.043)	(0.039)	(0.054)	(0.060)	(0.060)
HI × (log) GDP per capita	-0.012***	-0.007	-0.003	0.011*	0.036***	0.034***
	(0.003)	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)
(Log) GDP per capita	0.007	0.035	0.033	0.022	0.003	-0.040
	(0.021)	(0.056)	(0.082)	(0.091)	(0.095)	(0.085)
(Log) GDP per capita^2	-0.001	-0.002	-0.002	-0.001	-0.000	0.002
	(0.001)	(0.003)	(0.005)	(0.005)	(0.006)	(0.005)
FDI	0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Portfolio investments	-0.000**	-0.000**	-0.000	-0.000	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade	-0.000***	-0.000**	-0.000**	-0.000***	-0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Polity	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.579	0.716	0.784	0.834	0.880	0.917
Observations	1,784	1,683	1,582	1,481	1,381	1,282

Note: Market Gini refers to post-taxes and transfers Gini index. All the coefficients are expressed in cumulative form. All our variables (except HI) are lagged by one period. Standard errors are in parentheses; *** p <0.01, ** p <0.05, * p <0.1

Table A.2.3: Cumulative effect of Hurricane index on disposable Gini (Population Weighted regressions)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Hurricane index	0.151***	0.117*	0.146**	0.099	-0.094	-0.108*
	(0.039)	(0.062)	(0.064)	(0.072)	(0.059)	(0.055)
HI × (log) GDP per capita	-0.020***	-0.016**	-0.020**	-0.014*	0.011*	0.013*
	(0.004)	(0.007)	(0.008)	(0.008)	(0.006)	(0.007)
(Log) GDP per capita	0.049	0.111	0.164*	0.193*	0.162	0.087
	(0.035)	(0.077)	(0.092)	(0.100)	(0.118)	(0.125)
(Log) GDP per capita^2	-0.003	-0.007	-0.010*	-0.011*	-0.009	-0.005
	(0.002)	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)
FDI	0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Portfolio investments	0.000	0.000*	0.000***	0.000	0.000*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade	-0.000***	-0.000***	-0.000**	-0.000*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Polity	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.538	0.666	0.735	0.781	0.832	0.882
Observations	1,784	1,683	1,582	1,481	1,381	1,282

Note: Disposable Gini refers to post-taxes and transfers Gini index. All the coefficients are expressed in cumulative form. All our variables (except HI) are lagged by one period. Standard errors are in parentheses; *** p <0.01, ** p <0.05, * p <0.1

Chapter 3

Counter-cyclicality of the fiscal policy: a woman's touch

This chapter is a joint work with Dorian BALVIR (PhD student, Université Clermont Auvergne, LEO-UCA).

3.1 Introduction

Female representation in politics has been a key issue in recent years. It is vital to the health of the political system to offer citizens a representation which tends to be identical to the composition of the population. However, women suffer more discrimination than their male colleagues when it comes to accessing positions of responsibility. To date, over 88 countries have adopted electoral law quotas favouring the inclusion of women in the lower house at the national level (Gender Quotas Database).[1] Beyond the issue of equal representation, the rise in the number of women in politics seems likely to influence public policy.

Indeed, gender is an essential characteristic studied in the experimental economics and psychological literature. Numerous studies claim that women are more risk-averse and less attracted to competitive environments than their male counterparts (Eckel and Grossman, 2008; Beckmann and Menkhoff, 2008; Bertrand, 2011a; Filippin and Crosetto, 2016). This type of scenario, as well as the assumption that women are taking more care about the future (Read and Read, 2004), have already been studied in macro-economics literature and conclude on various effects of gender on policy-making output (Fuchs and Richert, 2018; Masciandaro et al., 2023). In this respect, Jochimsen and Thomasius (2014), who were interested in the effect of the

[1] See https://www.idea.int/data-tools/data/gender-quotas-database/database.

gender of the finance minister on the fiscal balance in Germany, specifically study the characteristics of the minister rather than the proportion of women at the centre of the budgetary process.

Moreover, focusing solely on the amount of public spending is a necessary but not sufficient condition for asserting good fiscal policy management. Indeed, in order to adhere to Keynesian theories that public spending should increase (decrease) during periods of economic recession (boom) in order to stabilise (and to some extent, ensure the sustainability of public finances) the economy, the fiscal policy must be counter-cyclical. However, to our knowledge, most of the papers which study the link between gender and fiscal policy focus on the quantity and the quality of public spending, but little is known about the effect of gender on the cyclicality the fiscal policy.

The aim of this paper is to exploit these potential micro-economics foundations to highlight the question: Could women in governments influence on the cyclicality of the fiscal policy? Using quarterly data on the share of women in national policy-making and the fiscal balance in the 27 countries of the European Union from 2003 to 2021, we use fiscal reaction functions *à la* Bohn (1998) to study the relationship between the share of women in policy-making and the cyclicality of fiscal policy.

At first sight, we did not see any relationship between the proportion of women in government and the cyclicality of fiscal policy. Nevertheless, when deepening the analysis and considering the share of women at the centre of the budgetary process, i.e., women in economic positions, we show that an increasing share of women in economic positions within government is associated with more counter-cyclicality in the fiscal policy management. This result is all the more true when we consider the proportion of women who hold an economic position and a seat in the cabinet (senior ministers) compared to those who do not hold a seat (junior ministers).

These results are robust to alternative sampling (dropping countries successively to avoid limiting the risk of being in the presence of an outlier) and estimators (system GMM and LSDVC) to rule out the possibility of Nickell bias (Nickell, 1981). We also made a particular concern on the temporal dimension. As quarterly measurements of the fiscal balance and the cycle do not allow for isolating the discretionary component of the fiscal policy.[2] We, therefore, reproduce the analysis at the annual level and still find that a higher share of women with economic responsibilities seems to reduce

[2]Measurements of the fiscal policy on a quarterly basis are not adjusted from the cycle. Such measures (CAPB) are calculated on an annual basis.

the pro-cyclical bias.

Overall, we found that once the thresholds of 13% and 18% of women holding economic positions in government have been passed, fiscal policy tends to respectively move from pro-cyclical to counter-cyclical (for quarterly data) and from pro-cyclical to acyclical (for annual data).

This paper does not aim to precisely isolate the channel through which women in economic ministries could influence the cyclicality of fiscal policy. Instead, it depicts this potential effect given the micro-hypotheses from the behavioural literature, considered as a whole.

The remainder of the paper is structured as follows: Section 3.2 provides an extensive literature review, while section 3.3 delves into the data and stylised facts. Section 3.4 is devoted to the econometric analysis and the presentation of our principal findings. In section 3.5, we test alternative specifications before concluding our study in section 3.6.

3.2 Literature review

The exploration of gender disparities has gained prominence in experimental and psychological literature. Although the origins of this disparity seem complex to determine, the role of socio-economic and political conditions and the position accorded to women in various societies would probably have strongly influenced their behaviour over time.

Among these potential diverging behaviours associated with gender, numerous studies, including those by Jianakoplos and Bernasek (1998), Bernasek and Shwiff (2001), Croson and Gneezy (2009) and Charness and Gneezy (2012) collectively suggest that women tend to display higher levels of risk aversion than men. Complementing these findings, Jung et al. (2018) contribute experimental evidence suggesting that women are more inclined to opt for secure job choices, even at the expense of lower remuneration, potentially contributing to the gender wage gap. Niederle and Vesterlund (2007) further delve into factors influencing preferences for competition, revealing that men tend to be more confident than women in competitive environments, possibly contributing to the observed gender selection gap in competitive scenarios.

The aversion to risk and competition may have broader implications for women in the professional sphere. Studies by Arfken et al. (2004), Del Prete and Stefani (2013), and Mateos de Cabo et al. (2012) indicate the existence of a so-called "glass

ceiling" effect, where women encounter greater discrimination in career progression than men. This discrimination may prompt women to adopt more conservative career strategies in navigating gender bias challenges.

In a later contribution, and in line with risk aversion, Adams and Ragunathan (2017) argue that if Lehman Brothers had been managed by women, the bank would not have gone bankrupt as women seem to be better crisis managers.

Beyond individual decision-making, gender differences also manifest in group behaviour. Horn et al. (2022) use incentive experiments in Hungarian secondary school classes to reveal that women tend to be more altruistic than men. Additionally, Woolley et al. (2010), in attempting to calculate a group's Collective Intelligence, show that it is not the sum of individual Intelligence Quotients (IQ) but rather the proportion of women in the group that matters, strongly correlated with listening skills, equal speaking time and social sensitivity.

Building on these behavioural disparities, a growing body of literature examines the role of gender in economic management.

At the local level, Chattopadhyay and Duflo (2004) find a significant gender effect on intra-household or village resource allocation in developing countries. Braga and Scervini (2017) observe that Women Mayors in Italy significantly increase both the efficacy of policies targeting women and households and the efficiency of the municipal administration. They also highlight that the effect is more substantial, with a higher share of women in the municipal office.

Shifting the focus to the national level, the influence of women in politics emerges as a pivotal factor shaping the size and composition of government spending in industrialised countries (Aidt et al., 2006; Funk and Gathmann, 2006). When focusing on specific expenses, Keneck-Massil et al. (2023), in a recent contribution, find that women empowerment reduces of the military-related spending across a large sample of countries. Delving deeper, Fuchs and Richert (2018), studying the characteristics of the development minister, reveal a nuanced impact, where gender does not affect the quantity of aid sent but significantly influences aid quality. Furthermore, the proportion of women in parliament correlates with the quantity of aid. The comprehensive exploration of gender impact seems to require an assessment of the gender composition of all pivotal individuals engaged in the decision-making process. In line with this point, Masciandaro et al. (2023), bringing risk aversion to the fore, find that a higher share of women in central bank boards is associated with higher interest rates.

While macroeconomic literature extensively explores the link between gender and public spending, the prevailing focus remains on the quantity and quality of spending. However, to our knowledge, a gap exists in understanding the impact of gender on the cyclicality of fiscal policy.

Recent literature on budget cycles has predominantly concentrated on factors such as fiscal rules (Larch et al., 2021; Gootjes and de Haan, 2022). However, traditional arguments have consistently highlighted the significance of political economy factors in influencing fiscal policies. Lane (2003) introduces the concept of the "voracity effect", illustrating how individual policymakers, plagued by deficit bias, tend to run deficits irrespective of prevailing cyclical conditions. Additionally, Alesina and Perotti (1995), Hallerberg et al. (2007), Talvi and Vegh (2005), and Beetsma et al. (2009) demonstrate that political dispersion and fragmentation make expenditure control more challenging. The presence of a deficit bias is further exacerbated by short-term thinking and political competition, as those in power may increase spending before elections to secure voter support or accumulate debt, constraining subsequent administration's flexibility and may ultimately modify the cyclicality of fiscal policy.

Despite the acknowledged impact of political decision-makers on spending cyclicality, little is known about the specific characteristics of these decision-makers that influence spending and, consequently, the cyclicality of fiscal policy.

This literature gap prompts a legitimate question about whether gender, particularly the share of women in governments, can exert an influence on the cyclicality of fiscal policies. Notably, micro-hypotheses supporting enhanced risk aversion (Croson and Gneezy, 2009), concern for the future (Read and Read, 2004), and influence over the group (Woolley et al., 2010) could be argued as potential explanations for this relation. Although the arguments mentioned above tend to show a difference in behaviour between genders, our article does not seek to explore the specific micro-founded reasons that could explain the effect of women's share on cyclicality.

3.3 Data on women's representation and stylised facts

3.3.1 How the budget is voted in EU countries

One concern in our analysis might be that the electoral system might affect fiscal policy. Persson and Tabellini (2004) explain that presidential regimes with a majoritarian system are less subject to political cycles than parliamentary regimes with a proportional system; as in the latter, politicians have to gather support to form a majority. Even if we are not explicitly dealing with electoral cycles here, the difference between systems of representation could lead to changes in the cyclicality of fiscal policy by manipulating spending on the eve of an election and could affect our results. Table A.3.1 provides an overview of the different political systems in our sample (i.e., the members of the European Union). It is worth noting the stability of the regimes over our analysis period, during which, to our knowledge, there have been no major constitutional changes. Although there is a diversity of regimes within the EU, all states are democracies bound by European budgetary rules, defined in the Treaty on the Functioning of the European Union (1958) and the Stability and Growth Pact (2005). These rules outline the procedure. First, the preparation of the draft budget: the Minister of Finance prepares the annual draft budget for the coming year. This draft is based on the country's political priorities and financial commitments within the European framework and is discussed within the government. The draft budget is then submitted to the national parliament for debate and adoption. Members of parliament can propose amendments. Finally, if the national parliament adopts the draft budget, it is signed into law by the Head of State. It is important to note that all EU member states are also subject to budgetary surveillance by the European Commission and the Council of the European Union to ensure that European budgetary rules are respected. In the event of non-compliance, measures can be taken to rectify the situation, including financial sanctions.[3]

In our context, women's ability to deliver counter-cyclical fiscal policies could be influenced by the very nature of the budgeting process. Indeed, as long as ministries of finance or ministries implied in economic decisions at large are consulted, some

[3]Furthermore, it is worth reminding that under the European treaties (Maastricht, 1992; and following), the public deficit of a European Union Member State must not exceed 3% of its GDP. Public debt is capped at 60% of GDP (both indicators being kept in recent reforms).

specific features in the behaviour of their members could be reflected in national policies.

3.3.2 On women's representation among EU national governments

Data on the share of women in government comes from the women and men in the decision-making database produced by the European Institute for Gender Equality (EIGE). One of the advantages of this database is that it is possible to obtain data on the share of women on a quarterly basis. This allows us to increase the temporal dimension and better capture changes in representatives, as election and ministerial reshuffles could occur anytime during a given year.

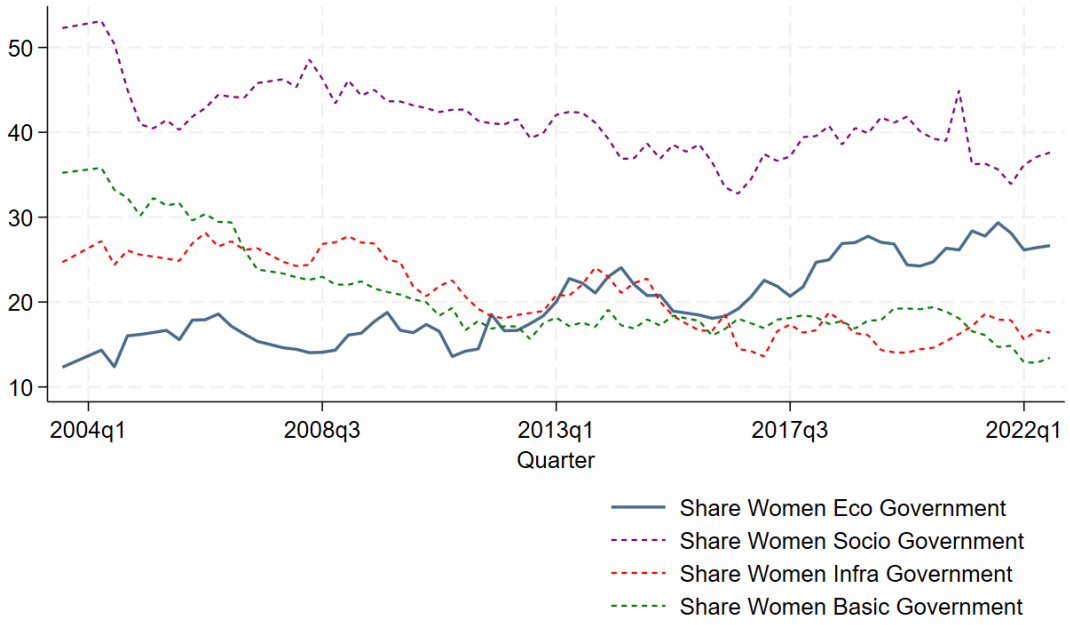
Notes: Mean of the share of women in national governments for all the 27 European countries between 2003 and 2022 . Source: Authors'elaboration

Figure 3.1: Average share of women in EU governments

Figure 3.1 shows the average share of women, by quarter, for all member countries over our sample period (2003-2022). There has been a marked increase in the proportion of women since 2003, from around 24% to 34% in 2022. Far from achieving perfect parity, this improvement in female representation results from inclusion policies at both European and national levels, such as the introduction of quotas in the electoral process for certain member countries. Almost 57% of the EU countries have adopted Electoral law quotas (Gender Quotas Database). Although

the introduction of quotas is relatively widespread among member countries, to our knowledge, no member country has quotas on government posts. Indeed, the composition of the government is a matter for the head of government and is often the result of political calculation to ensure a strong majority in the assembly (particularly true for parliamentary systems). The parity in some governments (e.g. the Borne government in France) is more the result of political and electoral will. Parity does not, however, guarantee equal gender distribution in key positions.

More than just the share of women in the government, the database also provides details on the share of women according to the position defined by the BEIS typology. Although the names of the ministries and their classification in BEIS may differ from country to country, there are four main categories: B stands for Basic and mainly concerns the regalian ministries (Defence, Foreign Affairs, Justice, Interior, etc.); E for Economic ministries (Finance, Economy, Budget, etc.); I means Infrastructure ministries (Infrastructure, Transport, etc.) and S refers to Socio-cultural ministries (Health, Education, Culture, etc.).[4]



Notes: Mean of the share of women in national governments for all the 27 European countries between 2003 and 2022 according to the functions

Figure 3.2: Average share of women in EU governments according to the functions

The average percentage of women in the different positions of the BEIS classification

[4]More details on the BEIS Typology can be found here: https://eige.europa.eu/sites/default/files/wmid_mapping_natadmin_1.pdf

per quarter in the European Union is shown in figure 3.2. The share of women is highest in socio-cultural positions, oscillating between 40% and 50%. In areas classified as basic and infrastructure, the average share across EU countries is much lower and has been falling throughout the period. Conversely, women's share in economic posts seems to increase, from around 10% in 2003 to 30% in 2022. On average, and even though this phenomenon is decreasing, women are less represented in government. However, they are also more likely to be confined to socio-cultural positions than their male counterparts, who occupy more regalian or economic positions.

Table 3.1: Descriptive statistics

	count	mean	sd	min	max
Share of women	1974	26.18085	13.50993	0	60
Share of junior women	1829	18.80437	18.50126	0	100
Share of senior women	1974	25.89443	14.57456	0	63.2
Share of women with economic functions	1974	20.07452	17.91134	0	87.5
Share of junior women with economic functions	1808	15.00985	22.5784	0	100
Share of senior women with economic functions	1974	18.24656	19.58108	0	80

Notes: These statistics relate to the proportion of women in the national government. Junior means that the minister does not have a seat in the cabinet. For the share of women in junior, senior and economic posts, the ratio is made between the number of women and the total number of members in the same category, i.e. the share of junior women is calculated as the number of women in junior posts out of the total number of juniors in government. Source: Authors'elaboration

Finally, we also use a distinction based on having a seat in the cabinet (senior ministers) and those who do not (junior ministers). Table 3.1 provides descriptive statistics for the share of women in the governments of our sample countries between 2003 and 2022. While on average, the share of women in EU governments represents 26.18% over the period, there is considerable disparity between countries. We can see that the share of women in key economic positions is lower, at around 20%. Once again, there is a marked disparity between countries. We can also see that the proportion of women with a cabinet post (senior) is lower than the overall proportion, whatever the type of ministry.

Overall, in addition to being less represented and having different ministries than men, women also have less power in the positioning within the ministerial office.

3.3.3 Is there some unobserved heterogeneity affecting women's share in governments?

To understand the disparity in women's representation in government and to study whether this could result from specific characteristics, we perform simple correlations between our main variable and a set of country-level covariates.

Table 3.2 presents this analysis, in which we control for various factors that may correlate with women's share in the government. First, we control for an index giving us the hourly wage gap between men and women in the private sector between 2007 and 2021 (Eurostat). Next, we study the female employment rate for each country between 2003 and 2022 (Eurostat). We also investigate whether or not our variables correlate with the political system. We include a time-invariant dummy that takes the value of 1 if the system is parliamentary and 0 otherwise (semi-presidential or presidential). Finally, we introduce a dummy that takes the value of 1 if the country is a former Soviet bloc country. In all regressions, we also control for the size of the government, dummies for GDP per capita deciles, the government's political orientation, and year-fixed effects.

Table 3.2: Share of Women in Government

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All women government members				Women members with economic functions			
Gender Pay Gap	0.0292				-0.152			
	(0.267)				(0.520)			
Female Employment Rate		-0.290				0.326		
		(0.235)				(0.326)		
Political System			4.139				3.446	
			(4.156)				(4.925)	
Post Communist Countries				-6.330*				4.323
				(3.794)				(8.147)
Observations	1,426	1,785	1,785	1,785	1,426	1,785	1,785	1,785
Number of id	27	27	27	27	27	27	27	27
Government Size FE	YES	YES	YES	YES	YES	YES	YES	YES
Income FE	YES	YES	YES	YES	YES	YES	YES	YES
Political Orientation	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
R^2	0.243	0.111	0.231	0.219	0.0957	0.126	0.0870	0.0950

Notes: Robust standard errors in parentheses. *** p <0.01, ** p <0.05, * p <0.1. For columns (1)-(4), the LHS variable is the share of women in government. For columns (5)-(8), the LHS variable is the share of women with economic positions.

Columns (1)-(4) show OLS estimates with the share of women in government as the dependent variable. We can see that none of our variables seem to be correlate with women's presence in government. Thus, the positioning of women in society does not seem to be related to the share of women in power in our sample. Indeed, the share of women in government may appear to be a fairly exogenous phenomenon, as they are appointed and not elected. Columns (5)-(8) estimate the percentage of women in government holding economic positions. Once again, none of our variables appear to be related. However, to control as much as possible for the specificity of the countries, we will introduce country-fixed effects to control for all characteristics that are invariant over time.

