IVIE

Aspectos distributivos de la transición a la descarbonización

Xavier Labandeira

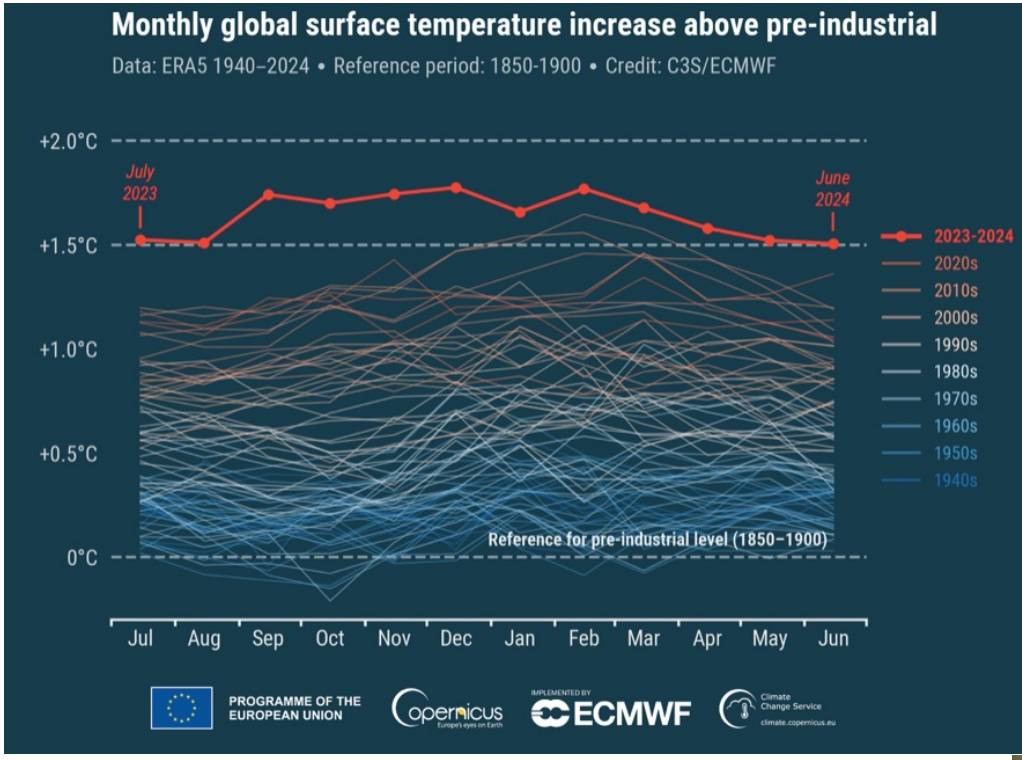
Universidade Vigo

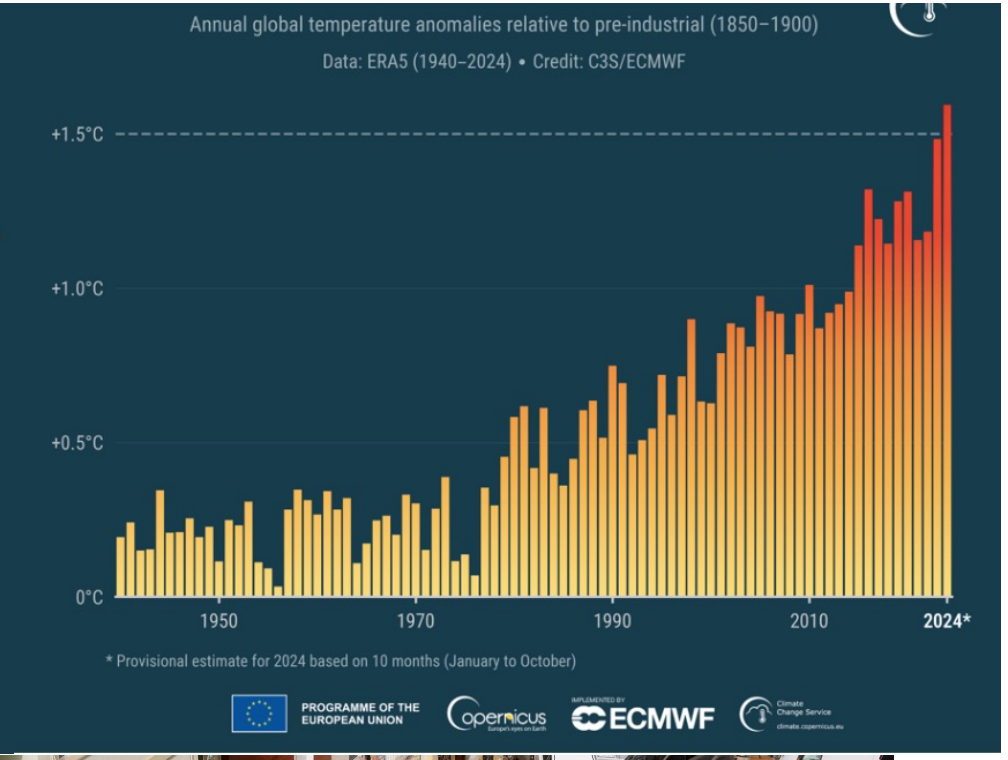
ECOBAS
Economics and Business Administration for Society