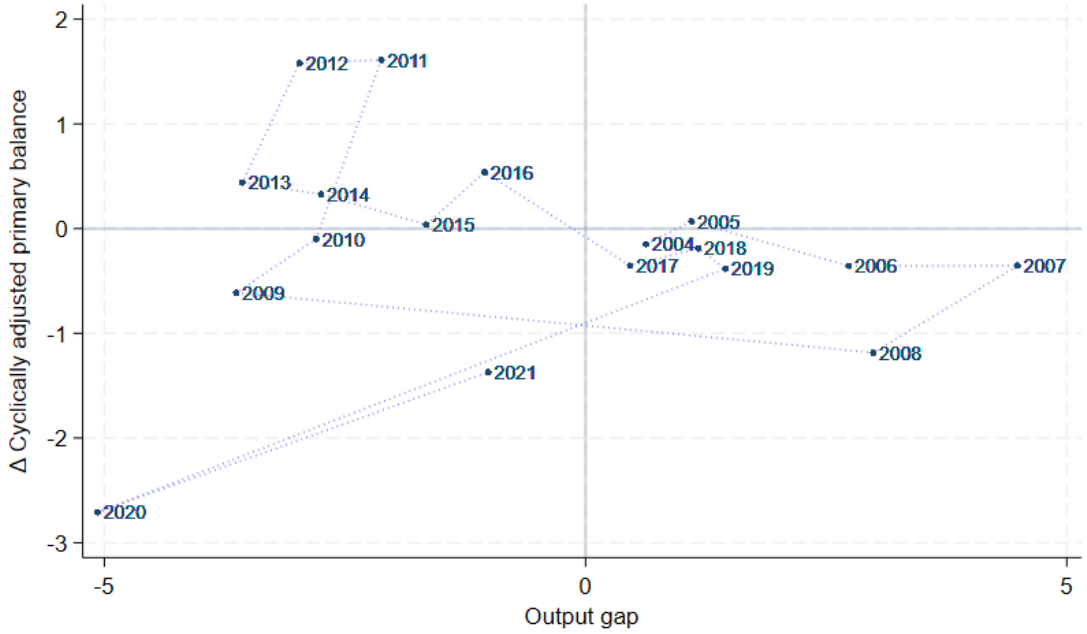
Overall, the European Union framework allows us to be reassured about the relative comparability of the countries in our sample. Even if there is heterogeneity in the electoral system, all the countries in our sample are democracies, and the budget voting process is oriented by European treaties. In addition, these different systems do not seem to impact on the share of women in government, allowing us to limit the extent to which unobservable heterogeneity can affect our results.

3.3.4 Cyclical behaviour of the fiscal policy in the EU

As stated above, based on micro-hypotheses presented on the literature in potential diverging average behaviours between women and men, this paper aims to unveil a correlation between these divergences and the cyclicality of fiscal policy. The fiscal stance's cyclicality is indeed an essential feature of the stabilisation function of macroeconomic policies. In this regard, it is often considered that reducing expenditures during booms and increasing them during recessions is the optimal behaviour. The so-called counter-cyclicality of the fiscal policy is then associated with *inter alia* enhanced levels of growth Aghion et al. (2007) and more sustainable levels of public debt Alberola et al. (2006).

Figure 3.3 aims to give a preliminary picture of the cyclicality of the fiscal policy in our sample. To do so, we follow Alesina et al. (2015) and plot the average change in our annual measure cyclically adjusted primary balance (Y-axis) against the average annual output gap in EU countries (X-axis).[5] Unsurprisingly, EU countries have known output levels considerably below their potential in 2009 (financial crisis) and 2020/2021 (COVID crisis). However, decreased balance levels were also observed

[5]We prefer to use our annual data for better clarity of the chart and to better capture the discretionary fiscal responses through the use of the CAPB.



Notes: Years of (more) counter-cyclical fiscal policy are those in the first and third quadrants, while years of (intensified) pro-cyclical policies lie in the second and fourth quadrants. Source: Authors'elaboration

Figure 3.3: Fiscal stance in the EU 2004-2021

during these years, suggesting counter-cyclicality of the fiscal policy. In our sample, the years of austerity following the financial crisis (2011-2013) combined lower levels of output with increasing measures of the fiscal stance in line with the pro-cyclicality hypothesis and thus in line with Alesina et al. (2015). Interestingly, the fiscal stance before the financial crisis appears to be somewhat decoupled from the business cycle. Indeed, the 2004-2007 period has been marked by a low variation of the adjusted balance in spite of an increasingly favourable economic environment. The cyclicality of the fiscal policy is analysed more accurately in sections 3.4 and 3.5 of the paper.

3.4 Model and main results

3.4.1 Model and data used

Our analysis is based on a traditional fiscal reaction function pioneered by Bohn (1998). In order to test for a potential dampening (or exacerbating) effect of women's representation in governments over the cycle, we augment this reaction function

with a variable capturing the share of women within governments.[6] The model used then becomes:

$$balance_{i,t} = \beta_1 balance_{i,t-1} + \beta_2 cycle_{i,t} + \beta_3 W_{i,t} + \beta_w W_{it} \cdot cycle_{i,t} + \beta_4 X_{i,t-1} + \mu_i + \rho_t + \epsilon_{i,t} \tag{3.1}$$

On the left-hand side of the equation, $balance_{i,t}$ is our measure of the fiscal stance. We alternate between two measures for the budgetary aggregate, namely the overall fiscal balance (hereafter FB) and the primary fiscal balance (hereafter PFB), which allows to exclude the interest payments. While many authors working with annual data use cyclically adjusted measures of the fiscal stance (e.g. through AMECO) to isolate discretionary decisions, such measures are not available on a quarterly basis. As mentioned above, the interest in using quarterly data is to isolate more precisely decisions (especially on the fiscal stimulus side) that could occur in a shorter span than the traditional yearly framework.[7] Nonetheless, the second part of our analysis tests the robustness of our results in an annual context that enables us to use the cyclically adjusted primary balance (CAPB) as the dependent variable.

In the quarterly framework, the choice is between seasonally adjusted measures and gross measures of both the dependent variable (FB or PFB) and the variable used to construct $cycle_{i,t}$ which captures the output gap. Our variable of interest, the share of women within governments, is not likely to vary substantially from one quarter to the next. More especially, there is no particular reason to believe that our variable of interest could be affected by some seasonal movements evolving in the same (opposite) direction as those affecting the fiscal stance. Using this non-adjusted measure for the dependent variable is then expected to introduce some noise in the analysis without *a priori* creating a bias. To ensure the veracity of this statement, we use a seasonally and calendar-adjusted (hereafter SCA) measure of the overall fiscal balance in further robustness checks.[8] The GDP variable used to build the output gap in the quarterly analysis is available for all 27 countries in its SCA version and is therefore preferred over the Non-Seasonally Ajusted (NSA) measure.

[6]The stationarity of our variables has been previously checked. Results are available upon demand.

[7]It is worth noting that some authors have proposed enhanced procedures of cyclical adjustment on quarterly data (Carnazza et al., 2020) and see their application on higher frequency data (quarterly data) as a considerable improvement for the conduct of fiscal policy.

[8]The SCA measure for the overall fiscal balance is available for a sufficient number of countries (23) compared to the same measure for the primary fiscal balance (4 countries).

More specifically, the output-gap variable ($cycle_{i,t}$) is constructed using the Hodrick-Prescott (HP) filter with the recommended value for the smoothing parameter ($\lambda = 1600$) when dealing with quarterly data.

The variable $W_{i,t}$ in equation 3.1 is the share of women represented in different executive power branches. Hereafter, when we mention specific executive power branches, such as ministers having economic functions, our variable should be read as the share of women among ministers with economic functions and not the share of ministers with economic functions being women within the government. Coefficient β_3 depicts the direct correlation between the share of women and the fiscal stance, but $W_{i,t}$ is essentially of use to our analysis for building our interest variable, i.e., the interaction term $W_{it} * cycle_{i,t}$. In this sense, the coefficient β_2 is used for evaluating the fiscal policy's cyclicality, with counter-cyclicality denoted by a positive sign (pro-cyclicality by a negative sign). The positivity of our coefficient of interest, β_w, then denotes an enhancement (dampening) of the counter-cyclicality (pro-cyclicality) of the fiscal policy, while a negative β_w suggests dampening (enhancement) of the counter-cyclicality (pro-cyclicality).

$X_{i,t-1}$ is a vector of traditional control variables used in the literature; knowingly, the debt ratio (in % of GDP) as higher debt levels make contractionary fiscal policies more likely (necessary but not sufficient condition for sustainability of fiscal finances, Bohn (1998)) and inflation rate to catch inflationary dynamics.[9] Political variables often used in the literature are selected to complement economic control variables. These variables all stem from the Comparative Political Data Sets (CPDS at the annual level). Table A.3.2 details the variables used, their definitions and the related sources.

3.4.2 Unconditional results

Table 3.3 displays the results from standard fiscal reaction functions excluding the share of women variable and the interaction term of interest in our paper. We first estimate the functions without the political factors as they decrease our time span due to data availability.[10] The results alternate between two dependent variables that are the overall fiscal balance (FB) and the primary fiscal balance (PFB). From

[9]The effect of inflation on budget balances might not be clear, as outlined by Tujula and Wolswijk (2004) as it could automatically increase tax receipts but could also trigger a rise in interest rates penalising economic activity.

[10]The variables used to capture political features all stem from the Comparative Political Data Set (CPDS), made available until 2021.

Table 3.3: Standard fiscal reaction functions without the interaction dummy

	(1)	(2)	(3)	(4)
	FB	PFB	FB	PFB
Cycle	14.91**	10.41**	13.42**	9.234*
	(5.445)	(4.996)	(5.133)	(4.853)
Inflation	-27.88	-30.57	-32.98	-36.75*
	(17.62)	(17.93)	(19.79)	(20.08)
L.Debt	0.00368	0.0245	-0.00177	0.0209
	(0.0239)	(0.0191)	(0.0258)	(0.0206)
L.FB	0.0328		0.0143	
	(0.102)		(0.104)	
L.PFB		0.0199		0.00269
		(0.101)		(0.103)
Crisis			-4.196***	-5.915***
			(1.486)	(1.796)
Change in Gov.			-0.585***	-0.572***
			(0.170)	(0.176)
Gov. support			0.0115	0.0141
			(0.0149)	(0.0150)
Cabinet composition			-0.00958	-0.0291
			(0.150)	(0.139)
Election			0.359*	0.362*
			(0.206)	(0.208)
Dependency			0.176	0.153
			(0.353)	(0.379)
EMU			0.129	0.464
			(0.526)	(0.501)
FRSI			0.472	0.410
			(0.376)	(0.371)
Observations	1,947	1,947	1,862	1,862
R^2	0.290	0.288	0.300	0.302

OLS estimations include country and time-fixed effects. Robust standard errors are displayed in parentheses. *** p <0.01, ** p <0.05, * p <0.1

our results, it cannot be confidently confirmed that fiscal policy is counter-cyclical. Indeed, even if the three first columns display a positive and significant coefficient at the 5% threshold, the results over the PFB and including political factors seem to suggest acyclicality (at the 5% threshold) of the fiscal policy. Additionally, a potential explanation could be provided regarding the counter-cyclicality of some measures. This part of the study does not rule out the effect of automatic stabilisers (which are, by definition, counter-cyclical), as cyclically adjusted fiscal stance measures are not available on a quarterly basis.

3.4.3 Baseline results (quarterly framework)

Table 3.4 introduces the results with the interaction dummies. The first panel of regressions interacts the cycle with the share of women within the government. Columns (1)-(4) show no effect of women's representation within governments on the behaviour of fiscal policy. The coefficients on the interaction term are indeed positive but not significant at the 5% threshold. While the voting process of the budget is likely to involve all the ministers, some of them may naturally exert more influence on the final value of fiscal aggregates. As such, one might argue that the budget should essentially follow the decisions made by the ministries with economic functions (in a collegial context) or at least by the ministry of finance (in a perfectly hierarchical context). One could also suggest that only the ministers with economic functions are more likely to react to conjectural events (especially for downturns) via additional spending. Therefore, we attempt to capture these priorities in the budget hierarchy by focusing on the share of women within the government having economic responsibilities, as defined by the BEIS classification. As described in section 3.3.2, BEIS stands for Basic, Economy, Infrastructure and Socio-cultural functions. These four categories classify the ministers according to their primary function. The economic function is of particular interest to us as discretionary and cyclical impulses are more likely to be under the responsibility of these ministers.[11] The hypothesis of these additional ministries pertaining to the category being less subject to cycles would create some noise in our analysis. Then, if we find a counter-cyclical effect of the share of women among economic ministries, these types of ministries (that could be decoupled from the cycles) would draw the

[11]Nonetheless, we should mention that the economic categorisation may be relatively large depending on the country; in this regard, while this category always includes the ministries of finance and/or economic affairs, it can also cover additional ministries such as agriculture or tourism depending on the country.

coefficients towards acyclicality, constituting a lower bound.

The results showing this economic consideration are displayed in the second panel [columns (5)-(8)] of table 3.4. Columns (5)-(7) show no evidence pleading for a direct influence exerted by the share of women on the fiscal stance. In contrast, column (8) suggests that a higher share of women working on economic functions is associated with lower deficits (positive coefficient significant at the 5% threshold). Our coefficient of interest is associated with the interaction variable. In this regard, the positive and significant coefficient across all specifications prevents us from rejecting the positive correlation between the share of women in ministries with economic functions and the counter-cyclicality of the fiscal policy. As stated before, this study aspires not to reveal a specific micro-hypothesis, among those presented in section **??**, that could explain precisely why the share of women in economic ministries could induce more counter-cyclicality. The objective is more to analyse whether all these micro-hypotheses combined could create a correlation between our variable of interest and the cyclicality of the fiscal policy.

Among our set of control variables, it is interesting to observe that the stock of government debt, despite having the expected positive sign, is not significantly correlated to our different measures of fiscal stance. One explanation of this phenomenon could be related to the frequency of the data used in this first section of the analysis. Indeed, the stock of debt is traditionally associated with lower deficits in the annual framework; this condition is necessary (but not sufficient) to ensure the sustainability of the fiscal policy. However, we use the quarterly frequency in our analysis to isolate impulsive fiscal responses to the cycle; we then believe that this timely fiscal policy management may dampen the relation between debt and fiscal balance, especially in the event of sudden economic downturns.

Our dummy variable for years of crises naturally displays a negative coefficient and is significant at the 1% threshold despite including quarter-fixed effects. Interestingly, both political-budget-cycle variables, changes in government and elections, are significant at the 5% level with opposite signs. In this sense, while changes in government seem to reduce fiscal balance, elections seem to be associated with a higher fiscal stance.

In this hypothetical context, where women are elected during contractionary periods because they are assumed to be better crisis managers, one could argue that our results could be artificially driven by higher representation of women during bad times. This concern is first limited by the timing of elections, which is (most of the

time) determined by constitutions (and then somewhat exogenous). Second, this first panel of results concern the government members and are therefore appointed instead of being elected.

Table 3.4: Main results (quarterly NSA data)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All women government members				Women members with economic functions			
	FB	PFB	FB	PFB	FB	PFB	FB	PFB
Cycle	6.013	0.122	3.831	-1.980	5.787	0.705	4.249	-0.628
	(10.65)	(10.16)	(10.20)	(10.02)	(7.039)	(6.400)	(6.715)	(6.326)
Women	0.0132	0.0165	0.0155	0.0208	0.0148*	0.0172*	0.0151*	0.0182**
	(0.0263)	(0.0250)	(0.0263)	(0.0253)	(0.00797)	(0.00862)	(0.00816)	(0.00840)
Cycle · Women	0.405	0.466	0.442	0.513	0.508**	0.538***	0.524***	0.559***
	(0.353)	(0.360)	(0.350)	(0.365)	(0.189)	(0.185)	(0.183)	(0.180)
Inflation	-28.01	-30.78	-33.74	-37.74*	-27.35	-30.04	-33.04	-36.88*
	(18.16)	(18.48)	(20.20)	(20.45)	(17.82)	(18.17)	(19.88)	(20.18)
L.Debt	0.00234	0.0229	-0.00338	0.0188	0.00220	0.0230	-0.00330	0.0193
	(0.0243)	(0.0192)	(0.0263)	(0.0208)	(0.0241)	(0.0191)	(0.0258)	(0.0204)
L.FB	0.0316		0.0133		0.0292		0.0107	
	(0.103)		(0.104)		(0.102)		(0.103)	
L.PFB		0.0181		0.000969		0.0151		-0.00226
		(0.101)		(0.103)		(0.101)		(0.102)
Crisis			-4.413***	-6.195***	-3.199***		-4.398***	-6.163***
			(1.495)	(1.796)	(1.021)		(1.394)	(1.690)
Change in Gov.			-0.586***	-0.572***			-0.612***	-0.605***
			(0.167)	(0.172)			(0.156)	(0.162)
Gov. support			0.0112	0.0139			0.0139	0.0168
			(0.0145)	(0.0145)			(0.0149)	(0.0151)
Cabinet composition			-0.0289	-0.0555			-0.0186	-0.0408
			(0.145)	(0.132)			(0.150)	(0.138)
Election			0.370*	0.377*			0.412**	0.426**
			(0.202)	(0.204)			(0.192)	(0.192)
Dependency			0.190	0.171			0.174	0.151
			(0.340)	(0.363)			(0.334)	(0.354)
EMU			0.141	0.476			0.190	0.533
			(0.515)	(0.497)			(0.533)	(0.508)
FRSI			0.448	0.381			0.465	0.401
			(0.373)	(0.366)			(0.375)	(0.368)
Observations	1947	1947	1862	1862	1947	1947	1862	1862
R^2	0.291	0.290	0.302	0.304	0.295	0.295	0.306	0.309

Notes: OLS estimations include country and time-fixed effects. Robust standard errors are displayed in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

3.5 Heterogeneity and robustness

3.5.1 Junior vs senior ministers

Our dataset (EIGE) allows us to desegregate further the analysis regarding the share of women in ministries with economic functions. In this additional specification, we consider separately the members who have seats in the cabinet (senior ministers) and those who do not (junior ministers). In this respect, some countries systematically offer a seat in the cabinet while others do not. Hence, this heterogeneity reduces the number of observations for the so-called junior ministers and mainly applies to those countries where some members might not have a seat. We exploit this additional breakdown for both heterogeneity and robustness purposes. Indeed, some countries automatically ensure a seat in the cabinet to their members ; more generally, a high share of the members naturally has a seat in the cabinet. Therefore, the share of women in ministries with economic functions is likely close to that of women qualified as senior members in those ministries. Nonetheless, there is no automatic correlation between the above-mentioned senior and junior members in those ministries. Figure 3.4 lines the evolution of the share of women (mean across all countries) in those two categories.

Notes: The solid (blue) line should be interpreted as the share of women among government members with economic functions having a seat in the cabinet (senior members). The dashed (purple) line should be interpreted as the share of women among government members with economic functions who do not have a seat in the cabinet (junior members). Source: Authors'elaboration

Figure 3.4: Evolution of the share of women in ministries with economic functions

From this chart, there is no apparent common movement between those two series.[12] The absence of correlation between the share of women among junior and senior members provides us with an interesting potential robustness check in addition to a simple heterogeneity analysis. If omitted variables were to be both correlated with our variable of interest and the fiscal stance, our estimations would result in a biased beta. Using two uncorrelated measures for the share of women limits the likelihood of our results being driven by potential confounders. From a theoretical perspective, we expect a positive and significant interaction term when focusing on members having a seat in the cabinet. One could argue that junior members could face a lower influence on the budget, and the resulting coefficient might be lower.

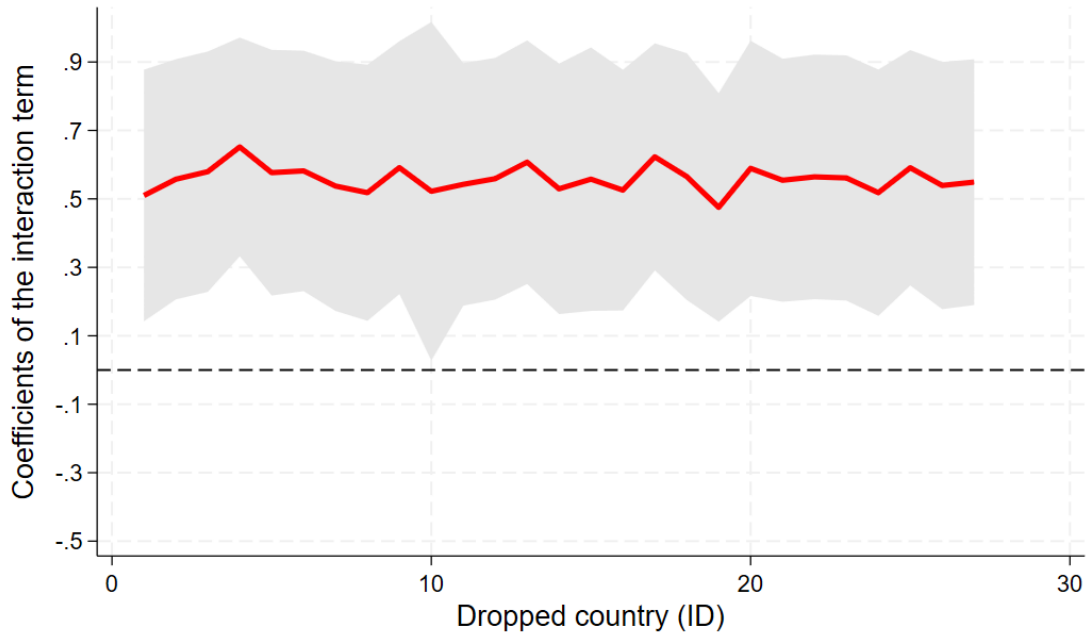
The results using the share of women among junior and senior members in economic ministries are reported in table A.3.3. As expected, the results on senior members are similar to those obtained in table 3.4, with a positive and significant coefficient for the interaction term. Interestingly, the coefficient of the interaction term in the controlled settings when focusing on the junior members [columns (7) and (8)] remains positive and significant. The value of those coefficients is nonetheless lower than those for the senior members, suggesting a lower influence over the cycle of female members who do not have a seat in the cabinet. The statistical significance of the interaction terms for both measures (being uncorrelated) provides us with an interesting setup to limit the concern of potentially shared movements that would affect both our variable of interest and the fiscal balance. It is also interesting to note that the coefficient for the level variable *Women* is significant when analysing the PFB for the senior members only.