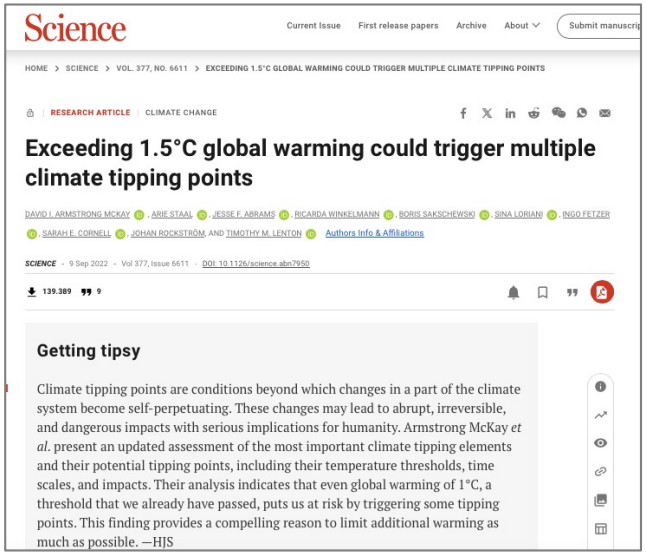
Valencia, 4 marzo 2025

- **The 'perfect' negative externality**
  - Mitigation, impacts, adaptation
  - Public intervention: fiscal policies
  - Trade-offs efficiency/equity

- **The policy discussion**
  - The costs of doing nothing
  - The costs of sub-optimal policies
  - Compensations with pricing approaches
    - How to compensate?
    - Constraints in practice: a lesson from Spain
    - New approaches?







Science

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HOME > SCIENCE > VOL. 377, NO. 6611 > EXCEEDING 1.5°C GLOBAL WARMING COULD TRIGGER MULTIPLE CLIMATE TIPPING POINTS

RESEARCH ARTICLE | CLIMATE CHANGE

Exceeding 1.5°C global warming could trigger multiple climate tipping points

DAVID I. ARMSTRONG MCKAY, ARIE STAAL, JESSE F. ABRAMS, RICARDA WINKELMANN, BORIS SAKSCHEWSKI, SINA LORIANI, INGO FETZER, SARAH E. CORNELL, JOHAN ROCKSTRÖM, AND TIMOTHY M. LENTON Authors Info & Affiliations