3.5.2 Testing for outliers and alternative estimation methods

Another potential concern could be the presence of outliers driving our results. The estimated coefficients could be increased due to some countries with a high share of women for our variable of interest and where the conduct of the fiscal policy is particularly counter-cyclical. Therefore, we test the robustness of our results when dropping each country from the sample. Figure 3.5 plots the evolution of the interaction term estimated in column (8) of table 3.4 after having dropped individually each country from the sample. Each country is denoted by the ID attributed in our dataset. The estimated coefficient for the interaction term remains

[12] Simple regressions with country-fixed effects (with or without time-fixed effects) also allow us to rule out the correlation between those two series. Results are available upon demand.

significant across all our reduced samples then, confirming the robustness of our results to potential outliers.



Notes: The red line represents the value (on the Y-axis) of the interaction term (the variable of interest) after individually dropping each country from the sample (country ID on the X-axis). The grey band covers the 95% confidence interval; the dashed line is the zero Y axis. Source: Authors'elaboration

Figure 3.5: Coefficient of the interaction term for each country dropped

Up to this point, all the estimations were conducted using fixed effects regression. This choice was motivated by the availability of data in our quarterly analysis with $T > N$ ($T = 72, N = 27$), limiting the probability of facing a Nickell (1981) bias. Nonetheless, we re-estimate our results using two standard methods in the fiscal cyclicality literature, knowingly the Nickell bias-corrected least-squares dummy variable method (LSDVC, Bruno (2005)) and the GMM à la Blundell and Bond (1998). The results using these two additional methods are reported in table 3.5. The interaction term is still significant and positive across all specifications, highlighting the stability of our main results to alternative estimation methods. It is also interesting to observe that the level variable *Cycle* seems to indicate the counter-cyclicality of the fiscal policy even when there are no women in the economic ministries.

Table 3.5: Main results, robustness to alternative estimation methods

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		LSDVC				GMM		
	FB	PFB	FB	PFB	FB	PFB	FB	PFB
Cycle	33.96***	29.65***	31.90***	28.49***	31.62***	31.88***	30.12***	29.76***
	(4.557)	(4.486)	(4.632)	(4.603)	(8.696)	(8.387)	(8.812)	(8.872)
Women	0.0140**	0.00886	0.0110	0.0125	0.0128	0.0102	0.0105	0.0134
	(0.00641)	(0.00628)	(0.00856)	(0.00853)	(0.00816)	(0.0108)	(0.00741)	(0.00870)
Cycle · Women	0.707***	0.768***	0.580***	0.631***	0.695***	0.797***	0.576**	0.643***
	(0.193)	(0.190)	(0.169)	(0.168)	(0.182)	(0.179)	(0.188)	(0.189)
Inflation	-6.298	-11.52**	-2.733	-4.254	-3.465	-13.88	-0.490	-4.372
	(5.752)	(5.671)	(13.47)	(13.43)	(12.08)	(12.11)	(14.97)	(14.95)
lagdebt	0.0133**	0.0165***	-0.00431	0.0174***	-3.465	-13.88	-0.490	-4.372
	(0.00642)	(0.00631)	(0.00481)	(0.00479)	(0.0127)	(0.0120)	(0.0183)	(0.0173)
L.FB	0.161***		0.0665***		0.213		0.115	
	(0.0201)		(0.0217)		(0.119)		(0.112)	
L.PFB		0.154***		0.0651***		0.0517		-0.00949
		(0.0200)		(0.0221)		(0.108)		(0.107)
Crisis			-2.383***	-2.408***			-2.276***	-2.573***
			(0.284)	(0.283)			(0.341)	(0.391)
Change in Gov.			-0.565***	-0.561***			-0.543***	-0.601***
			(0.159)	(0.158)			(0.126)	(0.130)
Gov. support			0.0205*	0.0280**			0.0194	0.0299*
			(0.0119)	(0.0119)			(0.0121)	(0.0150)
Cabinet composition			-0.0379	-0.0582			-0.0364	-0.0641
			(0.0740)	(0.0740)			(0.107)	(0.110)
Election			0.379	0.421*			0.378*	0.435*
			(0.241)	(0.241)			(0.191)	(0.211)
Dependency			-0.0974	-0.335***			-0.0905	-0.350
			(0.101)	(0.0997)			(0.180)	(0.197)
EMU			-0.397	-0.0727			-0.369	-0.0758
			(0.609)	(0.605)			(0.461)	(0.502)
FRSI			0.452**	0.276			0.412	0.331
			(0.177)	(0.177)			(0.335)	(0.400)
ar1p					0.000487	0.000139	0.000474	0.000172
ar2p					0.0670	0.0904	0.127	0.206
Hansen					0.068	0.113	0.056	0.184
N	1947	1947	1862	1862	1947	1947	1862	1862

Notes: Robust standard errors are displayed in parentheses. In the GMM specification, the instruments were replaced with their principal components to avoid the too-many-instruments problem (see Kapetanios and Marcellino (2010)) * p<0.10, ** p<0.05, *** p<0.01

3.5.3 Testing the stability of the results in the annual framework

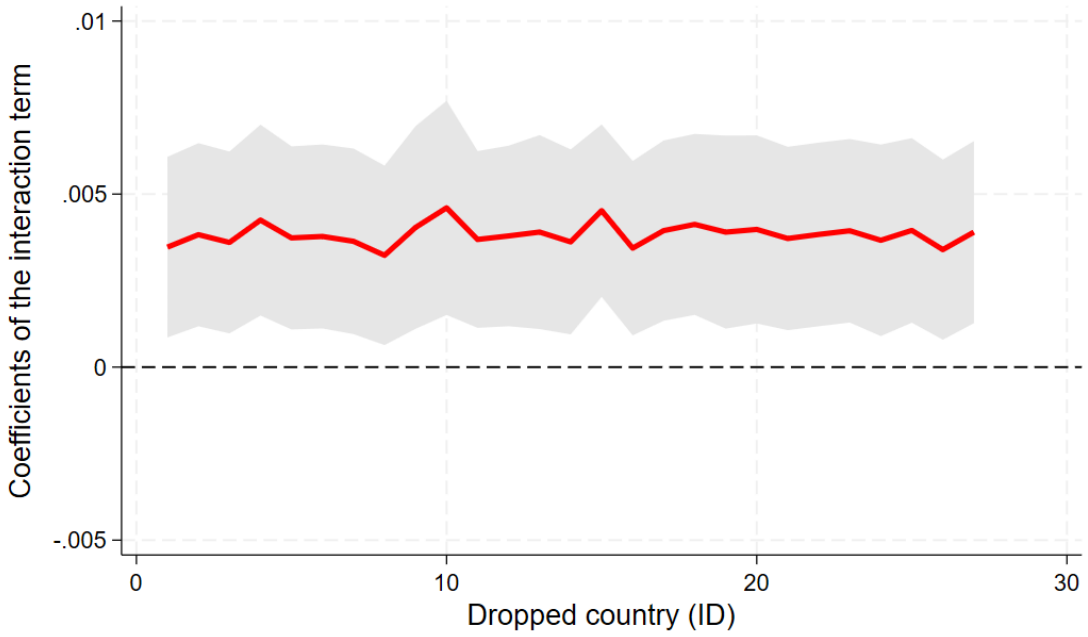
As mentioned above, cyclically adjusted measures of the fiscal stance are not available on a quarterly basis. These measures are generally highly scrutinised in the annual framework. In this respect, we decide to reiterate the analysis employing annual data. Compared to the quarterly basis that we used to isolate impulsive fiscal responses from the government more precisely, the annual framework not only allows us to use cyclically adjusted measures of the fiscal stance but also to use a measure of the output gap that is made available to a large public and easily monitorable by policymakers (rather than internally calculated using statistical filters). It is also worth noting that these measures are comprehensively forecasted, somewhat ensuring their visibility for policy decisions.

Data for the cyclically adjusted primary balance (CAPB) and the output gap, defined as the gap between the actual value and the potential value of the GDP rather than a trend, stem from AMECO (Annual Macro-Economic Database of the European Commission). Regarding our variable of interest, the share of women in ministries with economic functions, we simply compute the average of the share of women for the four quarters composing each year. The debt data is simply the value observed in Q4 of each year, debt being a stock, and the annual inflation is retrieved from Eurostat. All data from CPDS are already annually computed (the details for the variables used are made available in table A.3.2).

The results from the annual estimates are displayed in table 3.6. We solely use LSDVC and GMM methods for these annual estimates as our T (18) is inferior to N (27) and thus more exposed to the Nickell bias. The cycle is significantly and negatively correlated to the fiscal stance this time (as usual in recent annual analyses, e.g., see Gootjes and de Haan (2022)). This difference could be due to the different frequency of the data and/or more probably to the measure used for the fiscal balance. Indeed, the use of the CAPB is aimed at focusing on the discretionary decisions from the government. In this sense, compared to the overall balance and the PFB, the CAPB is not subject to automatic stabilisers, which could have made the fiscal policy counter-cyclical in the first place. Interestingly, the fiscal stance reacts positively to higher levels of debt in the annual analysis in accordance with the necessary conditions for fiscal sustainability.

Regarding the interaction term, the correlation found using quarterly data holds. The share of women in economic ministries seems to be associated with more counter-

cyclicality (less pro-cyclicality) of the fiscal policy across all specifications.[13] The robustness of this result to outliers is tested in figure 3.6. The retained specification for this test is the same as in column (4) of table 3.6.[14] The estimated coefficient is robust to successively dropping each country from the sample as it remains significant at the 5% level.



Notes: The red line represents the value (on the Y-axis) of the interaction term (the variable of interest) after individually dropping each country from the sample (country ID on the X-axis). The grey band covers the 95% confidence interval; the dashed line is the zero Y axis. Source: Authors'elaboration

Figure 3.6: Coefficient of the interaction term for each country dropped (annual)

The main objective of this paper is to highlight a potential correlation between women's representation within governments and the cyclicality of fiscal policy. Therefore, we have only discussed the statistical significance of the results up to this point. This choice is partly motivated by the construction of our output-gap variable in the quarterly setup using a statistical filter (making the interpretation lying on the choices for our measure). The measure in the annual framework being constructed using a calculated potential GDP, the interpretation of the economic significance of our results is made more accessible. We then explore, in figure 3.7(a) and 3.7(b) the marginal effect of the output gap conditional on the share of women in economic

[13]The amplitude of the coefficients has drastically diminished compared to the quarterly framework. This decrease can naturally find roots in the change of the dependent variable, which also has a consequent reduced amplitude as it erases the change in the fiscal stance due to stabilisers.

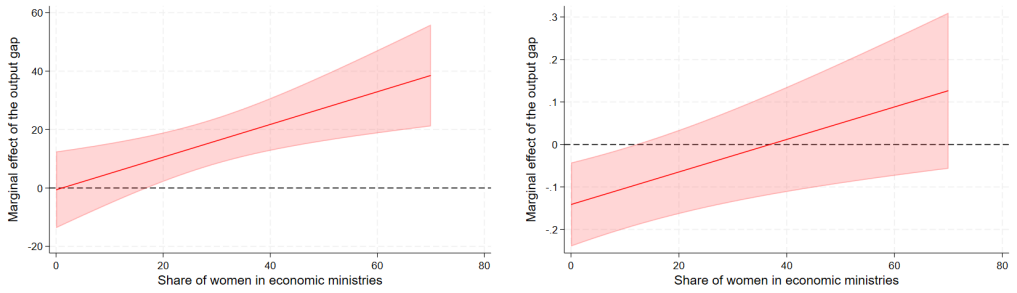
[14]The GMM specification is preferred for this test due to the high computational intensity of the LSDVC method.

Table 3.6: Annual estimates

	(1) LSDVC	(2) GMM	(3) LSDVC	(4) GMM
L.CAPB	0.644***	0.559***	0.656***	0.553***
	(0.0384)	(0.0425)	(0.0421)	(0.0491)
Cycle	-0.0949**	-0.0931*	-0.143***	-0.141***
	(0.0414)	(0.0489)	(0.0439)	(0.0503)
Women	0.00136	0.00226	0.00608	0.00778
	(0.00789)	(0.00612)	(0.00823)	(0.00625)
Cycle · Women	0.00341**	0.00350***	0.00369**	0.00383***
	(0.00168)	(0.00117)	(0.00177)	(0.00134)
L.Debt	0.0262***	0.0266***	0.0380***	0.0370***
	(0.00710)	(0.00520)	(0.00864)	(0.00667)
Crisis	-0.951***	-1.004***	-1.231***	-1.284***
	(0.202)	(0.247)	(0.243)	(0.349)
Inflation			0.149**	0.158
			(0.0647)	(0.128)
Change in Gov.			-0.224	-0.220
			(0.174)	(0.147)
Gov. support			0.0150	0.0144**
			(0.0120)	(0.00710)
Cabinet composition			0.0766	0.0677
			(0.0881)	(0.0818)
Election			0.0886	0.0853
			(0.245)	(0.185)
Dependency			-0.0998	-0.0835
			(0.118)	(0.102)
EMU			-0.0700	-0.152
			(0.496)	(0.276)
FR			-0.107	-0.0777
			(0.237)	(0.192)
ar1p		0.00959		0.0145
ar2p		0.200		0.121
Hansen		0.284		0.554
N	505	505	477	477

Robust standard errors are displayed in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

ministries. In the quarterly analysis, the fiscal policy is acyclical when the share of women in economic ministries equals 0. The fiscal policy becomes counter-cyclical when the share of women overpasses 18%. In the annual framework, it is interesting that the fiscal policy never becomes counter-cyclical despite higher shares of women in economic ministries (the conditional threshold for counter-cyclicality is above 100%). Nonetheless, a 13% or higher share seems to mark a change in the fiscal policy from pro-cyclical to acyclical. Given the changes in the amplitude of our coefficients from the quarterly to the annual framework, the relative proximity of those thresholds for changing the state of cyclicality could be seen as reassuring. Overall and most importantly, the direction of the coefficients both in the quarterly and the annual framework tends to suggest a positive correlation between the share of women in economics ministries and the stabilising behaviour of the fiscal policy.



Quarterly Annual

Notes: The red line represents the output gap's conditional coefficient (on the Y-axis) depending on the share of women in ministries with economic functions (X-axis). The light-red band covers the 95% confidence interval; the dashed line is the zero Y-axis.

Figure 3.7: Conditional effects of the output gap

3.6 Conclusion

We present new evidence on the role of women in government using a sample of the 27 EU countries over the quarters 2003-2021. The share of women in government has increased over the past decade in the EU, though parity is still a long way off in some countries, from around 24% on average to 34%. Yet, the share of women in the government seems to matter: we show a relation between the share of women with economic functions in the government and the counter-cyclicality of the fiscal policy. On the other hand, the share of women in government is not correlated with the cyclicality of fiscal policy, which tends to underline the importance of the positions closer to the budget process. Additionally, this effect is more prominent for the share of women with economic functions and sitting in the cabinet (senior ministers) than those without seats (junior ministers).

Our results are robust to the successive exclusion of countries in our sample, allowing us to verify the absence of outliers. We also check that our results are not sensitive to estimator changes: GMM & LSDVC.

Although our sample of countries is heterogeneous in terms of standard of living, the place of women in society and the system of representation (i.e. parliamentary system vs presidential system), they are all democracies, and their membership of the EU guarantees us a certain comparability in terms of the budgetary procedure enshrined in the EU treaties. However, particular attention is paid to the time dimension. Since quarterly measures of the fiscal balance and economic cycle do not provide the means to isolate the discretionary element of fiscal policy, limitations arise in this regard. We, therefore, reproduce the analysis at the annual level and find that the effect remains significant.

Finally, we determined that surpassing the thresholds of 13% (for annual framework) and 18% (for quarterly framework) representation of women in governmental economic functions results in a shift in fiscal policy dynamics. Specifically, this transition is characterised by a change from pro-cyclical to counter-cyclical patterns in the case of quarterly data and a shift from pro-cyclical to acyclical patterns for annual data.

More generally, our paper sheds new light on the role of women in public policy. Although many authors in the experimental economics or psychological literature study how women may adopt different preferences and behaviours from men regarding risk, altruism or self-confidence, we have not sought here to demonstrate what micro-

founded mechanism might mediate this effect. Our results suggest that policies aimed (i.e. quota policies) to achieve parity could lead to better management of public spending.

3.7 Appendix to chapter 3

Table A.3.1: Political system in European Union

Country	Political system	System of parliament	Election procedure for the lower house
Austria	Parliamentary republic	Bicameral	Proportional ballot
Belgium	Parliamentary monarchy	Bicameral	Proportional ballot
Bulgaria	Parliamentary republic	Unicameral	Proportional ballot
Croatia	Parliamentary republic	Unicameral	Proportional ballot
Cyprus	Presidential republic	Unicameral	Proportional ballot
Czechia	Parliamentary republic	Bicameral	Proportional ballot
Denmark	Parliamentary monarchy	Unicameral	Proportional ballot
Estonia	Parliamentary republic	Unicameral	Proportional ballot
Finland	Parliamentary republic	Unicameral	Proportional ballot
France	Semi-presidential republic	Bicameral	Single-member plurality system
Germany	Parliamentary republic	Bicameral	Mixed system
Greece	Parliamentary republic	Unicameral	Proportional ballot
Hungary	Parliamentary republic	Unicameral	Mixed system
Ireland	Parliamentary republic	Bicameral	Proportional ballot
Italy	Parliamentary republic	Bicameral	Mixed system
Latvia	Parliamentary republic	Unicameral	Proportional ballot
Lithuania	semi-presidential republic	Unicameral	Mixed system
Luxembourg	Parliamentary monarchy	Unicameral	Proportional ballot
Malta	Parliamentary republic	Unicameral	Proportional ballot
Netherlands	Parliamentary monarchy	Bicameral	Proportional ballot
Poland	semi-presidential republic	Bicameral	Single-member plurality system
Portugal	semi-presidential republic	Unicameral	Proportional ballot
Romania	semi-presidential republic	Bicameral	Proportional ballot
Slovakia	Parliamentary republic	Unicameral	Proportional ballot
Slovenia	Parliamentary republic	Bicameral	Proportional ballot
Spain	Parliamentary monarchy	Bicameral	Proportional ballot
Sweden	Parliamentary monarchy	Unicameral	Proportional ballot

Source: Authors' elaboration.

Table A.3.2: Sources and definitions of the variables

Variable	Definition	Source
FB (Fiscal Balance)	Quarterly Net lending/Net borrowing of the general government (S13) in % of GDP	Eurostat
PFB (Primary Fiscal Balance)	Quarterly Primary Net lending/Net borrowing of the general government (S13) in % of GDP	ECB
CAPB	Annual cyclically-adjusted primary balance.	AMECO
Women	Share of women within the executive power. Classification of functions according to the BEIS. Quarterly data	European Institute for Gender Equality (EIGE)
Cycle	Deviation from trend using the HP filter on quarterly GDP data. Quarterly GDP in chained linked volumes (2010), Million Euros, Seasonally and Calendar Adjusted (SCA)	Eurostat
Debt	Quarterly debt levels for the general government in % of GDP	Eurostat
Inflation	Quarterly inflation rates. Recalculations from authors based on monthly Consumer Price Index (CPI, base year 2015)	Eurostat
Change in Gov.	Number of changes in government per year.	Armingeon et al. (2022), CPDS
Gov. support	Total government support: seat share of all parties in government. Weighted by the number of days in office in a given year.	Armingeon et al. (2022), CPDS
Cabinet composition	Cabinet composition (Schmidt-Index). Indicator from 1 [hegemony of right-wing (and centre) parties] to 5 [hegemony of social-democratic and other left parties].	Armingeon et al. (2022), CPDS
Election	Dummy variable for the years of election.	Armingeon et al. (2022), CPDS
Dependency	Population over 65, as a percentage of population.	Armingeon et al. (2022), CPDS
EMU	Dummy variable with value 1 for member states of the Economic and Monetary Union (EMU).	Armingeon et al. (2022), CPDS
FR	Fiscal Rules Strength Index (FRSI)	Fiscal Rules Database, Directorate-General for Economic and Financial Affairs

Table A.3.3: Heterogeneity depending on seats in the cabinet

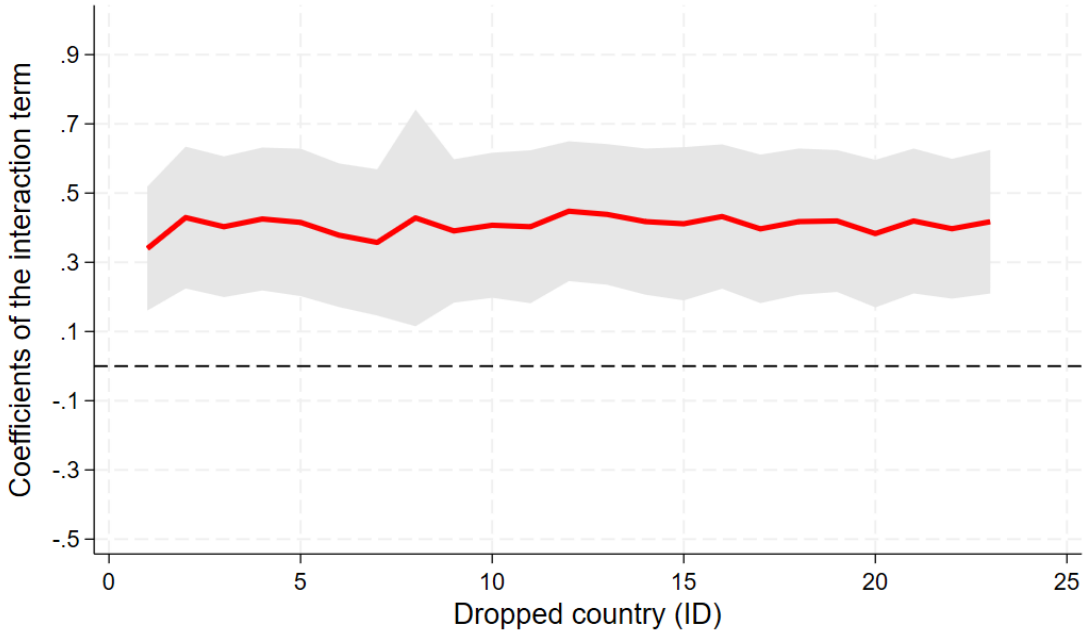
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Senior members				Junior members		
	FB	PFB	FB	PFB	FB	PFB	FB	PFB
Cycle	8.368	3.163	7.107	2.128	11.25	6.504	8.527	4.120
	(6.662)	(5.955)	(6.292)	(5.823)	(7.046)	(6.589)	(6.633)	(6.403)
Women	0.0142*	0.0173**	0.0130*	0.0169**	0.00258	0.00322	0.00362	0.00470
	(0.00731)	(0.00745)	(0.00756)	(0.00736)	(0.00712)	(0.00722)	(0.00627)	(0.00633)
Cycle · Women	0.436**	0.483**	0.426**	0.477**	0.305*	0.281*	0.366***	0.346**
	(0.184)	(0.178)	(0.177)	(0.172)	(0.150)	(0.160)	(0.126)	(0.133)
Inflation	-26.09	-28.61	-31.59	-35.22*	-24.84	-27.21	-29.88	-33.28
	(17.91)	(18.25)	(20.31)	(20.65)	(18.03)	(18.28)	(20.84)	(21.08)
L.FB	0.0275		0.00996		0.0264		0.00482	
	(0.102)		(0.103)		(0.111)		(0.113)	
L.Debt	0.00372	0.0248	-0.00140	0.0216	0.0114	0.0320	0.00687	0.0295
	(0.0238)	(0.0185)	(0.0254)	(0.0199)	(0.0256)	(0.0216)	(0.0285)	(0.0243)
L.PFB		0.0125		-0.00396		0.0172		-0.00337
		(0.101)		(0.102)		(0.108)		(0.111)
Crisis			-4.228***	-5.958***			-4.166**	-6.306***
			(1.436)	(1.716)			(1.696)	(1.919)
Change in Gov.			-0.596***	-0.588***			-0.600***	-0.573***
			(0.159)	(0.164)			(0.173)	(0.178)
Gov. support			0.0137	0.0169			0.0146	0.0167
			(0.0146)	(0.0146)			(0.0169)	(0.0169)
Cabinet composition			-0.0153	-0.0373			-0.0531	-0.0709
			(0.149)	(0.137)			(0.138)	(0.130)
Election			0.381*	0.393*			0.456**	0.437**
			(0.203)	(0.204)			(0.196)	(0.197)
Dependency			0.149	0.117			0.300	0.293
			(0.339)	(0.359)			(0.344)	(0.353)
EMU			0.197	0.554			0.638	0.949
			(0.556)	(0.535)			(0.608)	(0.605)
FRSI			0.450	0.380			0.390	0.330
			(0.371)	(0.363)			(0.374)	(0.377)
Observations	1947	1947	1862	1862	1793	1793	1708	1708
R^2	0.295	0.296	0.305	0.309	0.296	0.293	0.308	0.309

Notes: OLS estimations including country and time fixed effects. Robust standard errors are displayed in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table A.3.4: Main results (quarterly SCA data)

	(1) FB	(2) FB	(3) FB	(4) FB
Cycle	6.684	5.203	-0.569	-2.022
	(3.996)	(3.999)	(4.531)	(4.618)
Women			0.00719	0.00748
			(0.00446)	(0.00491)
Cycle · Women			0.403***	0.407***
			(0.102)	(0.105)
Inflation	-0.0832	1.930	0.561	2.143
	(5.266)	(7.158)	(5.301)	(7.277)
L.Debt	-0.00384	-0.00850	-0.00500	-0.00966
	(0.00918)	(0.00954)	(0.00922)	(0.00956)
L.FB	0.477***	0.445***	0.472***	0.440***
	(0.0666)	(0.0747)	(0.0667)	(0.0747)
Crisis		-1.111	-0.578	-1.205
		(0.908)	(0.499)	(0.862)
Change in Gov.		-0.329		-0.338
		(0.222)		(0.214)
Gov. support		0.0102		0.0123
		(0.00993)		(0.00996)
Cabinet composition		-0.0165		-0.0179
		(0.0798)		(0.0816)
Election		0.344		0.361
		(0.258)		(0.250)
Dependency		0.0360		0.0291
		(0.193)		(0.182)
EMU		0.0438		0.0802
		(0.335)		(0.335)
FRSI		0.429*		0.432*
		(0.245)		(0.244)
Observations	1667	1594	1667	1594
R-squared	0.524	0.527	0.528	0.532

Notes: OLS estimations include country and time fixed effects. Robust standard errors are displayed in parentheses. Due to availability of SCA data, the sample is reduced to 23 countries. * p <0.10, ** p <0.05, *** p <0.01



Notes: The red line represents the value (on the Y axis) of the interaction term (the variable of interest) after individually dropping each country from the sample (country ID on the X axis).The grey band covers the 95% confidence interval and the dashed line is the zero Y axis

Figure A.3.1: Coefficient of the interaction term for each country dropped (SCA)

Chapter 4

Want to protect the environment? Advocate for women! Analysis of the impact of women on environmental spending

This chapter is a joint work with Sonia SCHWARTZ (Professor, Université Clermont Auvergne, LEO-UCA).

4.1 Introduction

Contemporary environmental problems are numerous, from pollution to the loss of biodiversity. These include, but are not limited to, climate change, deforestation, water pollution and waste management. Macroeconomic environmental public policies aim to mitigate these environmental degradations. In particular, this translates into public spending targeted at these issues. The determinants of public spending are well-studied in the economic literature today. If we refer to Lechevalier and Vigny (2022), economic growth, the configuration of political systems, the democratization of societies, social demands, and the consequences of the increasing internalization of economies are the factors most often put forward. Of course, institutional complementarities can be added to these general factors when studying countries involved in economic integration, as well as the implications of the treaties establishing these trade or monetary unions.

Recent studies have examined whether the gender of policymakers affects public spending. They rely on empirical evidence from psychology or experimental economics suggesting that women are more risk-averse than their male counterparts (Jianakoplos and Bernasek, 1998; Bernasek and Shwiff, 2001; Eckel and Gross-

man, 2008; Croson and Gneezy, 2009; Charness and Gneezy, 2012; Beckmann and Menkhoff, 2008; Bertrand, 2011a; Filippin and Crosetto, 2016). Most of these studies also reveal that women are less attracted to a competitive environment than men (see Niederle and Vesterlund (2007)). According to Rubalcava et al. (2009), women have a greater preference for the future than their male counterparts. Furthermore, Horn et al. (2022) show that women tend to be more altruistic than men.

Given special characteristics assumed for women, the question of gender's impact on decisions in the public sector should be considered. First, women have different electoral preferences than men, and this affects the composition of public spending. For example, Funk and Gathmann (2006) show that women are more likely to support spending on public goods such as the environment and public transport, while opposing defense spending and agricultural subsidies. Consequently, women's suffrage has a significant impact on the composition of public spending (Aidt et al., 2006). But what happens when women are in power?

At the local level, several studies show that the presence of women on elected councils influences the nature of public spending. For example, Chattopadhyay and Duflo (2004) and Svaleryd (2009) found that the presence of women on local councils led to increased spending on women's specific needs. Extending the analysis to the national level, women's influence on budget decisions remains evident and manifests itself at multiple levels. With regard to monetary policy, Masciandaro et al. (2023) show that central bank boards with a higher proportion of women tend to set higher interest rates for the same level of inflation. Balvir and Vignoboul (2024) points out that a higher proportion of women improves public budget management by increasing the countercyclicality of spending. Fuchs and Richert (2018) examine whether the characteristics of development ministers in Germany are associated with aid budgets and the quality of that aid. The results suggest that female ministers provide higher quality official development assistance (ODA). Hessami and da Fonseca (2020) show that the increase in the number of women in power in developed countries does not affect total spending, but it does change policy choices. They tend to cut military spending (Keneck-Massil et al., 2023) in favor of health care (Clayton and Zetterberg, 2018).

Overall, these studies show, on the one hand, that gender plays a role in public spending decisions. On the other hand, some research suggests that women's suffrage may differ from men's in the composition of public spending. This article examines whether the presence of women in government has a specific impact on environmental

spending.

The literature has questioned the link between gender and environmental concerns. Glass et al. (2016) investigate the impact women leaders have on the corporate environmental strategies of organizations. They show that firms characterized by gender-diverse leadership teams are more effective than other firms at pursuing environmentally friendly strategies. However, this article deals with decisions made by the private and not public sectors (see also Jiang and Akbar (2018)). According to DiRienzo and Das (2019), a more significant percentage of women in positions of political power improve environmental outcomes. However, this effect is generated by a reduction in corruption, and the study does not use time-series data, which limits the scope of results. Lv et al. (2020) show that female parliamentarians impact a country's environmental performance, provided a certain income threshold is reached. To account for this threshold, our article will focus on developed countries. It examines the direct relationship between women's presence in government and public environmental spending, taking into account the need for a time dimension.

To address this question, we consider 27 European Union member countries over 2003-2022. Using the Ordinary Least Square fixed effects estimator, we highlight a relationship between the proportion of women in government and increased environmental spending. More precisely, environmental spending increases by 0.9% following a one-percentage-point increase in the share of women. Our main result is robust to the addition of control variables, changes in the measure of environmental spending, the use of alternative estimators, and a marginal change in our sample to ensure that some countries do not drive our effect. Heterogeneity analysis shows that women in senior positions have the largest impact on environmental spending. Moreover, our main result holds regardless of the timing of women's participation in the decision-making process and does not depend on political party orientation. When environmental expenditures are subcategorized, it appears that the presence of women increases expenditures on environmental R&D and water conservation, but reduces expenditures on waste management. This article contributes to the understanding of gender impacts. Finally, if you want to preserve the environment, promote greater inclusion of women in leadership positions.

This article is structured as follows. Section 4.2 exposes the data used, and Section 4.3 presents the econometric analysis and results obtained. Section 4.4 performs a robustness analysis and section 4.5 carries out a heterogeneity study. Section 4.6 gives a conclusion.

4.2 Data

To examine the relationship between women's participation in government and environmental spending, we focus on the 27 member countries of the European Union over the period 2003-2022. Data on women's participation in government are provided by the European Institute for Gender Equality (EIGE) database. Disaggregated data on public environmental expenditures are taken from Eurostat's Classification Of Functions Of Government (COFOG). The focus on European Union countries maximizes comparability between these countries, which share cultural and economic similarities. Although the European Union sets a general framework for economic and environmental policies, each member state retains a degree of budgetary autonomy in its spending. What's more, all EU member states are democracies, although they have different electoral systems. These two factors help to reduce the heterogeneity of our analysis.

4.2.1 Data on women's share

The data for our variable of interest, the proportion of women in government, come from the European Institute for Gender Equality (EIGE) database. This database provides detailed, disaggregated information on the representation of women in the national governments of the 27 countries of the European Union on a quarterly basis for the period from 2003 to 2022. However, we cannot take full advantage of this time dimension because data on environmental expenditures are only available on an annual basis. Therefore, we have calculated annual averages of the female share by country over the four quarters of each year.

A notable advantage of the EIGE database for our study is its level of disaggregation. It distinguishes between ministers according to whether or not they hold a seat in the cabinet, with senior ministers holding a seat and junior ministers not holding a seat. The share of female senior (junior) ministers is calculated as the ratio of women with (without) a cabinet post to the total number of ministers with (without) a seat. This distinction helps us to assess relative levels of influence within the government. Similarly, it also classifies the share of ministers according to the BEIS typology: Basic, Economy, Infrastructure, Socio-cultural. For example, the share of women in economic positions is the ratio of the number of female ministers with economic functions to the total number of ministers with economic functions. This facilitates the analysis of the differentiated impact of women according to their specific responsibilities.

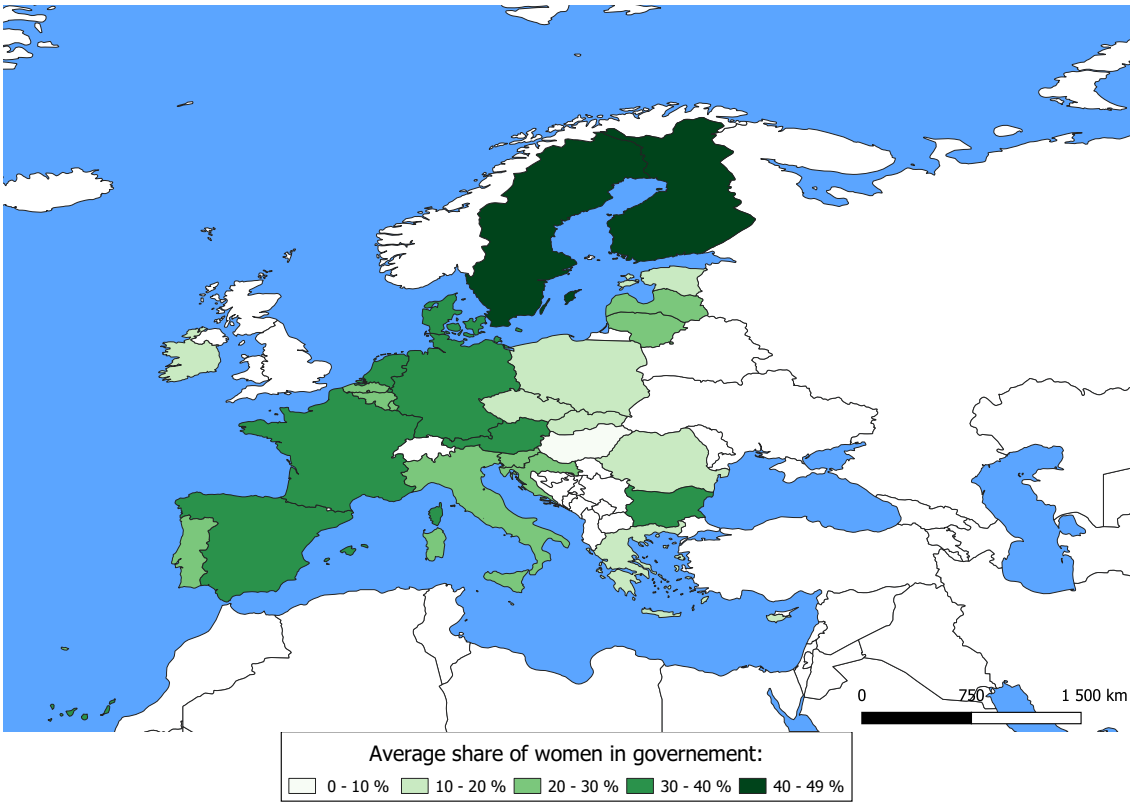
Table 4.1: Descriptive statistics

	N	Mean	SD	Min	Max
Share of Women Ministres	532	26.06	13.30	0.00	58.75
Share of Junior Women Ministres	496	18.89	17.94	0.00	83.35
Share of Senior Women Ministres	532	25.73	14.28	0.00	60.90
Share of Environmental Spending (% total)	540	0.99	0.74	-1.49	4.26
Share of Environmental Spending (% GDP)	540	0.32	0.29	-0.51	1.80

Notes: These statistics relate to the proportion of women in the national government. Junior means that the minister does not have a seat in the cabinet. For the share of women in junior or senior the ratio is made between the number of women and the total number of members in the same category, i.e. the share of junior women is calculated as the number of women in junior posts out of the total number of juniors in government. Negative environmental expenditures may result from budget adjustments, reimbursements of unused funds, intergovernmental transfers, or the sale of environmental assets. Source: Author's elaboration.

Table 4.1 presents descriptive statistics for the period 2003-2022. The average proportion of women ministers in European Union governments is 26%, with considerable heterogeneity within the sample (ranging from 0% to 58%). A more detailed analysis shows that the average proportion of women in non-cabinet positions (junior ministers) is lower than that of women in cabinet positions (senior ministers). Despite progress in improving women's representation, parity seems to be far from being achieved, even though women are on average more represented in the most important government positions. There are large disparities between countries, reflecting different national contexts in terms of women's participation in power.

Figure 4.1 illustrates this geographical heterogeneity by showing the average share of women in government in EU countries from 2003 to 2022. Some countries, notably the Nordic ones, have a relatively high proportion of women ministers, over 40%, while others, specifically in Eastern and Southern Europe, are well below this average. These differences highlight the influence of contextual and cultural factors on women's access to governmental responsibilities.



Notes: Average percentage of female ministers in each EU country, 2003-2022. Source: Authors' elaboration from EIGE database.

Figure 4.1: Share of women in EU governments

Figure 4.2 shows the evolution of women's representation in European governments over the period studied. There is a general upward trend, with an increase in female representation among ministers, especially those with a cabinet seat. However, the increase is less marked for women without a cabinet seat. This suggests that despite progress in integrating more women into high decision-making positions, significant obstacles remain in achieving equitable representation across all government functions.

In short, the descriptive statistics show that despite an overall improvement in women's representation, there are still marked differences between countries and between levels of responsibility within governments.

4.2.2 Environmental expenditures

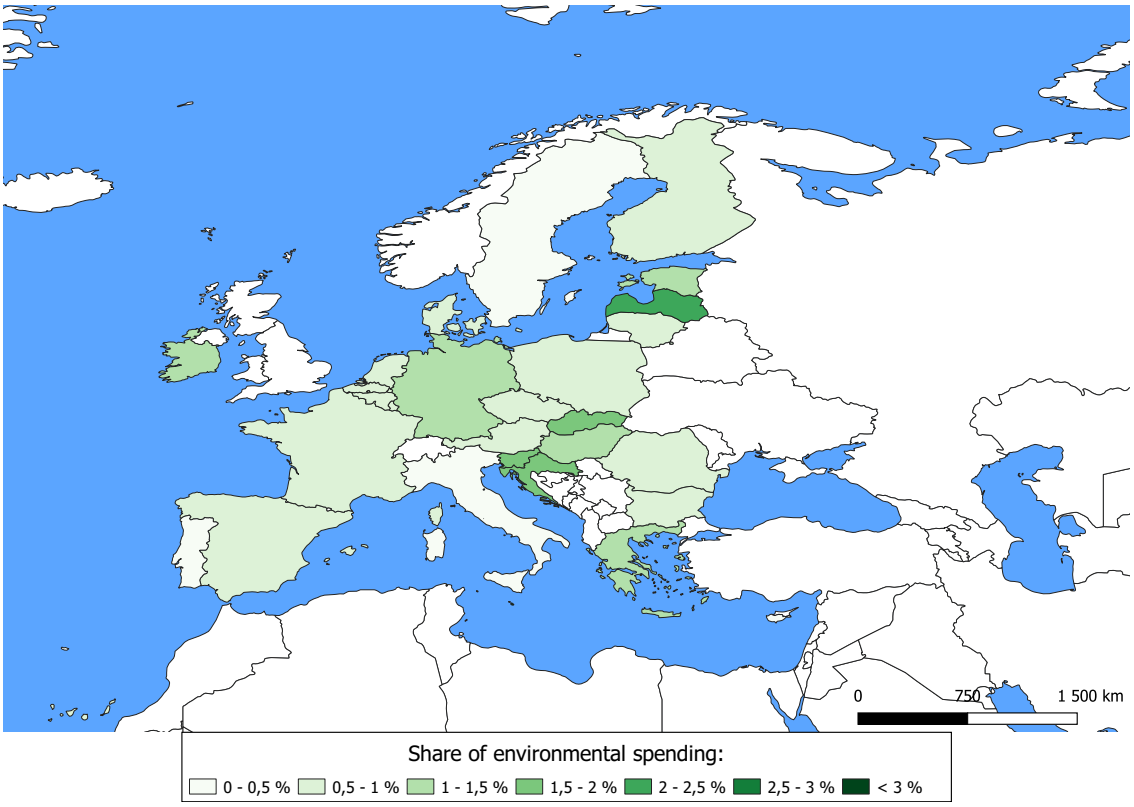
The data for the dependent variable, environmental expenditure, come from Eurostat's COFOG (Classification Of the Functions Of Government) database. This consolidated database, designed to maximize comparability between countries, provides a detailed overview of public expenditure in the Member States of the European

Notes: Average share of women in EU countries over the period 2003-2022. Source: Author's elaboration from EIGE database

Figure 4.2: Trend in the proportion of women ministers in EU countries

Union, classified by function. One of the main advantages of this database is the breakdown of expenditure into specific sub-categories, which allows a more detailed analysis of government priorities. Environmental expenditure is thus broken down into six sub-categories: waste management, water waste management, pollution abatement, protection of biodiversity and landscape, R&D related to environmental protection and other environmental activities.