SCIENCE · 9 Sep 2022 · Vol 377, Issue 6611 · DOI: 10.1126/science.abn7950

139,389 9

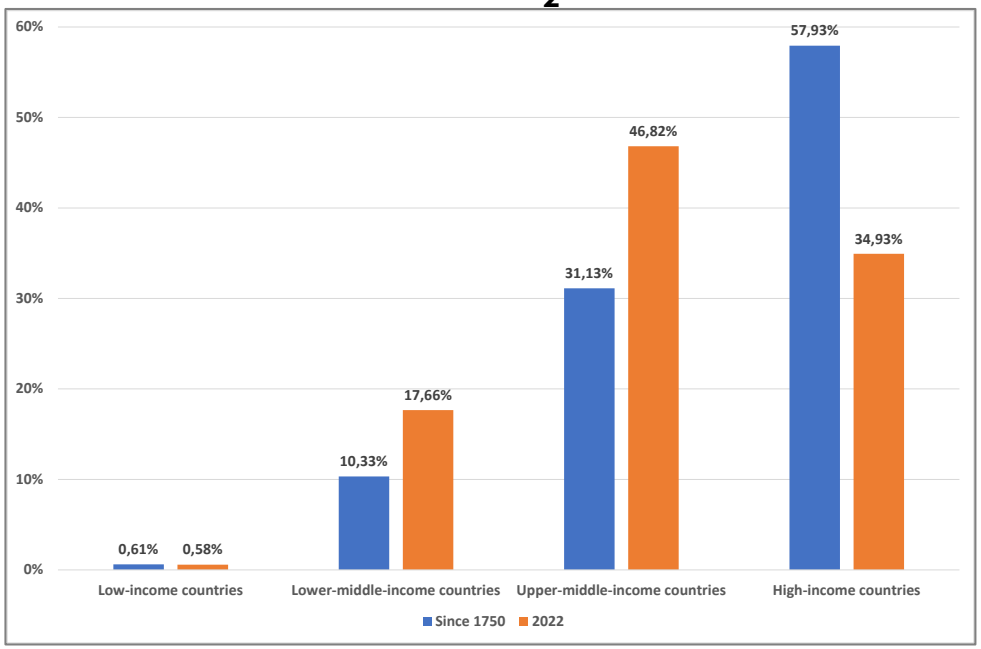
Getting tipsy

Climate tipping points are conditions beyond which changes in a part of the climate system become self-perpetuating. These changes may lead to abrupt, irreversible, and dangerous impacts with serious implications for humanity. Armstrong McKay *et al.* present an updated assessment of the most important climate tipping elements and their potential tipping points, including their temperature thresholds, time scales, and impacts. Their analysis indicates that even global warming of 1°C, a threshold that we already have passed, puts us at risk by triggering some tipping points. This finding provides a compelling reason to limit additional warming as much as possible. —HJS

Valencia, Spain, November 2024

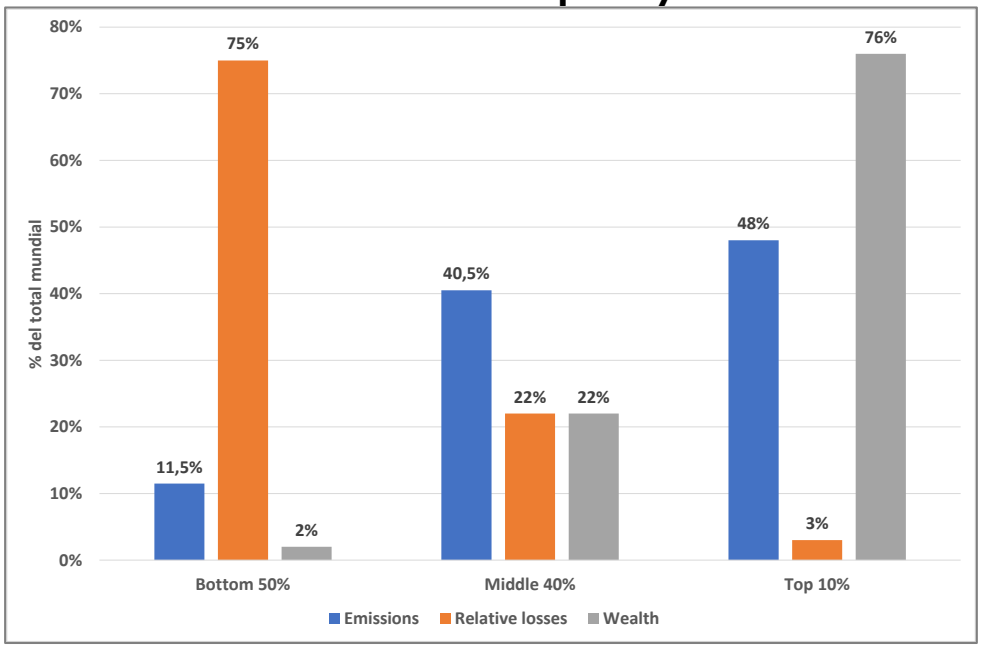
- **The 'perfect' negative externality**
  - Global, inter-generational, + thresholds & extreme events
  - Huge distributional issues:
    - Source of the problem
    - Impacts
    - Adaptation (autonomous or public policy)
    - Mitigation policies
    - *Loss and damage*
  - Pervasive Trade-offs Efficiency/equity
    - Equity, a central issue
    - Feasibility of actions

Historical and current CO_2 emissions sources



Source: Global Carbon Budget (2023)