Table 4.1 shows that environmental expenditure represents on average 0.99% of total government expenditure and 0.32% of GDP for the period 2003-2022. However, there is considerable heterogeneity within our sample, reflecting the variability of environmental priorities across EU countries and over time.

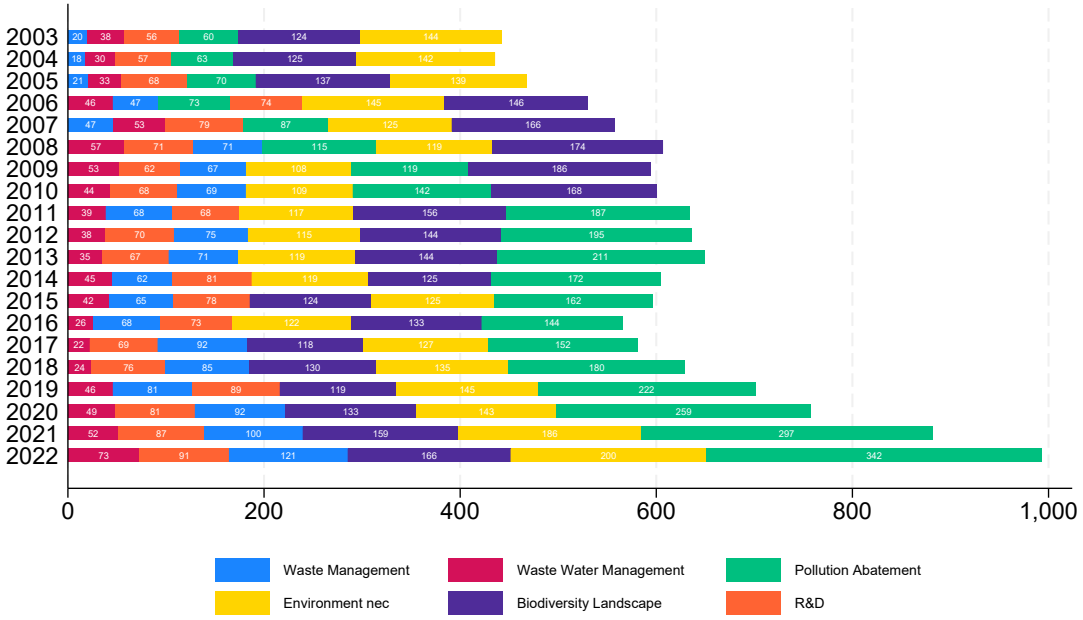


Notes: Average share of environmental expenditure in EU countries over the period 2003-2022. Source: Author's elaboration from COFOG database

Figure 4.3: Average share of environmental expenditure in EU countries

Indeed, Figure 4.3 provides a comparison of countries according to the share of their total expenditure devoted to the environment. Surprisingly, several Eastern European countries devote on average more than 1.5% of their public expenditure to the environment, often exceeding the levels observed in other EU regions. This map also shows that there is no strict correlation between the share of women in government and environmental spending, reducing concerns about unobservable heterogeneity, possibly related to cultural or social factors that might influence these two variables.

Figure 4.4 highlights a general increase in environmental spending (in millions of euros) since 2003, with growth more than doubling over this period, despite a slight decline between 2014 and 2017. This growth reflects an increased awareness and commitment to environmental issues by EU governments, although spending levels fluctuate according to economic and political contexts. In terms of the ranking of spending items, the two main categories over the period analysed are air pollution control and biodiversity conservation, which account for the majority of environmental spending. Environmental research and development (R&D) systematically



Notes: Years are shown on the y-axis. The x-axis shows the total amount of environmental expenditure in euros for the EU countries. We have plotted the six sub-categories of environmental expenditure in ascending order for each year. To make the graph easier to read, amounts displayed correctly within colored segments. The sum of the six gives the total environmental expenditure

Figure 4.4: Total environmental expenditure for EU countries by year and subcategory

ranks third or fourth, reflecting a constant but relatively low priority commitment to the development of new green technologies.

4.3 Model and main results

This section presents the econometric model used to analyze the impact of the proportion of women in government on environmental spending. The model specification is presented first, followed by the main results.

4.3.1 Model

Our paper focuses on the relationship between women's share of government and environmental spending. To estimate this relationship, we use Equation 4.1:

$$Environmental\ expenses_{i,t} = \alpha + \beta_1\ Women_{i,t} + \beta_2 X_{i,t} + \mu_i + \rho_t + \epsilon_{i,t} \tag{4.1}$$

$Environmental\ expenses_{i,t}$ is our dependent variable, measured as a percentage of

total expenditure in country i in year t. The coefficient of interest, β_1, is associated with our main variable, $Women_{i,t}$, which indicates the proportion of female ministers in the government of country i for year t. $X_{i,t}$ includes a set of control variables in our model to capture factors that are likely to influence both environmental spending and the proportion of women in government, and to reduce omission bias. Table A.4.1 gives more details on the variables and their sources.

We include the output gap to adjust our model for fluctuations in the business cycle that may affect environmental spending. From a Keynesian perspective, fiscal policy tends to be countercyclical. In times of recession, we might expect public spending, including environmental spending, to increase, while in times of economic expansion, it might decrease. However, if environmental spending is not perceived as essential to growth, the opposite effect could occur: a government facing a recession might choose to reallocate its resources by reducing environmental spending in favor of investments aimed directly at stimulating economic growth. What's more, during a recession, the increase in spending induced by automatic stabilizers such as unemployment insurance or falling tax revenues could lead to a reduction in environmental spending, which might be seen as a lower priority.[1] We also include a crisis variable that may affect environmental expenditures by causing a reallocation of resources to the detriment of the environment.

We control for real GDP per capita as an indicator of a country's wealth. This variable is crucial to control for the effect of economic wealth on environmental spending, as wealthier countries tend to allocate more resources to social priorities, including the environment (Badulescu et al., 2019).

We take into account the lagged public debt in our model as it can have ambiguous effects on environmental spending. On the one hand, high public debt can constrain governments' fiscal capacity, thereby reducing spending, including spending on the environment (Fodha and Seegmuller, 2014; Boly et al., 2023; Reinhart and Rogoff, 2010; Cottarelli, 2020). However, high public debt can also result from massive investments in low-carbon projects, clean energy initiatives, or environmental R&D activities that will primarily benefit future generations (Bénassy-Quéré et al., 2010).

We add trade openness (as a percentage of GDP), which can have opposite effects on environmental spending. On the one hand, trade openness may induce governments

[1]The examples of the "yellow vests" in France in 2019 or more recently the agricultural movements in EU countries, clearly illustrate the difficult trade-off between environmental policies and economic and social demands induced by the economic cycle.

to strengthen their environmental policies to comply with international standards, especially if trade leads to an increase in CO2 emissions through the economies of scale effect (Antweiler et al., 2001; Farhani et al., 2014). In this case, governments may need to increase their investment in environmental initiatives to mitigate the negative effects of trade. On the other hand, trade openness may also promote the adoption of cleaner technologies by facilitating technology exchange with trading partners, which could reduce the need for additional public spending on environmental issues (Dauda et al., 2021).

We then control for an index of the strength of fiscal rules, as strict fiscal rules may limit the flexibility of governments to increase environmental spending (Alesina et al., 1999; Hallerberg et al., 2007).

We also consider the structure of the population using the dependency ratio. An older population can put pressure on public finances through higher social spending and may limit environmental spending (Sawadogo, 2020).

Finally, we take into account environmental taxes, an economic instrument that reflects the government's commitment to environmental protection and can also serve as a source of financing for environmental policies.[2]

We include a set of institutional variables that may affect both the share of environmental spending and the share of women in government.

First, the political ideology of the government may influence public spending, with left-wing governments tending to favor higher spending on social and environmental policies (Berdiev et al., 2012; Neumayer, 2003). In terms of women's representation, left-wing governments are also more likely to promote parity and increase the number of women in government (Braga and Scervini, 2017; Inglehart, 2003).

Second, government fragmentation, as measured by the distribution of party seats in government, may have ambiguous effects on environmental spending. On the one hand, a strong parliamentary majority may facilitate the adoption of ambitious policies, including environmental ones. However, in a fragmented government, compromises between different political forces can make the impact on environmental spending uncertain (Blais et al., 2010). The "common pool" theory suggests that coalitions within a government may increase public debt to satisfy various interests, including environmental spending, if some parties consider these issues a priority

[2]The variables measuring GDP per capita, debt, trade openness, and environmental taxes are in first difference to make them stationary and avoid unit root problems.

(Weingast et al., 1981; Kontopoulos et al., 1999). On the other hand, the "theory of veto actors" suggests that government fragmentation can limit spending if certain members use their veto power, especially if these parties prioritize economic, industrial, or social issues over environmental ones.

Finally, election years can also affect public spending, including environmental spending, as governments often seek to satisfy interest groups or win votes during election periods (Nordhaus, 1975; Cukierman and Meltzer, 1986). Of course, election years also affect the composition of government.

We include country and year fixed effects to control for country-specific characteristics μ_i and time fixed effect ρ_t. These fixed effects neutralize the effects of factors that are constant over time within countries, as well as shocks common to all countries for each year, thus ensuring the robustness of our estimates. $\epsilon_{i,t}$ is the robust idiosyncratic error term to correct for heteroskedasticity.

4.3.2 Main results

We estimate Equation 4.1 with Ordinary Least Square (OLS) fixed effects estimator. Table 4.2 present our main results. Column (1) presents a basic structural model to assess the effect of the female share of government on environmental spending. In columns (2)- (8), we progressively add the control variables described above to test the sensitivity of our variable of interest. Finally, column (9) presents our baseline model with all the control variables.

We find that the coefficient associated with the share of women in government is positive and significant in all columns. One percentage point increase in the share of women in government is associated with an increase of 0.007 to 0.009 percentage points in the share of environmental spending in total spending. Although this effect may seem relatively small, it still corresponds to a 0.9% increase in environmental spending following a one-percentage-point increase in the share of women.[3] Looking more closely at our baseline model in column (9), we can analyze the effects of the control variables.

First, an increase in GDP per capita has a positive and significant effect on environmental spending. Environmental concerns tend to grow and are easier to finance as living standards rise.

[3]This result takes into account the coefficient in column (9) and an environnemental spending share of 0.99%, which is the sample average, see Table 4.1.

We also observe that when government fragmentation is reduced (i.e., an increase in the variable), environmental spending increases. Thus, a government with a large majority, reflecting the majority composition in parliament, is more likely to pass an ambitious and substantial environmental budget. On the other hand, a more fragmented government may be paralyzed by internal opposition, limiting its ability to finance ambitious environmental initiatives.

The coefficient associated with fiscal rules is negative and significant. The negative effect of fiscal rules can be explained by a reallocation effect, whereby a government subject to restrictive rules is prevented from increasing the deficit and debt, leading it to make unfavorable trade-offs at the expense of the environment.

Surprisingly, crises seem to increase environmental spending. This may be explained by the adoption of Keynesian policies towards environmental initiatives and green investments, such as the US Green New Deal or the European Green Deal.

Finally, a high dependency ratio is associated with reduced environmental spending. Indeed, countries with an aging population face higher health and social protection (pension) costs, leading to a trade-off with environmental spending.

Thus, we find that the proportion of women in government is positively correlated with environmental spending. This effect can be explained by gender differences in preferences. Women tend to be more future-oriented and risk-averse, which may lead them, once in office, to influence budget decisions in favor of increased environmental spending. However, it is essential to test the robustness of our model to confirm this result.

Table 4.2: Environmental Spending and Share of Women in Government: Baseline results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of Women Ministres	0.007**	0.008**	0.007**	0.007**	0.007**	0.007**	0.007**	0.007**	0.009**
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Output Gap	-0.013	-0.013	-0.013	-0.013	-0.012	-0.013	-0.013	-0.015	-0.016
	(0.014)	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
Lag Public Debt	0.007	0.007	0.006	0.007	0.007	0.007	0.007	0.007	0.007
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Lag Real GDP per capita	0.043**	0.044**	0.043**	0.043**	0.042**	0.043**	0.043**	0.043**	0.044**
	(0.020)	(0.020)	(0.020)	(0.019)	(0.019)	(0.020)	(0.019)	(0.020)	(0.019)
Trade Openness (% of GDP)	-0.003	-0.004	-0.003	-0.004	-0.003	-0.003	-0.003	-0.003	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Political Ideology		-0.028							-0.029
		(0.018)							(0.018)
Seat share of parties in Gov			0.005**						0.006**
			(0.002)						(0.002)
Year of Elections				-0.069					-0.054
				(0.043)					(0.042)
Fiscal Rules Index					-0.081*				-0.083*
					(0.042)				(0.043)
Crisis						0.085			0.201*
						(0.115)			(0.112)
Dependency Ratio							-0.017		-0.024**
							(0.011)		(0.011)
Environmental Taxes								-0.050	-0.059
								(0.073)	(0.074)
Observations	403	403	403	403	403	403	403	403	403
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.7550	0.7565	0.7572	0.7566	0.7570	0.7550	0.7559	0.7556	0.7648

Notes OLS estimations, controlling for country and time-fixed effects. The last column includes all of the additional controls simultaneously. Regressions include the constant not reported in the table. Robust standard errors are shown in parentheses. *** p <0.01, ** p <0.05, * p <0.1.

4.4 Robustness

To test the robustness of our results, we perform a series of tests. First, we add control variables to limit omission bias, next we change our variables of interest, then we use alternative estimators (LSDVC) to account for the lagged endogenous variable. Finally we test the sensitivity of our results to the successive removal of countries from our sample.

4.4.1 Adding control variables

We include in Table 4.3 control variables that are likely to affect both our dependent variable and our variable of interest. This allows us to test the robustness of our

model and limit omission bias.

In column (1), we include a variable describing the political system of the country, which takes the value of 1 for a parliamentary system and 0 for a presidential system. The associated coefficient is negative and significant, consistent with observations in the literature that presidential regimes are more inclined to provide public goods and allocate substantial environmental expenditures (De Mesquita et al., 2005; Bernauer and Koubi, 2009). This result may be explained by the greater ease with which presidential regimes can build a solid governing majority, as opposed to governments in parliamentary systems that often rely on coalitions.

In column (2), we add a variable related to political checks and balances to account for the distribution of power among decision-makers. Indeed, a rigorous system of checks and balances can be perceived as an implicit contract between the government and the electorate (Debrun and Kumar, 2009), thus promoting the defense of environmental initiatives could be more accurate. Conversely, greater fragmentation of power may complicate negotiations and coordination, making it more difficult to pass a budget that favors environmental spending. However, the coefficient associated with this variable is not significant, suggesting that the effect of these mechanisms on environmental spending in our model is uncertain or limited.

We add the unemployment rate (as a percentage of the labor force) in column (3) to take into account both the business cycle and the budgetary priorities of governments. Indeed, in periods of high unemployment, automatic stabilizers lead to an increase in social spending, which may cause a budgetary reallocation to the detriment of environmental spending. However, the coefficient on this variable is insignificant.

In columns (4) and (5) we add variables for tax revenue and fiscal balance, both expressed as a percentage of GDP and lagged by one period. These variables allow us to control for the way environmental policies are financed, as they are the main sources of government funding. We find that the coefficients associated with these variables are positive and significant, suggesting that environmental policies are better financed when the government has greater financial resources, whether from a budget surplus or from tax revenues. It is important to note that the impact of the previous year's budget surplus on environmental spending is more pronounced than that of an increase in tax revenues. The implication of this observation is that excessive deficits, which require greater recourse to borrowing, could lead to a greater reduction in environmental spending than the increase in fiscal revenues.

Finally, column (6) gives us the results for all the control variables. Overall, we can see that the coefficient of our variable of interest, the proportion of women in government, remains positive, significant and of comparable magnitude for all columns, which indicates its robustness to the addition of control variables.

Table 4.3: Environmental Spending and Share of Women in Government: Additional control variables

	(1)	(2)	(3)	(4)	(5)	(6)
Share of Women Ministres	0.009**	0.009**	0.009**	0.008**	0.009**	0.009**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Output Gap	-0.016	-0.017	-0.024	-0.017	-0.016	-0.017
	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)	(0.015)
Lag Public Debt	0.007	0.007	0.008	0.010	0.018	0.019*
	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	(0.011)
Lag Real GDP per capita	0.044**	0.044**	0.044**	0.049**	0.046**	0.050***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.018)	(0.019)
Trade Openness (% of GDP)	-0.004	-0.004	-0.003	-0.005	-0.003	-0.005
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Political Ideology	-0.029	-0.029	-0.030	-0.031	-0.030*	-0.029
	(0.018)	(0.018)	(0.018)	(0.019)	(0.018)	(0.019)
Seat share of parties in Gov	0.006**	0.006**	0.006***	0.005**	0.006***	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Year of Elections	-0.054	-0.055	-0.051	-0.060	-0.038	-0.045
	(0.042)	(0.042)	(0.043)	(0.042)	(0.043)	(0.043)
Fiscal Rules Index	-0.083*	-0.083*	-0.078*	-0.068	-0.108**	-0.097**
	(0.043)	(0.044)	(0.042)	(0.043)	(0.044)	(0.045)
Crisis	0.201*	0.205*	0.201*	0.241**	0.213*	0.249**
	(0.112)	(0.112)	(0.113)	(0.116)	(0.110)	(0.114)
Dependency Ratio	-0.024**	-0.024**	-0.025**	-0.028**	-0.015	-0.020
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.013)
Environmental Taxes	-0.059	-0.057	-0.060	-0.063	-0.056	-0.056
	(0.074)	(0.074)	(0.074)	(0.074)	(0.072)	(0.072)
Political System	-0.383**					-0.513***
	(0.157)					(0.161)
Political Checks and Balances		-0.013				-0.012
		(0.030)				(0.029)
Unemployment Rate			-0.011			-0.002
			(0.012)			(0.014)
Lag Tax Revenue (% of GDP)				0.015***		0.014**
				(0.006)		(0.006)
Lag Fiscal Balance					0.036**	0.036**
					(0.014)	(0.016)
Observations	403	402	403	395	403	394
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.7648	0.7648	0.7654	0.7689	0.7724	0.7764

Notes: OLS estimations, controlling for country and time-fixed effects. The last column includes all of the additional controls simultaneously. Regressions include the constant not reported in the table. Robust standard errors are shown in parentheses. *** p <0.01, ** p <0.05, * p <0.1.

4.4.2 Change in measurement of environmental expenditures variable

The COFOG database provides detailed information on government expenditure at different levels of government. So far, we have used the share of environmental expenditure in total central government expenditure, since the decisions and the actions taken by ministers and especially by women in government mainly concern the central government budget. However, it is also possible to use the share of environmental expenditure for general government, i.e. the sum of environmental expenditure for all administrations (central and local). Indeed, while women in government may wish to increase environmental spending at the central level, they may also influence more local levels of government by transferring funds or promoting environmental initiatives that inspire local decision-makers. Column (1) of Table 4.4 presents the results when we replace the dependent variable in our baseline model with the share of environmental spending for the general government as a whole. The results show that neither the significance nor the magnitude of the coefficient associated with our variable of interest changes.

Column (2) presents a variant of the model using the share of central government environmental spending relative to GDP. The coefficient remains positive and significant, although at first glance its effect appears to be slightly reduced. However, interpreting the coefficient for an average environmental expenditure share of 0.32% of GDP (see Table 4.1), a one percentage point increase in the share of women in government leads to a 0.9% increase in the share of environmental expenditure in GDP. This effect is similar to the one previously observed in our baseline model.

Thus, the effect of the share of women in government on environmental spending appears to be robust to changes in the measurement of environmental spending.

Table 4.4: Environmental Spending and Share of Women in Government: Change of the LHS variable

	Share for general Gov	Share in % of GDP
Share of Women Ministres	0.007**	0.003**
	(0.003)	(0.001)
Output Gap	-0.019	-0.009*
	(0.013)	(0.005)
Lag Public Debt	0.001	0.002
	(0.008)	(0.004)
Lag Real GDP per capita	0.031*	0.011
	(0.018)	(0.007)
Trade Openness (% of GDP)	-0.002	-0.001
	(0.004)	(0.001)
Political Ideology	-0.026	-0.010
	(0.018)	(0.006)
Seat share of parties in Gov	0.005**	0.002**
	(0.002)	(0.001)
Year of Elections	-0.014	-0.015
	(0.039)	(0.014)
Fiscal Rules Index	-0.048	-0.032**
	(0.041)	(0.014)
Crisis	0.112	0.049
	(0.116)	(0.034)
Dependency Ratio	-0.035***	-0.003
	(0.010)	(0.003)
Environmental Taxes	-0.004	-0.012
	(0.068)	(0.023)
Observations	403	403
Country FE	Yes	Yes
Time FE	Yes	Yes
R^2	0.7981	0.7962

Notes: OLS estimations, controlling for country and time-fixed effects. Regressions include the constant not reported in the table. Robust standard errors are shown in parentheses. *** p <0.01, ** p <0.05, * p <0.1.

4.4.3 Change of estimators: LSDVC

Our dependent variable might be affected by past environmental expenditures. To address this concern, we chose to include a one-period lagged dependent variable in our model. However, the inclusion of a lagged dependent variable in a fixed effects model can introduce a Nickell bias (Nickell, 1981), which is particularly problematic when the number of time periods (T) is less than the number of cross-sectional observations (N). To avoid this bias, we change the estimator.

Table 4.5 shows the results of our benchmark model with the inclusion of the one-period lagged share of environmental expenditures. We use several estimation techniques to assess the robustness of our results. In columns (1) to (3) we use the Least Squares Dummy Variable Correction (LSDVC) estimator, with three different

variants: Blundell-Bond (bb), Arellano-Bond (ab), and Anderson-Hsiao (ah) (Bruno, 2005). These variants are all designed to correct for the bias introduced by the inclusion of a lagged dependent variable, using different approaches to estimating dynamic effects in panel models.

The results show that the coefficient associated with women's participation in government remains positive, significant, and of a magnitude comparable to that observed in our baseline model with no lagged dependent variable. The effect of women in government on environmental spending is robust even after controlling for the influence of past spending. Including the lagged dependent variable captures the inertia of environmental spending while ensuring that the results are not biased by the correlation between the fixed effects and the lagged variable. These estimates strengthen the credibility of our findings, showing that the impact of women's participation in government is significant.

Table 4.5: Environmental Spending and Share of Women in Government: Change of estimator and lag LHS variable as control

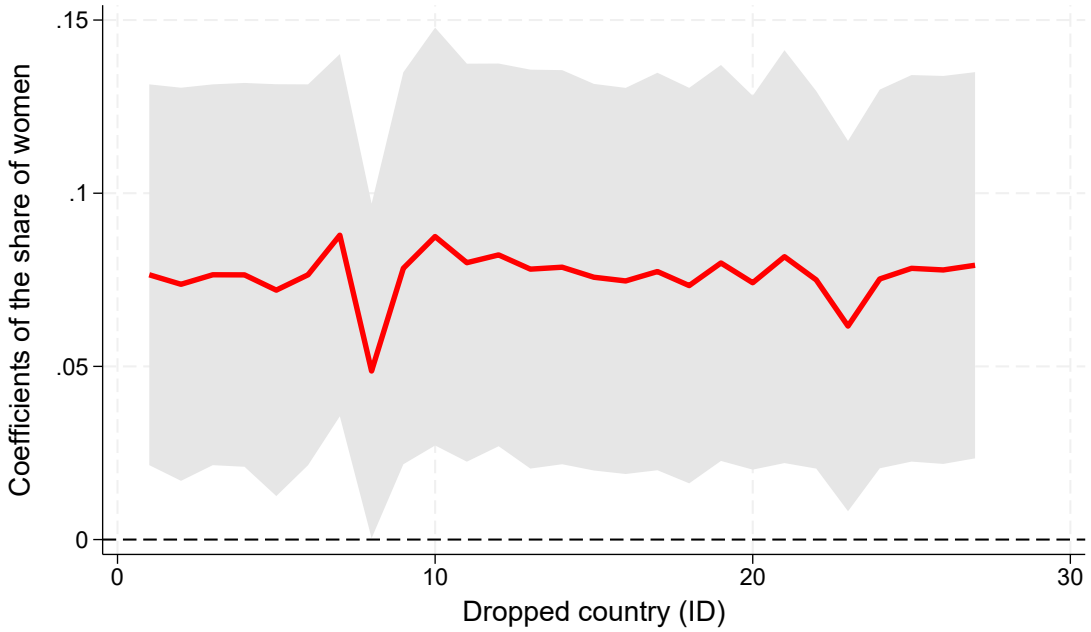
	LSDVC (bb)	LSDVC (ab)	LSDVC (ah)
Lag share of environmental expense	0.538***	0.488***	0.523***
	(0.050)	(0.053)	(0.053)
Share of Women Ministres	0.007**	0.006**	0.007**
	(0.003)	(0.003)	(0.003)
Output Gap	-0.012*	-0.012*	-0.013*
	(0.007)	(0.007)	(0.007)
Lag Public Debt	0.010**	0.010***	0.010**
	(0.004)	(0.004)	(0.004)
Lag Real GDP per capita	0.035***	0.034***	0.035***
	(0.009)	(0.008)	(0.009)
Trade Openness (% of GDP)	0.000	0.000	0.001
	(0.003)	(0.003)	(0.003)
Political Ideology	-0.017	-0.018	-0.018
	(0.020)	(0.019)	(0.020)
Seat share of parties in Gov	0.005*	0.005*	0.005*
	(0.003)	(0.002)	(0.003)
Year of Elections	-0.015	-0.015	-0.015
	(0.041)	(0.038)	(0.040)
Fiscal Rules Index	-0.019	-0.023	-0.018
	(0.031)	(0.029)	(0.031)
Crisis	-0.081	-0.074	-0.085
	(0.057)	(0.053)	(0.057)
Dependency Ratio	-0.004	-0.003	-0.004
	(0.012)	(0.011)	(0.012)
Environmental Taxes	-0.090*	-0.085*	-0.093**
	(0.048)	(0.044)	(0.047)
Observations	403	403	403

Notes: LSDVC estimations. Robust standard errors are shown in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.4.4 Check sensitivity

Given the large heterogeneity observed in the descriptive statistics, a potential problem could be the presence of outliers that may influence our results. The estimated coefficients could be amplified by certain countries with a high proportion of women, where environmental policies are particularly influenced by specific factors. To test the robustness of our results to this possibility, we successively excluded each country from the sample and re-estimated the model. Figure 4.5 shows the evolution of the estimated coefficient for the share of women in government in our baseline model after removing each country from the sample one at a time. Each country is denoted by the ID attributed in our dataset. The results show that the estimated coefficient for the variable of interest remains significant in all reduced samples, confirming the robustness of our results to the possible presence of outliers.

Overall, our results appear to be robust to the addition of control variables, changes in the measurement of our dependent variable, the use of different estimators, and the inclusion of lagged environmental expenditures to account for spending inertia, as well as to the exclusion of individual countries from our sample. It would be interesting to examine the cases in which the proportion of women in government affects environmental spending.



Notes: The red line represents the value (on the Y-axis) of the share of women (the variable of interest) after individually dropping each country from the sample (country ID on the X-axis). The grey band covers the 90% confidence interval; the dashed line is the zero Y axis

Figure 4.5: Coefficient of the share of women for each country dropped for the baseline result

4.5 Heterogeneity

We highlighted a robust relationship between the proportion of women in government and environmental spending. In this section, we first examine the influence of the gender of decision-makers according to their responsibilities within the state. We also analyze the impact of the presence of women in government throughout the budget process. In addition, we examine the role of the ruling party, which can influence both environmental spending and women's representation in government. Finally, we provide an in-depth analysis of the impact of gender on the distribution of environmental spending.

4.5.1 Gender impact by government position

As described in section 4.2, the EIGE database enables us to distinguish the proportion of women according to their status in government, whether they hold a cabinet seat (senior ministers) or not (junior ministers). In addition, the BEIS classification provides information on the specific functions held by women. The EIGE database also provides us data on the gender of the head of government, the head of state, and the proportion of women in parliament. This information is essential to determine whether the effect of gender on environmental expenditure varies according to the position held, or whether it is limited to certain specific functions. On the same principle as for our initial variable of interest, we calculated an annual average for each category, then successively replaced our variable of interest by these in our model. Table 4.6 presents the results obtained for each of these functions.[4]

The results show that only the proportion of women with a cabinet seat has a significant impact on environmental spending. This observation is consistent with the idea that women in senior ministerial positions are better able to influence environmental budget decisions, given their direct access to key decision-making processes.

More surprisingly, neither the gender of the head of government or state nor the proportion of women in parliament had a significant effect on environmental spending. In addition, we found no significant effect of the proportion of women holding positions in the ministries of economy or infrastructure, even though these ministries

[4]We selected the economic and infrastructure functions from the BEIS classification because these are the two broad categories in which environmental issues are classified (i.e., Ministry of Energy, Ministry of the Sea, Ministry of Biodiversity, etc.). The names of the ministries and their classification between these two categories vary from one EU country to another.

often have environment-related responsibilities.

These findings suggest that the effect of gender on environmental spending is mainly collective and manifests itself across the government, particularly for women in senior positions. The impact seems to come from the budget process as a whole, where a general impetus in favor of environmental policies is given by an increased presence of women in government. This indicates that women's influence on environmental policy is stronger when they participate collectively in decision-making, rather than when they occupy specific or isolated positions.

4.5.2 Gender effect along the budget process

As we have just seen, the effect of gender on environmental spending appears to be mainly due to the ability of female ministers to influence the national budget. However, it's important to note that the budgeting process takes place over a period of time, and the impact of women's presence in government can vary over the course of this process. What's more, even after the budget is passed, it is common for it to be amended throughout the year.

To explore this temporal dimension, we have chosen to replace in our model the average annual share of women in government by the share of women for each quarter of year t, as well as for the last quarter of year $t-1$, the key moment corresponding to the presentation and vote of the budget for year t. This approach also allows us to test the robustness of our variable of interest, since the share of women in government can fluctuate according to election years and ministerial reshuffles, which may occur independently of elections.

Table 4.7 shows the results of this analysis. We find that the coefficients associated with our variables of interest are all significant, positive, and of comparable magnitude, regardless of the quarter considered. These results highlight the consistency with which women in government appear to be committed to the environment through budgetary decisions, regardless of when they participate in the process.

Table 4.6: Environmental Spending and Share of Women in Government: According to their functions and if they have a seat in the cabinet

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of Women in Gov with a seat	0.006**						
	(0.003)						
Share of Women in Gov without a seat		-0.000					
		(0.002)					
Share of Women in Gov Economic function			0.002				
			(0.002)				
Gender of the head of Gov				-0.000			
				(0.001)			
Gender of the head of State					0.000		
					(0.001)		
Share of Women in Parliament						0.006	
						(0.006)	
Share of Women in Gov infra function							-0.000
							(0.002)
Output Gap	-0.017	-0.021	-0.016	-0.015	-0.018	-0.013	-0.016
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)	(0.015)
Lag Public Debt	0.006	0.005	0.007	0.006	0.006	0.006	0.006
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)
Lag Real GDP per capita	0.043**	0.043**	0.045**	0.044**	0.045**	0.042**	0.044**
	(0.019)	(0.020)	(0.019)	(0.019)	(0.020)	(0.020)	(0.019)
Trade Openness (% of GDP)	-0.003	-0.005	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Political Ideology	-0.022	-0.016	-0.017	-0.014	-0.013	-0.016	-0.013
	(0.017)	(0.016)	(0.016)	(0.016)	(0.017)	(0.016)	(0.016)
Seat share of parties in Gov	0.006**	0.005**	0.006**	0.006**	0.005**	0.005**	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Year of Elections	-0.061	-0.050	-0.055	-0.058	-0.068	-0.063	-0.058
	(0.042)	(0.044)	(0.043)	(0.043)	(0.044)	(0.043)	(0.043)
Fiscal Rules Index	-0.085**	-0.089*	-0.079*	-0.082*	-0.086*	-0.084*	-0.080*
	(0.043)	(0.047)	(0.042)	(0.043)	(0.045)	(0.043)	(0.044)
Crisis	0.216*	0.330**	0.228**	0.228**	0.248*	0.224**	0.246**
	(0.111)	(0.136)	(0.113)	(0.113)	(0.131)	(0.113)	(0.111)
Dependency Ratio	-0.025**	-0.015	-0.023**	-0.019	-0.017	-0.023**	-0.023**
	(0.011)	(0.013)	(0.011)	(0.012)	(0.013)	(0.011)	(0.011)
Environmental Taxes	-0.055	-0.042	-0.056	-0.060	-0.062	-0.053	-0.060
	(0.074)	(0.075)	(0.073)	(0.075)	(0.075)	(0.074)	(0.073)
Observations	403	384	403	401	391	403	405
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.7634	0.7624	0.7615	0.7591	0.7618	0.7611	0.7606

Notes: OLS estimations, controlling for country and time-fixed effects. Regressions include the constant not reported in the table. Robust standard errors are shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4.7: Environmental Spending and Share of Women in Government: Using quarterly measurement of the share of women

	(1)	(2)	(3)	(4)	(5)
Share of Women in Gov Q1	0.007**				
	(0.003)				
Share of Women in Gov Q2		0.007**			
		(0.003)			
Share of Women in Gov Q3			0.006*		
			(0.003)		
Share of Women in Gov Q4				0.009***	
				(0.003)	
Lag Share of Women in Gov Q4					0.006*
					(0.003)
Output Gap	-0.015	-0.016	-0.017	-0.017	-0.015
	(0.015)	(0.014)	(0.015)	(0.015)	(0.015)
Lag Public Debt	0.007	0.007	0.007	0.008	0.007
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Lag Real GDP per capita	0.043**	0.044**	0.043**	0.044**	0.044**
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Trade Openness (% of GDP)	-0.003	-0.004	-0.004	-0.003	-0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Political Ideology	-0.026	-0.026	-0.025	-0.028	-0.025
	(0.018)	(0.018)	(0.019)	(0.017)	(0.018)
Seat share of parties in Gov	0.006**	0.006***	0.005**	0.006**	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Year of Elections	-0.057	-0.058	-0.060	-0.051	-0.060
	(0.042)	(0.042)	(0.044)	(0.042)	(0.043)
Fiscal Rules Index	-0.083*	-0.083*	-0.086*	-0.081*	-0.085*
	(0.043)	(0.043)	(0.045)	(0.042)	(0.044)
Crisis	0.218*	0.203*	0.194*	0.196*	0.225**
	(0.112)	(0.112)	(0.114)	(0.112)	(0.112)
Dependency Ratio	-0.024**	-0.022**	-0.016	-0.023**	-0.023**
	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)
Environmental Taxes	-0.058	-0.057	-0.079	-0.059	-0.059
	(0.074)	(0.074)	(0.076)	(0.073)	(0.074)
Observations	403	403	376	403	402
Country FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
R^2	0.7636	0.7635	0.7588	0.7656	0.7621

Notes: OLS estimations, controlling for country and time-fixed effects. Regressions include the constant not reported in the table. Robust standard errors are shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.5.3 The effect of parties

Observed results could be the consequence of a spurious correlation between the proportion of women in government and environmental spending. Political party affiliation of the government could actually explain this relationship, as, for example, left-wing parties are traditionally more inclined to defend the environment and promote gender parity. This tendency could be reinforced by the partisan gender gap, which points out that women are more often elected in left-wing parties. This difference can be explained by both ideological factors - such as a stronger commitment to gender equality - and voters' biases against women. Saltzer and McGrath (2024) argue that in US Democratic voters are biased in favor of women, while Republicans tend to rely on traditional gender roles to evaluate candidates. Although we included a control variable for political ideology in our basic model, it remains difficult to determine whether the observed effect varies according to the party in power, especially since this variable is multinomial, making it difficult to interpret.

To explore this question further, we decided to re-estimate our baseline model in three different versions, introducing successively for the left, right, and center parties a variable from the CPDS database. This new variable measures the proportion of ministerial posts held by the party (left, right, and center), weighted by the number of days in office in a given year. It was included in two ways: first, as an interactive term with the share of women, to test the indirect effect of political affiliation via the share of women on environmental spending, and second, additively, to assess its direct effect.

The results presented in Table 4.8 show that neither the interaction variables nor the variables controlling for political affiliation are significant. On the other hand, the coefficient associated with the share of women in government remains positive and significant, indicating that the effect of women on environmental spending is independent of the political label of the government.

Table 4.8: Environmental Spending and Share of Women in Government according to their party

	(1)	(2)	(3)
Share of Women Ministres	0.009**	0.007**	0.009**
	(0.004)	(0.003)	(0.004)
Share of Women × Left party	0.000		
	(0.000)		
Left party	-0.003		
	(0.003)		
Share of Women × Right party		0.000	
		(0.000)	
Right party		-0.002	
		(0.002)	
Share of Women × Center party			-0.000
			(0.000)
Center party			0.003
			(0.003)
Seat share of parties in Gov	0.006***	0.007***	0.006**
	(0.002)	(0.002)	(0.002)
Political Ideology	0.021	-0.057**	-0.012
	(0.058)	(0.024)	(0.020)
Output Gap	-0.016	-0.014	-0.016
	(0.015)	(0.015)	(0.015)
Lag Public Debt	0.007	0.007	0.007
	(0.009)	(0.009)	(0.009)
Lag Real GDP per capita	0.044**	0.041**	0.042**
	(0.019)	(0.019)	(0.019)
Trade Openness (% of GDP)	-0.004	-0.004	-0.004
	(0.004)	(0.004)	(0.004)
Year of Elections	-0.060	-0.057	-0.057
	(0.045)	(0.042)	(0.042)
Fiscal Rules Index	-0.083*	-0.081*	-0.081*
	(0.044)	(0.044)	(0.042)
Crisis	0.198*	0.224**	0.227**
	(0.111)	(0.112)	(0.110)
Dependency Ratio	-0.025**	-0.030***	-0.032***
	(0.011)	(0.011)	(0.011)
Environmental Taxes	-0.063	-0.053	-0.056
	(0.075)	(0.076)	(0.074)
Observations	403	403	403
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
R^2	0.7653	0.7670	0.7669

Notes: OLS estimations, controlling for country and time-fixed effects. Regressions include the constant not reported in the table. Robust standard errors are shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.5.4 Women's share and environmental expenditure subcategories

We have established a relationship between the proportion of women in government and environmental spending. this section investigates whether this increase in spending is evenly distributed across the various environmental spending categories. The COFOG database allows us to explore this question by dividing environmental expenditures into six subcategories: environmental R&D, waste management, biodiversity conservation, waste water management, air pollution control, and other environmental expenditures.

Table 4.9 shows the results obtained when we successively replace our dependent variable by each of these six subcategories, expressed as a percentage of total environmental expenditure. The results indicate that more women in government increases environmental R&D and water conservation but reduces spending on waste management. These results can be explained by women's greater risk aversion and preference for future-oriented investments. Because women are thought to be more focused on sustainability and the conservation of natural resources, they are more likely to invest in low-carbon technologies and initiatives aimed at long-term environmental protection. Water management, a crucial issue in the face of global warming, could also benefit from this strategic orientation. The negative effect observed for waste management spending is more difficult to interpret. It is possible that this reflects a partial reallocation of funds in favor of the previously mentioned categories, such as R&D and water management, which are perceived as long-term priorities.

Overall, we have found that the gender effect on environmental spending manifests itself in collective action at the government level, throughout the budget process, and regardless of the political party in power. Women in government seem to prioritize water conservation and, most importantly, environmental research and development.

Table 4.9: Environmental Spending and Share of Women in Government: Sub spending according to the COFOG classification

	R&D	Waste	Biodiversity	Water	Air pollution	Others
Share of Women Ministres	0.128**	-0.207**	-0.104	0.235**	-0.345	0.252
	(0.055)	(0.095)	(0.135)	(0.108)	(0.495)	(0.307)
Output Gap	0.201	0.131	-0.216	-0.948*	2.947	-2.434
	(0.146)	(0.642)	(0.758)	(0.566)	(3.346)	(2.315)
Lag Public Debt	0.118	0.405*	0.130	0.615***	-1.949*	0.602
	(0.105)	(0.217)	(0.254)	(0.216)	(1.070)	(0.656)
Lag Real GDP per capita	0.135	-0.761	0.557	1.192**	-2.728	1.710
	(0.220)	(0.605)	(0.599)	(0.464)	(2.564)	(1.679)
Trade Openness (% of GDP)	-0.084*	0.105	0.043	0.017	-0.511	0.394
	(0.048)	(0.119)	(0.184)	(0.094)	(0.806)	(0.513)
Political Ideology	-0.677***	-0.703	-0.646	-0.812	7.054	-4.291
	(0.249)	(0.798)	(1.501)	(0.530)	(6.773)	(4.580)
Seat share of parties in Gov	0.024	0.058	0.198	0.072	-0.232	-0.095
	(0.066)	(0.087)	(0.216)	(0.160)	(0.337)	(0.425)
Year of Elections	0.541	1.056	-1.543	-0.138	9.244	-8.126
	(0.760)	(1.835)	(2.244)	(1.443)	(9.270)	(6.185)
Fiscal Rules Index	0.818	1.087	-3.008*	-3.158*	5.771	-1.734
	(0.728)	(1.394)	(1.596)	(1.819)	(5.562)	(3.494)
Crisis	-1.726	-6.462	4.159	-5.533	23.473	-13.160
	(2.388)	(5.496)	(4.151)	(4.273)	(14.880)	(9.207)
Dependency Ratio	0.656***	0.759*	0.252	-0.590	-0.645	-0.549
	(0.156)	(0.421)	(0.428)	(0.388)	(1.040)	(0.850)
Environmental Taxes	1.414**	5.244	0.219	2.823	-7.929	-1.223
	(0.693)	(3.369)	(2.129)	(5.279)	(11.265)	(5.511)
Observations	356	371	361	338	351	371
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.7796	0.5666	0.3778	0.4305	0.1731	0.2132

Notes: OLS estimations, controlling for country and time-fixed effects. Regressions include the constant not reported in the table. Robust standard errors are shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.6 Conclusion

The need to manage environmental problems raises the question of the most appropriate environmental policies. An indirect way of looking at this question is to analyze the determinants of public environmental spending. More specifically, this article investigates whether environmental expenditure depends on the gender of the public decision-maker. According to the literature, women are more risk-averse, less attracted to a competitive universe, have a higher discount rate and are more altruistic than their male counterparts. One wonders whether these features have

any impact in terms of environmental preservation. The effect of gender has been addressed in the economic literature but more in the private sphere. This article sought to analyze whether increasing the share of women in government impacted environmental spending.