Global carbon inequality. 2019



Source: Chancel et al. (2023)

Comunidad Valenciana

LAS CONSECUENCIAS DE LA DANA >

Datos de los fallecidos en la dana por edad, género y lugar: casi la mitad tenía más de 70 años

La riada que asoló valencia se cebó con los más mayores: el 7% eran nonagenarios, aunque constituyen el 1% de la población

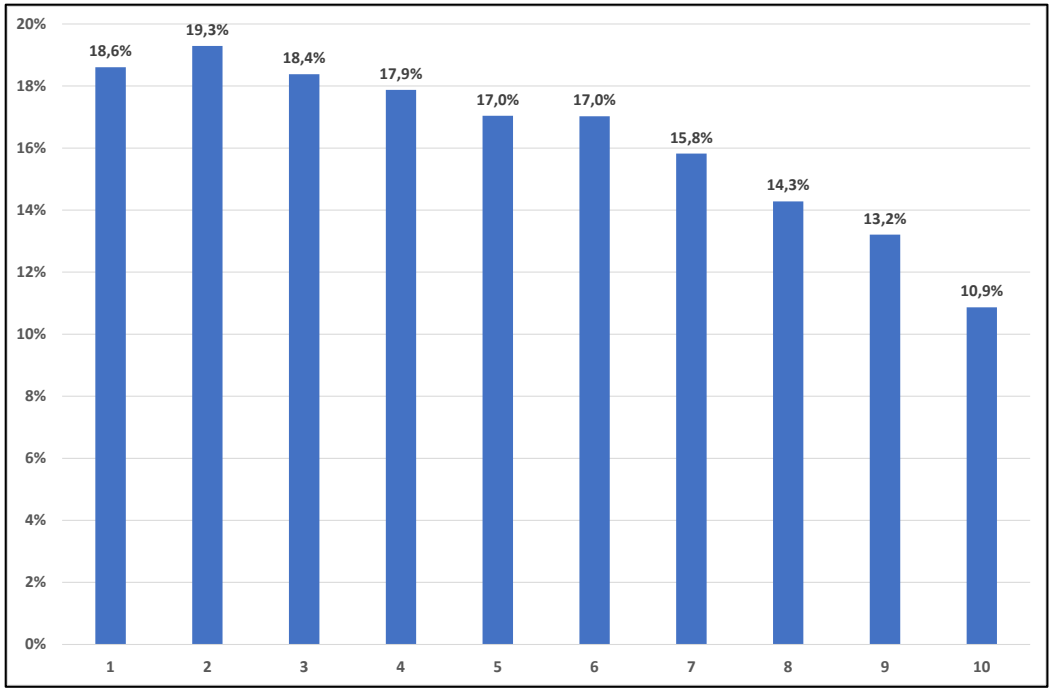
Retirada de un cadáver en el 'parking' del supermercado de la localidad de Benetússer. CLAUDIO ÁLVAREZ

MONTSE HIDALGO PÉREZ | YOLANDA CLEMENTE POMEDA

Valencia - 14 NOV 2024 - 15:10 | Actualizado: 14 NOV 2024 - 20:18 CET

58

Expenditure share of food by decile of EI

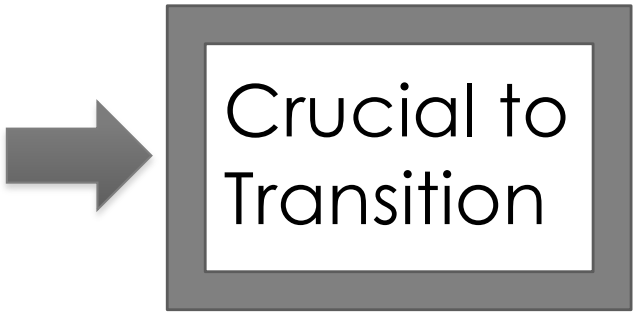


Source: INE (2023)