Considering a sample of 27 European Union countries from 2003 to 2022 and using the Ordinary Least Square fixed effects estimator, we showed that increasing the share of women in government by one percentage point leads to a 0.9% increase in environmental spending. Robustness tests are carried out, and sensitivity analyses are performed to show the robustness of our results. This main result applies especially to women in positions of responsibility and does not depend on the type of political party. Women, in particular, are driving an increase in public spending on environmental R&D and water management but reducing spending on waste management.

Promoting gender parity policies in the public sphere has an equity objective. Our results suggest that the consequences of these policies go beyond this and positively impact the environment. Adams and Ragunathan (2017) argue that if women had managed Lehman Brothers, the bank would not have gone bankrupt as women seem to be better crisis managers. This hopeful perspective raises the question: if more women were in power, could environmental problems be better managed?

As women are more risk-averse and have a higher discount rate, they value the future by spending more on environmental R&D. The result on waste management is more difficult to analyze. This work should be taken further, with a more detailed analysis of the various environmental items. It would also be interesting to look at women's specific characteristics, such as age or level of education, and the proportion of women in specific environmental positions in government and to consider more countries. But the analysis of these questions faces a sea of data. This emphasis on the need for further research engages the audience in the ongoing conversation about gender and environmental policy.

4.7 Appendix to chapter 4

Table A.4.1: Sources and definitions of the variables

Variable	Definition	Source
Environmental expenditure	Environmental expenditure (GF05) of central government (S1311)/ general government (S13) as a percentage of total expenditure/GDP	COFOF, Eurostat
Women	Share of women within the executive power. Classification of functions according to the BEIS. Quarterly data	European Institute for Gender Equality (EIGE)
Output gap	Annual gap between the actual value and the potential value of the GDP	AMECO
Debt	Debt levels for the general government in % of GDP	Eurostat
Real GDP per capita	Gross domestic product divided by midyear population.	WDI, World Bank
Trade openness	Sum of exports and imports of goods and services measured as a share of gross domestic product.	WDI, World Bank
Political Ideologie	Cabinet composition (Schmidt-Index). Indicator from 1 [hegemony of right-wing (and centre) parties] to 5 [hegemony of social-democratic and other left parties].	Armingeon et al. (2022), CPDS
Seat share of parties in Gov	Total government support: seat share of all parties in government. Weighted by the number of days in office in a given year.	Armingeon et al. (2022), CPDS
Year of Election	Dummy variable for the years of legislative election.	Armingeon et al. (2022), CPDS
Fiscal Rules Index	Fiscal Rules Strength Index (FRSI)	Fiscal Rules Database, Directorate-General for Economic and Financial Affairs
Dependency Ratio	Age dependency ratio is the ratio of dependents people younger than 15 or older than 64 to the working-age population–those ages 15-64.	WDI, World Bank
Environmental Taxes	An environmental tax is a tax on something that has a proven, specific negative impact on the environment, as a percentage of total government revenue.	Eurostat
Political System	Dummy variable: 1 for parliamentary, 0 for presidential	DPI2020, Database of Political Institution
Political Checks and Balances	Index ranking for 0 to 18	DPI2020, Database of Political Institution
Unemployment Rate	Unemployment refers to the share of the labor force that is without work but available for and seeking employment (in % of total labor force).	WDI, World Bank
Tax Revenue	Tax revenue refers to compulsory transfers to the central government for public purposes(in % of GDP).	WDI, World Bank
Fiscal Balance	in % of GDP.	Kose et al. (2022), Fiscal Space Database

Chapter 5

Conclusion générale

5.1 Résultats principaux de la thèse

Cette thèse contribue à deux importants champs de recherche : l'étude des inégalités de revenus dans le contexte des catastrophes naturelles et l'influence du genre sur les politiques publiques. A travers trois chapitres, elle analyse économétriquement les liens complexes entre les politiques budgétaires et les inégalités de revenus et de genre.

Le premier chapitre se concentre sur l'impact des ouragans sur les inégalités de revenus, en différenciant les effets selon le niveau de développement et la structure démocratique des pays affectés. Les résultats révèlent une dynamique hétérogène : dans les pays en développement, l'aide internationale et les transferts des migrants jouent un rôle central dans la réduction des inégalités post-redistribution. Pour les pays développés, les inégalités après redistribution diminuent initialement, avant d'augmenter à moyen terme. Ce phénomène est attribuable à un effet schumpétérien où les plus riches bénéficient de la reconstruction, et notamment de la modernisation et l'amélioration du capital détruit, d'une amélioration de leurs revenus. Les politiques de redistribution dans les pays développés limitent la hausse des inégalités post-transfert en les maintenant à leur niveau initial. Ce chapitre souligne le rôle essentiel d'un État avec une bonne qualité institutionnelle et démocratique pour lutter contre les inégalités dans un contexte de changement climatique.

Le deuxième chapitre aborde la question de la représentation des femmes dans les gouvernements et leur influence sur la cyclicité des politiques budgétaires. Il montre que la présence accrue des femmes dans les ministères économiques est associée à des politiques budgétaires plus contracycliques. Autrement dit, les gouvernements avec une forte représentation féminine tendent à accroître les dépenses publiques en période de récession et à les réduire en période d'expansion, ce qui favorise une

meilleure stabilisation économique. Ces résultats soulignent l'importance d'une gouvernance plus inclusive et paritaire, non seulement pour des raisons d'équité, mais aussi pour une gestion plus efficace et durable des finances publiques.

Le troisième chapitre explore l'impact de la représentation féminine sur les dépenses publiques en faveur de l'environnement. L'analyse des pays européens révèle qu'une plus grande participation des femmes aux processus décisionnels entraîne une hausse des dépenses environnementales. Cela se traduit par des augmentations dans les budgets consacrés à la recherche et au développement dans le secteur environnemental, ainsi qu'à la gestion des ressources en eau. Ces résultats suggèrent que l'inclusion des femmes au sein des gouvernements peut favoriser la mise en place de politiques plus ambitieuses pour faire face aux enjeux environnementaux.

De manière générale, cette thèse met en lumière deux éléments essentiels pour répondre aux défis contemporains : d'une part, l'importance des politiques publiques dans la réduction des inégalités économiques associées aux désastres naturels, et d'autre part, le rôle crucial que les femmes peuvent jouer dans l'élaboration de ces politiques, en particulier en matière de gestion budgétaire et environnementale. Les résultats des trois chapitres convergent vers une même idée : la promotion de gouvernements plus paritaires pourrait être une des solutions clés pour répondre aux défis environnementaux et aux inégalités économiques, grâce à une meilleure gestion des dépenses publiques.

5.2 Limites et perspectives futures de la thèse

Bien que cette thèse apporte d'importantes contributions à l'étude des inégalités de revenus et de genre dans un contexte de problèmes environnementaux, certaines limites restreignent la portée des conclusions. Ces freins ouvrent néanmoins des perspectives intéressantes pour des recherches futures, permettant d'approfondir et d'élargir les résultats obtenus.

La principale limite du premier chapitre, qui analyse l'impact des ouragans sur les inégalités de revenus, réside dans la profondeur temporelle des données utilisées. En effet, les bases de données sur les ouragans et les inégalités ne permettent pas d'observer les dynamiques à très long terme des inégalités de revenus, ce qui restreint notre capacité à saisir pleinement les effets de ces catastrophes naturelles au-delà du moyen terme. Une extension possible serait d'intégrer des données historiques couvrant des périodes plus longues, afin d'examiner les effets à très long terme

des catastrophes climatiques sur les inégalités de revenus. Cela permettrait de mieux comprendre si les effets observés à court et moyen termes se maintiennent, se réduisent ou s'aggravent avec le temps. En effet des phénomènes d'équilibres multiples et de dépendance au sentier pourraient avoir comme conséquence une persistance durable des chocs climatiques sur les inégalités de revenus. Cette analyse cliométrique pourrait être réalisée sur un échantillon réduit de pays, compte tenu de la disponibilité limitée des données historiques sur les inégalités.

Une autre extension de cette analyse serait d'examiner plus spécifiquement les impacts des catastrophes naturelles sur les inégalités de genre à l'échelle macroéconomique. En effet, ces événements peuvent affecter les hommes et les femmes de manière différenciée, exacerbant ainsi des inégalités déjà existantes. Il serait donc pertinent d'élargir l'analyse pour explorer comment les ouragans influencent les inégalités de revenus en fonction du genre, et ce, non seulement d'un point de vue économique, mais aussi en termes de relations de pouvoir et de représentation politique. Les catastrophes naturelles peuvent avoir des répercussions sur les institutions politiques, modifiant ainsi la place des femmes dans les sociétés. D'une part, de telles crises pourraient améliorer la condition des femmes et accroître leur représentativité, notamment si elles sont perçues comme plus à même de répondre aux enjeux climatiques. D'un autre côté, l'intensification des catastrophes naturelles pourrait également déstabiliser les institutions gouvernementales en place, provoquant l'émergence de régimes plus autoritaires. Ces régimes tendent à adopter des politiques plus régressives concernant la place des femmes dans la société, limitant ainsi leur accès au pouvoir politique. Cette incertitude quant aux conséquences des catastrophes naturelles sur la place des femmes, à travers l'altération des relations de pouvoir, souligne la nécessité de recherches futures.

Pour les deuxième et troisième chapitres, une des principales limites est liée à l'absence de données disponibles sur la part des femmes au gouvernement en dehors des pays de l'Union européenne. Cette restriction empêche de généraliser les résultats à d'autres régions du monde où les contextes institutionnels et culturels peuvent différer. Une extension de l'analyse nécessiterait l'accès à des données provenant d'un plus grand nombre de pays, y compris des économies émergentes et en développement, afin de tester la robustesse des conclusions et de mieux comprendre la relation entre la représentation féminine et les politiques publiques dans des contextes variés.

En outre, les données disponibles ne fournissent pas d'informations détaillées sur les caractéristiques individuelles des membres du gouvernement, ce qui empêche d'isoler

l'effet seulement attribuable au genre. La prise en compte de variables telles que l'expérience politique, le niveau d'éducation, l'âge ou l'orientation idéologique des ministres permettraient de mieux distinguer l'effet spécifique du genre.

De plus, les recherches futures pourraient aller au-delà de la cyclicité des politiques budgétaires en étudiant l'efficience des dépenses publiques. En définissant l'efficience comme la capacité à maximiser l'impact des dépenses publiques sur des objectifs précis (réduction des inégalités, croissance économique durable, etc.), il serait intéressant d'examiner si la représentation féminine au sein des gouvernements influence cette efficience. Par exemple, des études pourraient s'intéresser à l'efficacité des politiques redistributives ou environnementales mises en place dans des gouvernements plus paritaires par rapport à ceux où la présence féminine est plus faible. Cette analyse apporterait un éclairage nouveau sur les interactions entre genre, gouvernance et performance des politiques publiques.

Chapter 6

Résumé extensif en français: Inégalité et Dépenses Publiques

Ce résumé extensif de la thèse est structuré comme suit. La section 6.1 introduit la notion d'inégalités de revenus dans le contexte environnemental. La section 6.2 décrit les inégalités de genre en politique. Les principaux résultats de la thèse sont présentés dans la section 6.3. Enfin, la section 6.4 discute des pistes de recherche futures.

Les inégalités sociales et économiques se déclinent sous de nombreuses formes : elles concernent les revenus, la géographie, le genre, l'âge, l'origine ethnique, le handicap, l'orientation sexuelle, la classe sociale, voire la religion. Elles ne se limitent pas à une simple disparité économique mais restreignent les libertés réelles et les possibilités offertes aux individus de mener la vie qu'ils souhaitent (Sen, 1993). Les inégalités posent également un problème d'efficacité économique. En présence de marchés imparfaits, l'inégalité d'accès aux ressources, comme le crédit, freine le développement économique. Les politiques publiques, notamment à travers les choix budgétaires de l'État, jouent un rôle primordial. En redistribuant les ressources et en garantissant l'accès aux biens publics essentiels comme la santé et l'éducation, les gouvernements agissent directement sur les inégalités. Ces actions contribuent à promouvoir la justice sociale et l'efficacité économique.

Le changement climatique et l'intensification des catastrophes naturelles ont des conséquences majeures sur l'économie et complexifient les défis auxquels les politiques publiques doivent répondre. Cependant, les effets à long terme sur les inégalités de revenus au niveau macroéconomique restent ambigus. Parallèlement, les inégalités de genre persistent, notamment dans les sphères de pouvoir. Bien que des avancées aient été faites, les femmes continuent d'être sous-représentées dans les postes à responsabilités. Pourtant, la présence de femmes dans les processus décisionnels pourrait avoir un impact significatif sur la gestion des politiques publiques. De

nombreuses études montrent que les normes sociales transmises par le genre ont un impact sur les comportements et les préférences des femmes et donc sur les politiques publiques.

Cette thèse s'inscrit au carrefour de ces deux grands champs d'étude : l'analyse des chocs climatiques sur les inégalités de revenus, d'une part, et l'influence de la représentation féminine sur les politiques publiques, d'autre part.

Afin d'introduire le contexte général de la thèse, la première section dressera un portrait des inégalités de revenus mondiales dans le contexte des catastrophes naturelles ; la deuxième section se penchera sur l'état mondial des inégalités de genre et leur effet sur les politiques publiques. Enfin, la troisième section présentera les principaux résultats et contributions de cette thèse.

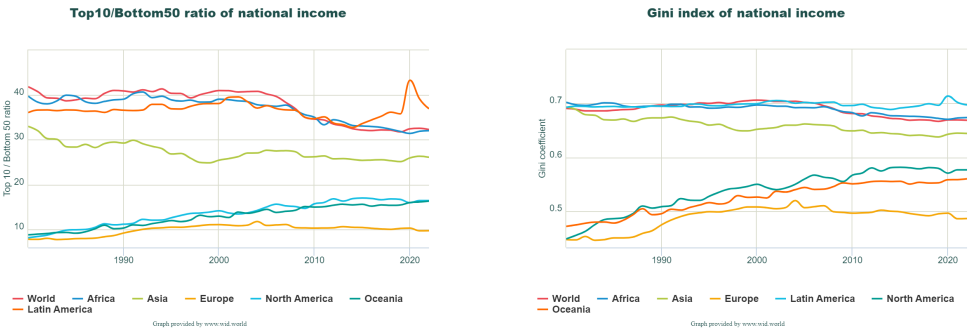
6.1 Inégalités de revenus, catastrophes naturelles et politiques de redistribution

Cette section examine, d'une part, l'évolution des inégalités de revenus et, d'autre part, des catastrophes naturelles, tout en s'interrogeant sur les potentielles interactions entre les deux.

6.1.1 Dynamiques et déterminants des inégalités de revenus

La richesse d'une nation n'est pas une condition suffisante pour assurer une société égalitaire. L'étude des inégalités de revenus est l'une des premières conditions à l'établissement d'une société socialement juste. Son analyse permet de faire un état des lieux de la répartition des richesses au sein d'une nation. Celles-ci sont mesurées à l'aide de différents indicateurs tels que le coefficient de Gini, variant de 0 (absence d'inégalités) à 1 (société parfaitement inégalitaire), ou le rapport interdécile, qui permet d'identifier les disparités entre le haut et le bas de la distribution des revenus. Au travers de ces deux indicateurs, la figure 6.1 dépeint un état des lieux des inégalités de revenus avant taxes pour les six continents de la planète, entre 1980 et 2022. Au niveau mondial, la tendance est clairement à la baisse. Cette dynamique semble être tirée par l'Asie et l'Afrique, représentant plus de la moitié de la population mondiale. Ces deux continents connaissent sur la période une trajectoire de réduction des inégalités. L'Amérique du Nord, l'Europe et l'Océanie, malgré leur niveau de développement élevé, connaissent une tout autre dynamique avec une forte augmentation des inégalités. Ces continents demeurent malgré tout

plus égalitaires comparativement aux autres zones.



(a) (b)

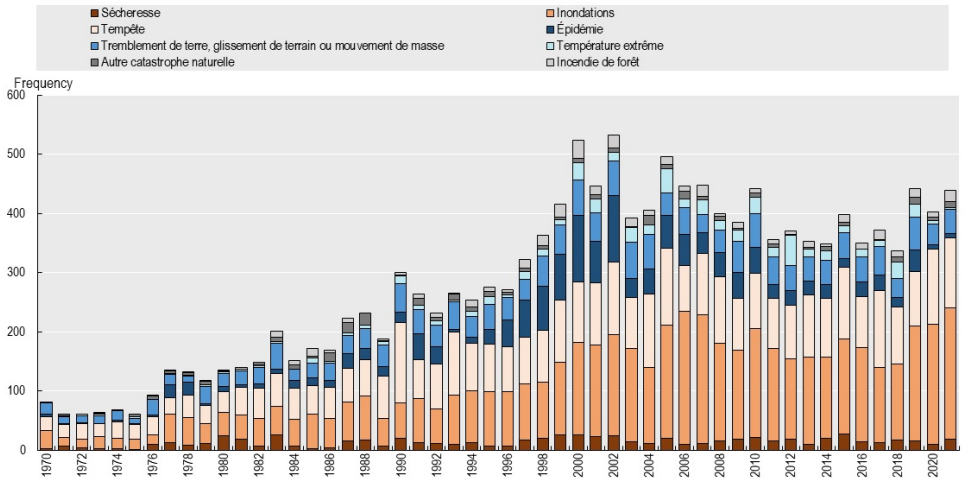
Source: la partie (a) et (b) proviennent du World Inequality Database

Figure 6.1: Évolution des inégalités de revenus pré-taxes de 1980 à 2022

La dynamique mondiale des inégalités sur cette période peut être expliquée en partie par l'intensification du commerce international, le transfert de technologie et la croissance du PIB. Le continent asiatique et, plus récemment, l'Afrique ont accéléré leurs processus de développement au travers d'une plus grande intégration aux échanges mondiaux. L'augmentation du PIB et la transformation de l'économie induites par la globalisation et la diffusion technologique ont permis la réduction de l'extrême pauvreté et l'émergence d'une classe moyenne (Fosu, 2017). Dans les pays développés, l'effet du commerce mondial et de la libéralisation des flux de capitaux a eu un effet positif sur l'économie mais a aussi négativement impacté la distribution des revenus. L'ouverture de l'économie a provoqué des phases de désindustrialisation et de délocalisations impactant majoritairement les emplois moins qualifiés, augmentant ainsi les disparités salariales. Fung (2024) indique que la mondialisation dans les pays développés n'a majoritairement profité qu'aux 10 % les plus riches de la distribution du revenu national. Sur la période, les pays de ces continents ont aussi connu un net ralentissement de la croissance du PIB marqué par de fortes crises financières et économiques, provoquant une augmentation des inégalités (Bodea et al., 2021). En dehors des déterminants purement économiques, des facteurs politiques tel les changements de régime (Haggard and Kaufman, 2012) ou plus exogènes comme les pandémies (Esseau-Thomas et al., 2022) ou les conflits(Bircan et al., 2017) peuvent aussi expliquer la dynamique des inégalités de revenus. Dans le contexte du changement climatique, de plus en plus d'articles s'intéressent aux liens entre inégalités de revenus et catastrophes naturelles.

6.1.2 Les catastrophes naturelles, une menace grandissante

L'accroissement de l'activité économique contemporaine s'est accompagné de l'augmentation des émissions de gaz à effet de serre (GES). Le Groupe d'experts Intergouvernemental sur l'Evolution du Climat (GIEC), dans son rapport de 2022, fait état d'une augmentation de 54 % des GES d'origine anthropique par rapport à leurs niveaux de 1990 (Pathak et al., 2022). L'augmentation des températures impacte également la prévalence et l'intensité des catastrophes naturelles. La figure 6.2 illustre ce propos. Depuis 1970, le nombre d'événements climatiques a été multiplié par quatre, passant d'environ 100 à 400 par an. À l'exception des tremblements de terre, la fréquence de toutes les catastrophes augmente sur la période. Cette hausse est d'autant plus marquée pour les événements climatiques directement liés au réchauffement de la planète, tels que les inondations et les tempêtes.