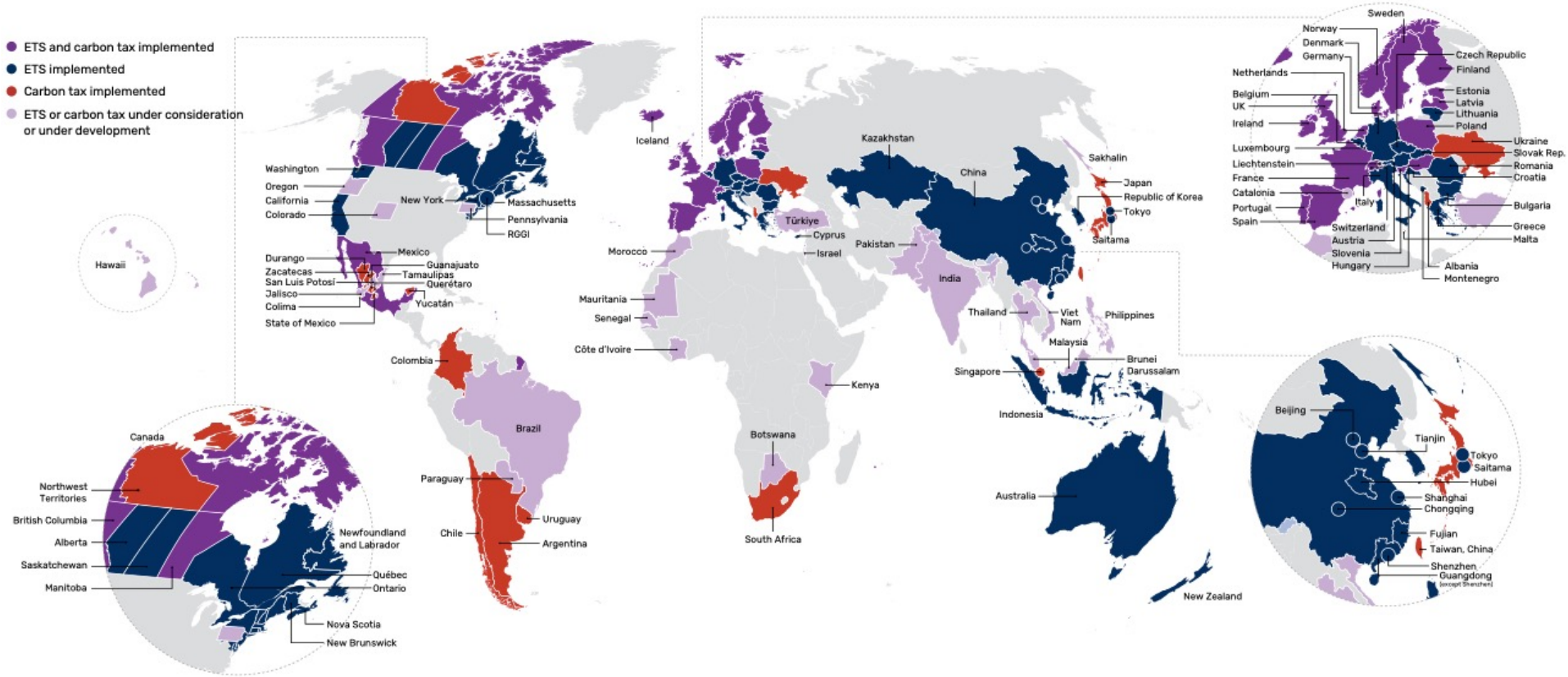
- **More on efficiency-equity:**
  - Measurement issues: Additionality, income/wealth, horizontal/vertical equity
  - Distributional pathways (Vona, 2023)
    - Sources of income (labour market)
    - Uses of income*
- **Public policy discussions**
  - Distributional costs of doing nothing
    - Global loss; within the world and countries
    - More impacts, less adaptation (Bastien-Olvera et al., 2023; Hallegate et al., 2016)
  - The costs of sub-optimal policies
    - More costs to distribute
    - Distributional impacts: measurement and salience of different policy options (Zachmann and Frederiksson, 2018)

Why prices for climate policies?

- Account for social costs
- Cost-effectiveness
- Salience
- Promote innovation
- Raise revenues for:
  - **Distributional compensations**
    - **Within the country**
    - **Global transfers**
  - Fund the transitions (Energy efficiency, etc.)
- Necessary (not sufficient) for the vast transformations

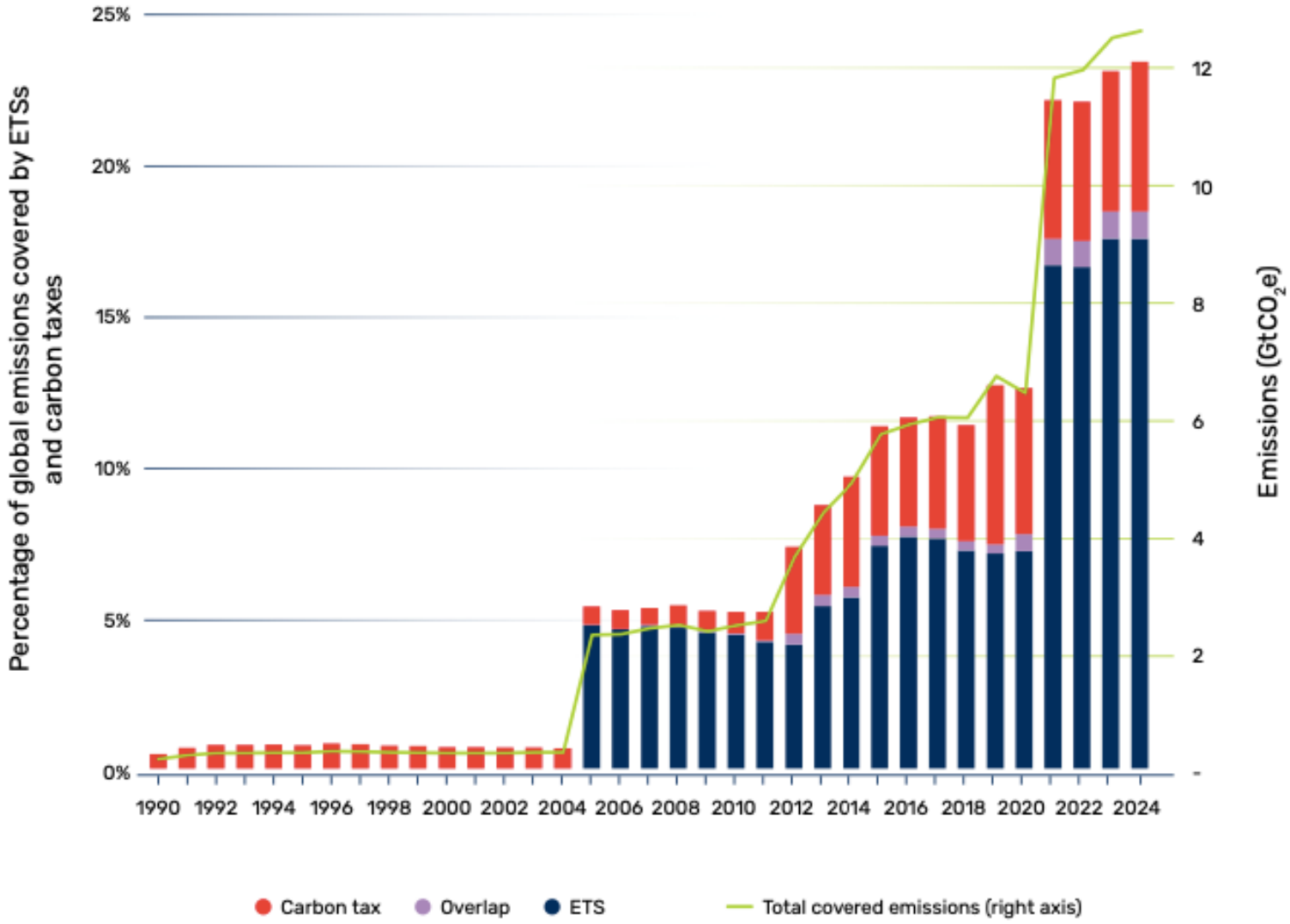


Carbon pricing across the world



Source: World Bank

Carbon pricing across the world



Source: World Bank

INSTITUTO DE ESTUDIOS FISCALES

LIBRO BLANCO SOBRE LA REFORMA TRIBUTARIA

MINISTERIO DE HACIENDA Y FUNCIÓN PÚBLICA

COMITÉ DE PERSONAS EXPERTAS PARA ELABORAR EL LIBRO BLANCO SOBRE LA REFORMA TRIBUTARIA

Working Paper 9/2022
30 December 2022

REAL INSTITUTO elcano ROYAL INSTITUTE

Taxation and ecological transition during climate and energy crises: the main conclusions of the 2022 Spanish White Book on tax reform

Xavier Labandeira

economics for energy

WP 02a/2023

Alternativas Compensatorias para la Transición Energética: Lecciones de la Crisis de 2022

Alberto Gago
Xavier Labandeira
José M. Labeaga
Xiral López-Otero

Assessment

- Revenue and emissions impacts
- **Distributional impacts and compensations (households)**
- Particularly in electrification and mobility (in other areas, generic or no assessment)