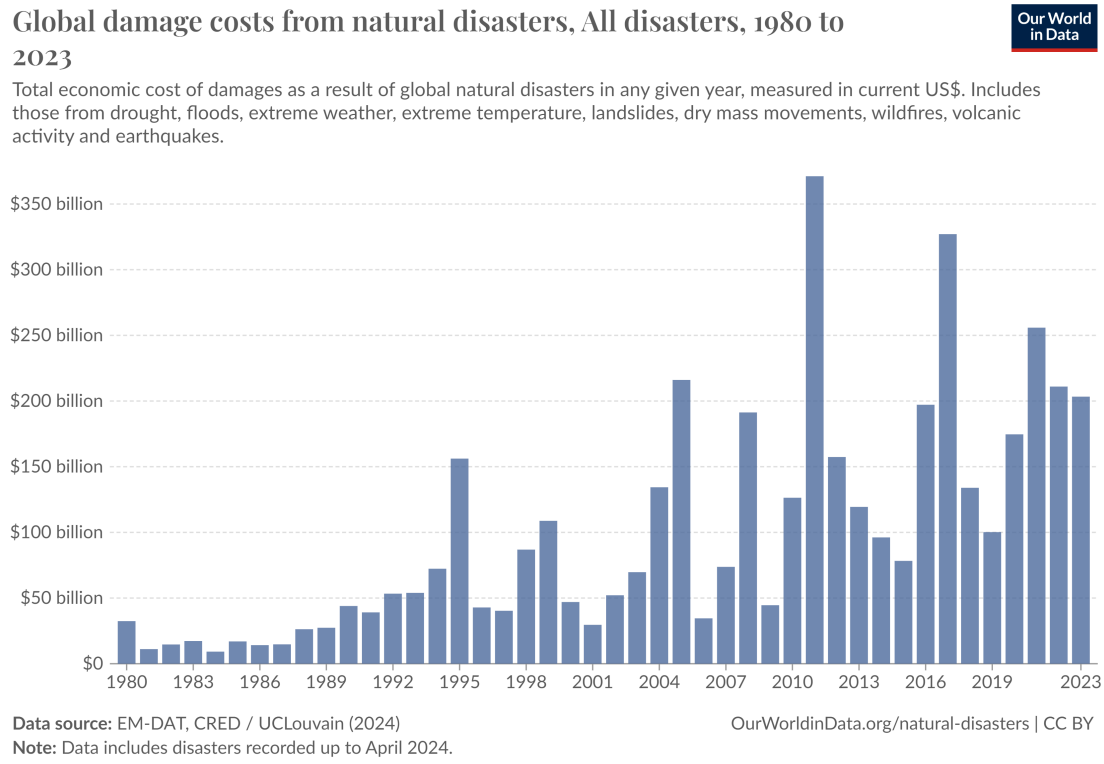


Source : OCDE à partir des données EM-DAT, CRED / UCLouvain, Bruxelles, Belgique

Figure 6.2: Nombre de catastrophes naturelles, de 1970 à 2021, par catégorie

Le bilan humain des catastrophes naturelles est colossal. Selon le World Meteorological Organization (WMO), plus de 2 millions de personnes sont décédées depuis 1970 en raison d'événements extrêmes. Ce sont d'autant plus de personnes blessées ou contraintes de migrer. La figure 6.3 illustre la nette augmentation des dommages matériels causés par les catastrophes naturelles. Avant les années 1990, les coûts associés aux catastrophes naturelles restaient en dessous de 50 milliards de dollars par an. En comparaison avec la situation actuelle, les dommages ont été multipliés par quatre, atteignant environ 200 milliards de dollars par an. Ces chiffres soulignent non seulement une augmentation de la fréquence des catastrophes naturelles, mais

surtout une intensification de leur impact.



Source : Our World in Data à partir des données EM-DAT, CRED / UCLouvain, Bruxelles, Belgique

Figure 6.3: Coût matériel des catastrophes naturelles de 1980 à 2023, en dollars courants

Cette forte hausse des dégâts matériels et humains affecte négativement de nombreux indicateurs économiques tels que le PIB et la croissance (Klomp and Valckx, 2014) ou les finances publiques (Fan et al., 2024). Cependant, Cavallo et al. (2013) montrent que ces effets disparaissent lorsque sont introduits dans l'analyse les potentielles déstabilisations politiques engendrées par les événements climatiques. La stabilité et la force d'un État sont essentiels pour permettre à un pays de surmonter les effets d'une catastrophe naturelle, notamment grâce à une gestion efficace de sa politique budgétaire (Deryugina, 2022).

6.1.3 Les politiques de redistribution face aux cataclysmes

Scheidel (2017), dans son ouvrage The Great Leveler, explique que l'économie basée sur l'accumulation de capital conduit nécessairement à l'émergence de sociétés inégalitaires, concentrant les richesses au sommet de la distribution des revenus. Selon cet auteur, l'économie est incapable, à elle seule, de réduire les inégalités de

revenus. Il avance qu'historiquement, seuls les "Quatre Cavaliers de l'Apocalypse" – que sont les guerres de masse, les pandémies, l'effondrement de l'État et les révolutions – ont profondément et structurellement eu un effet bénéfique sur les inégalités. En France, par exemple, les inégalités ont fortement augmenté durant la "Belle Époque" (1870-1914). La Seconde Guerre mondiale, avec ses destructions massives de capitaux, a provoqué une réduction drastique des inégalités, rééquilibrant la répartition des richesses et du pouvoir. En l'absence de ces bouleversements, l'État ne serait pas assez puissant pour lutter contre les inégalités. L'avènement des "Quatre Cavaliers" permettrait le renouveau de l'État en remplaçant les classes dirigeantes. L'émergence de nouveaux rapports de force dans la société conduirait ainsi à une répartition plus égalitaire des revenus. Compte tenu du contexte actuel, caractérisé par l'augmentation de la fréquence et de l'intensité des catastrophes naturelles, manquerait-il un cavalier à ce quatuor ?

La question est d'autant plus légitime au regard de l'hyper-concentration des richesses. Depuis 2020, les 1 % les plus riches de la planète ont profité de 63 % de la richesse produite (Christensen et al., 2023). Les catastrophes naturelles, par leur caractère erratique et violent, pourraient-elles altérer les rapports de force et conduire à la réduction des inégalités ? Si tel était le cas, quel serait le rôle de l'État et des politiques de redistribution dans ce contexte ?

Le chapitre 1 de cette thèse vise à répondre à ces questions en analysant, au niveau macroéconomique, les dynamiques de moyen terme des inégalités de revenus avant et après redistribution à la suite d'un ouragan.

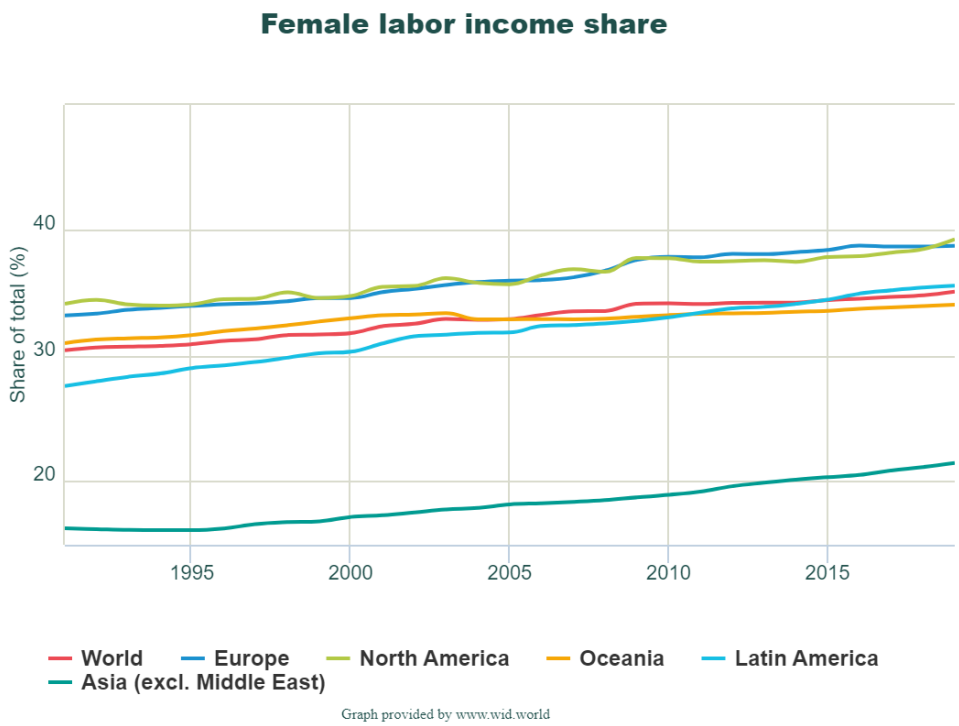
6.2 Inégalités de genre et dépenses publiques

Cette section présente d'abord un état des lieux des inégalités de genre à l'échelle mondiale, puis explore leurs impacts sur les politiques publiques.

6.2.1 Portrait des inégalités de genre dans le monde

La question des inégalités de revenus est étroitement liée à celle des inégalités de genre. Les femmes, bien que représentant la moitié de la population mondiale, se retrouvent généralement plus bas dans la distribution des revenus que les hommes. La figure 6.4 illustre ce constat en présentant la part du revenu du travail des femmes dans le revenu total. Dans un monde idéal, celle-ci devrait être à 50 %. Force est de constater que la parité n'est pas atteinte. Tenir compte des facteurs socio-

économiques, tels que le niveau d'éducation, la classe sociale ou l'état du marché du travail, ne suffisent pas à expliquer ces écarts salariaux. La raison principale réside dans les normes sociétales concernant la place des femmes dans la société et les discriminations auxquelles elles ont dû faire face (Blau and Kahn, 2017). Fort heureusement, l'Histoire n'est pas linéaire, et elles ont su acquérir des droits au fil du temps, mais le péché originel est tenace. Les caractéristiques associées et transmises par la notion de genre restent profondément enracinées. Les études en microéconomie ou en économie comportementale soulignent un effet du genre sur les variables économiques. En raison de ces facteurs socio-culturels, les femmes auraient des préférences différentes de celles des hommes et seraient, par exemple, plus averses au risque (Bertrand, 2011b).



Source : World Inequality Database

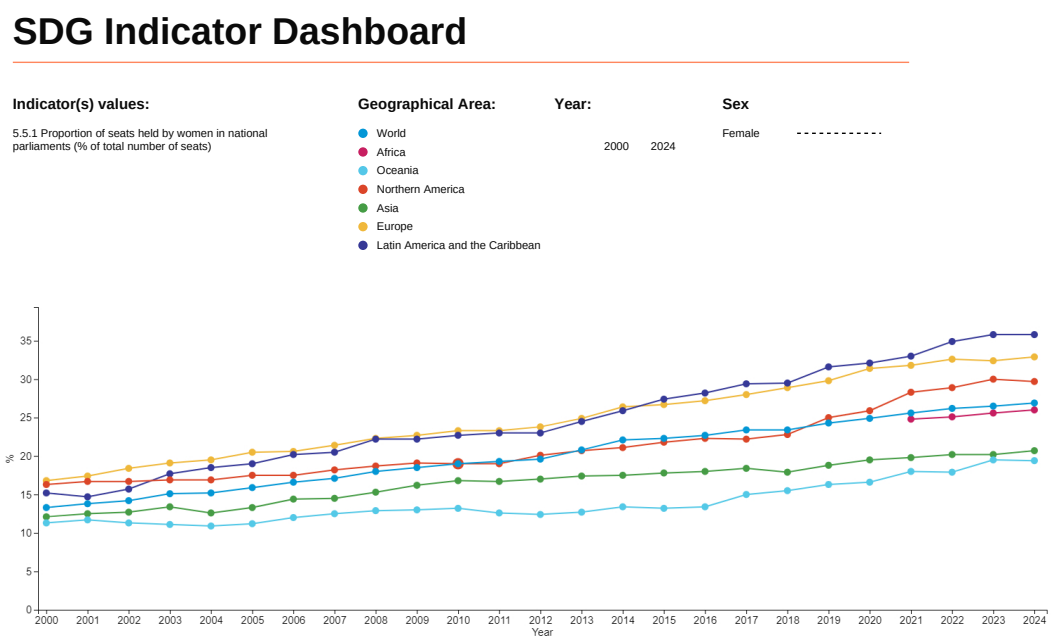
Figure 6.4: Part du revenu du travail avant impôts des femmes de 1980 à 2022

La mise en place de politiques publiques favorables à l'égalité des genres a contribué à réduire les écarts salariaux. Il s'agit, par exemple, d'instauration de quotas de représentation positive, d'une promotion accrue de l'éducation des filles, ainsi que des réformes du marché du travail visant à améliorer la conciliation entre vie professionnelle et vie personnelle. Depuis 1980, sur tous les continents, la part des femmes dans le revenu national est en augmentation. Sur la période, l'Europe

et l'Amérique du Nord sont les continents où cette part est la plus élevée, même s'il reste dix points de pourcentage à gravir pour atteindre l'égalité. En dépit de ces politiques, la parité dans nos sociétés n'est toujours pas atteinte, et les discriminations continuent d'exister. Les femmes gagnent en moyenne, à poste équivalent, moins que leurs collègues masculins et sont sous-représentées dans les postes à responsabilités, plus rémunérateurs.

6.2.2 Femmes au pouvoir et dépenses publiques

Les inégalités de genre ne se limitent pas uniquement aux disparités salariales. L'accès des femmes aux postes à responsabilités constitue un indicateur clé de leur place dans la société. En 2023, dans le secteur privé, les femmes représentaient seulement 23 % des membres des conseils d'administration au niveau mondial (Global, 2024). Cette sous-représentation dans les grandes entreprises se reflète également en politique. La figure 6.5 présente la part moyenne des femmes dans les parlements des différents continents. Bien que la tendance soit à la hausse, les femmes demeurent largement sous-représentées dans ces instances. En 2024, elles ne comptent que pour 26 % des parlementaires dans le monde. Les continents européens et sud-américains affichent les meilleurs résultats, avec environ 35 % de femmes siégeant dans les parlements, mais ils restent encore loin d'une représentation paritaire.



Source : UN Women

Figure 6.5: Part des femmes dans les parlements nationaux de 2000 à 2024

Par ailleurs, le rôle de l'État dans la réduction des inégalités est fondamental. Les pays développés doivent aujourd'hui relever plusieurs grands défis, notamment la lutte contre le changement climatique, l'augmentation des inégalités sociales, la baisse des taux de croissance économique marquée par des crises successives, et l'augmentation des niveaux de dettes publiques. Si les normes sociétales liées au genre influencent les préférences économiques et les comportements des femmes, on peut se demander si la promotion de la diversité dans les instances de pouvoir permet de prendre des décisions plus efficaces.

Un plus grand nombre de femmes au sein du gouvernement pourrait-il améliorer la gestion des dépenses publiques ? Un gouvernement plus paritaire pourrait-il avoir un plus grand impact sur les dépenses environnementales ?

Les chapitres 2 et 3 de cette thèse adresse ces questions en prenant en compte la part des femmes au gouvernement dans les pays de l'Union Européenne. Plus spécifiquement, le deuxième chapitre étudie la relation entre la part des femmes dans le gouvernement et la cyclicité des dépenses publiques. Le chapitre 3 se focalise

sur le lien entre représentation féminine et dépenses environnementales, instrument de la préservation de l'environnement.

6.3 Contribution de la thèse

Cette thèse s'inscrit dans deux courants majeurs de la littérature : d'une part, celui portant sur l'impact des catastrophes naturelles sur les inégalités de revenus, et d'autre part, celui traitant de l'incidence du genre sur les politiques publiques. En trois chapitres, elle analyse les dynamiques entre les inégalités de revenus et de genre et les politiques budgétaires dans le domaine environnemental.

Le premier chapitre se concentre sur l'impact macroéconomique des ouragans sur les inégalités de revenus. La méthode des projections locales est utilisée en mobilisant des données météorologiques couvrant 114 pays entre 1995 et 2014. Les résultats principaux montrent que l'impact des cyclones sur les dynamiques des inégalités, avant et après redistribution, varie selon le niveau de développement et de démocratie des pays. Dans les pays les plus pauvres, les inégalités diminuent grâce à l'afflux d'aides internationales et aux transferts des migrants. En revanche, dans les pays développés, les inégalités avant redistribution baissent, puis augmentent. Cet effet rebond traduit un mécanisme schumpétérien. Davantage touchés par la destruction du capital, les ménages les plus aisés bénéficient de la modernisation de celui-ci pendant la phase de reconstruction, ce qui augmente ainsi leurs revenus et donc les inégalités avant transfert. Cette hausse ne se répercute pas sur la dynamique des inégalités après redistribution. Ce résultat souligne l'importance des politiques redistributives dans les pays développés afin de freiner l'aggravation des inégalités suite à un ouragan.

Le deuxième chapitre explore le lien entre la représentation des femmes au sein des gouvernements et la cyclicité des dépenses publiques. L'étude porte sur une analyse trimestrielle des 27 pays membres de l'Union Européenne sur la période 2003-2021. Les résultats obtenus avec la méthode des Moindres Carrés Ordinaires à effets fixes montrent que la part des femmes occupant des fonctions économiques au sein des gouvernements est associée à une politique budgétaire plus optimale au sens keynésien, en renforçant sa contracyclicité. Ce résultat est robuste au changement d'estimateurs et de variables mesurant le cycle économique et le solde budgétaire. Cet effet est particulièrement marqué pour les femmes ministres avec des fonctions économiques occupant un siège au conseil des ministres. Le chapitre met en évidence l'importance de la représentation des femmes dans la lutte contre les déficits et la

dette en rendant la politique budgétaire plus efficace.

Le troisième chapitre s'intéresse à l'influence de la représentation féminine sur les dépenses publiques environnementales. En analysant les 27 pays de l'Union Européenne entre 2003 et 2022, ce chapitre montre, à partir d'estimations menées avec les Moindres Carrés Ordinaires à effets fixes, qu'une présence accrue des femmes dans les gouvernements est corrélée à une augmentation des dépenses publiques en faveur de l'environnement. Ce résultat est robuste à l'ajout de variables de contrôle, aux changements dans les variables utilisées pour capturer les dépenses environnementales et à l'utilisation d'estimateurs alternatifs. Les femmes occupant des sièges au conseil des ministres ont l'impact le plus important sur les dépenses environnementales. Il apparaît que cet effet du genre ne dépend ni du moment où les femmes interviennent dans le processus budgétaire, ni de l'orientation politique du parti au pouvoir. La hausse des dépenses environnementales concerne les secteurs de la recherche & développement ainsi que la gestion des ressources en eau. Ces résultats suggèrent que l'intégration des femmes dans les processus décisionnels pourrait jouer un rôle crucial dans la mise en place de politiques environnementales plus ambitieuses.

En somme, cette thèse insiste sur l'importance des politiques publiques dans la réduction des inégalités, tout en soulignant le rôle crucial que jouent les femmes dans l'amélioration de la gestion budgétaire. Elle conclut que, face aux défis environnementaux, la promotion de gouvernements plus paritaires pourrait être une des clés pour une politique budgétaire plus efficace et durable.

6.4 Limites et perspectives futures de la thèse

Bien que cette thèse apporte d'importantes contributions à l'étude des inégalités de revenus et de genre dans un contexte de problèmes environnementaux, certaines limites restreignent la portée des conclusions. Ces freins ouvrent néanmoins des perspectives intéressantes pour des recherches futures, permettant d'approfondir et d'élargir les résultats obtenus.

La principale limite du premier chapitre, qui analyse l'impact des ouragans sur les inégalités de revenus, réside dans la profondeur temporelle des données utilisées. En effet, les bases de données sur les ouragans et les inégalités ne permettent pas d'observer les dynamiques à très long terme des inégalités de revenus, ce qui restreint notre capacité à saisir pleinement les effets de ces catastrophes naturelles au-delà

du moyen terme. Une extension possible serait d'intégrer des données historiques couvrant des périodes plus longues, afin d'examiner les effets à très long terme des catastrophes climatiques sur les inégalités de revenus. Cela permettrait de mieux comprendre si les effets observés à court et moyen termes se maintiennent, se réduisent ou s'aggravent avec le temps. En effet des phénomènes d'équilibres multiples et de dépendance au sentier pourraient avoir comme conséquence une persistance durable des chocs climatiques sur les inégalités de revenus. Cette analyse cliométrique pourrait être réalisée sur un échantillon réduit de pays, compte tenu de la disponibilité limitée des données historiques sur les inégalités.

Une autre extension de cette analyse serait d'examiner plus spécifiquement les impacts des catastrophes naturelles sur les inégalités de genre à l'échelle macroéconomique. En effet, ces événements peuvent affecter les hommes et les femmes de manière différenciée, exacerbant ainsi des inégalités déjà existantes. Il serait donc pertinent d'élargir l'analyse pour explorer comment les ouragans influencent les inégalités de revenus en fonction du genre, et ce, non seulement d'un point de vue économique, mais aussi en termes de relations de pouvoir et de représentation politique. Les catastrophes naturelles peuvent avoir des répercussions sur les institutions politiques, modifiant ainsi la place des femmes dans les sociétés. D'une part, de telles crises pourraient améliorer la condition des femmes et accroître leur représentativité, notamment si elles sont perçues comme plus à même de répondre aux enjeux climatiques. D'un autre côté, l'intensification des catastrophes naturelles pourrait également déstabiliser les institutions gouvernementales en place, provoquant l'émergence de régimes plus autoritaires. Ces régimes tendent à adopter des politiques plus régressives concernant la place des femmes dans la société, limitant ainsi leur accès au pouvoir politique. Cette incertitude quant aux conséquences des catastrophes naturelles sur la place des femmes, à travers l'altération des relations de pouvoir, souligne la nécessité de recherches futures.

Pour les deuxième et troisième chapitres, une des principales limites est liée à l'absence de données disponibles sur la part des femmes au gouvernement en dehors des pays de l'Union européenne. Cette restriction empêche de généraliser les résultats à d'autres régions du monde où les contextes institutionnels et culturels peuvent différer. Une extension de l'analyse nécessiterait l'accès à des données provenant d'un plus grand nombre de pays, y compris des économies émergentes et en développement, afin de tester la robustesse des conclusions et de mieux comprendre la relation entre la représentation féminine et les politiques publiques dans des contextes variés.

En outre, les données disponibles ne fournissent pas d'informations détaillées sur les caractéristiques individuelles des membres du gouvernement, ce qui empêche d'isoler l'effet seulement attribuable au genre. La prise en compte de variables telles que l'expérience politique, le niveau d'éducation, l'âge ou l'orientation idéologique des ministres permettraient de mieux distinguer l'effet spécifique du genre.

De plus, les recherches futures pourraient aller au-delà de la cyclicité des politiques budgétaires en étudiant l'efficience des dépenses publiques. En définissant l'efficience comme la capacité à maximiser l'impact des dépenses publiques sur des objectifs précis (réduction des inégalités, croissance économique durable, etc.), il serait intéressant d'examiner si la représentation féminine au sein des gouvernements influence cette efficience. Par exemple, des études pourraient s'intéresser à l'efficacité des politiques redistributives ou environnementales mises en place dans des gouvernements plus paritaires par rapport à ceux où la présence féminine est plus faible. Cette analyse apporterait un éclairage nouveau sur les interactions entre genre, gouvernance et performance des politiques publiques.

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