- **Priority Areas**:
  - ‘Sustainable Electrification’
  - ‘Mobility compatible with ecological transition’
  - ‘Increase in circularity’
  - ‘Recognition of environmental costs associated to water use’
- **“Roadmap”** based on **academic approach** and detailed simulations:

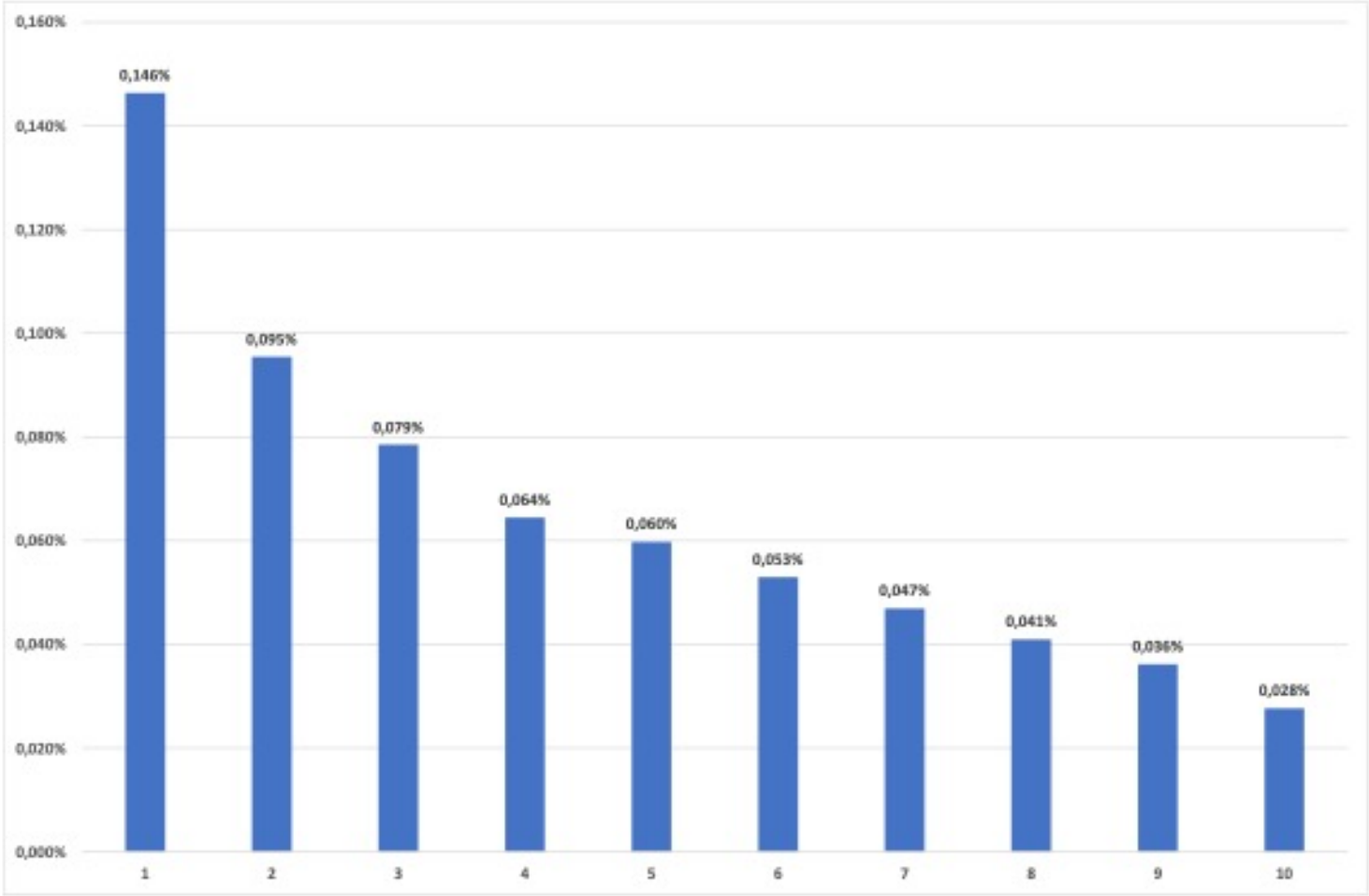
Electricity tax reduction

Table 3. Impacts on prices, demand and revenues of P1

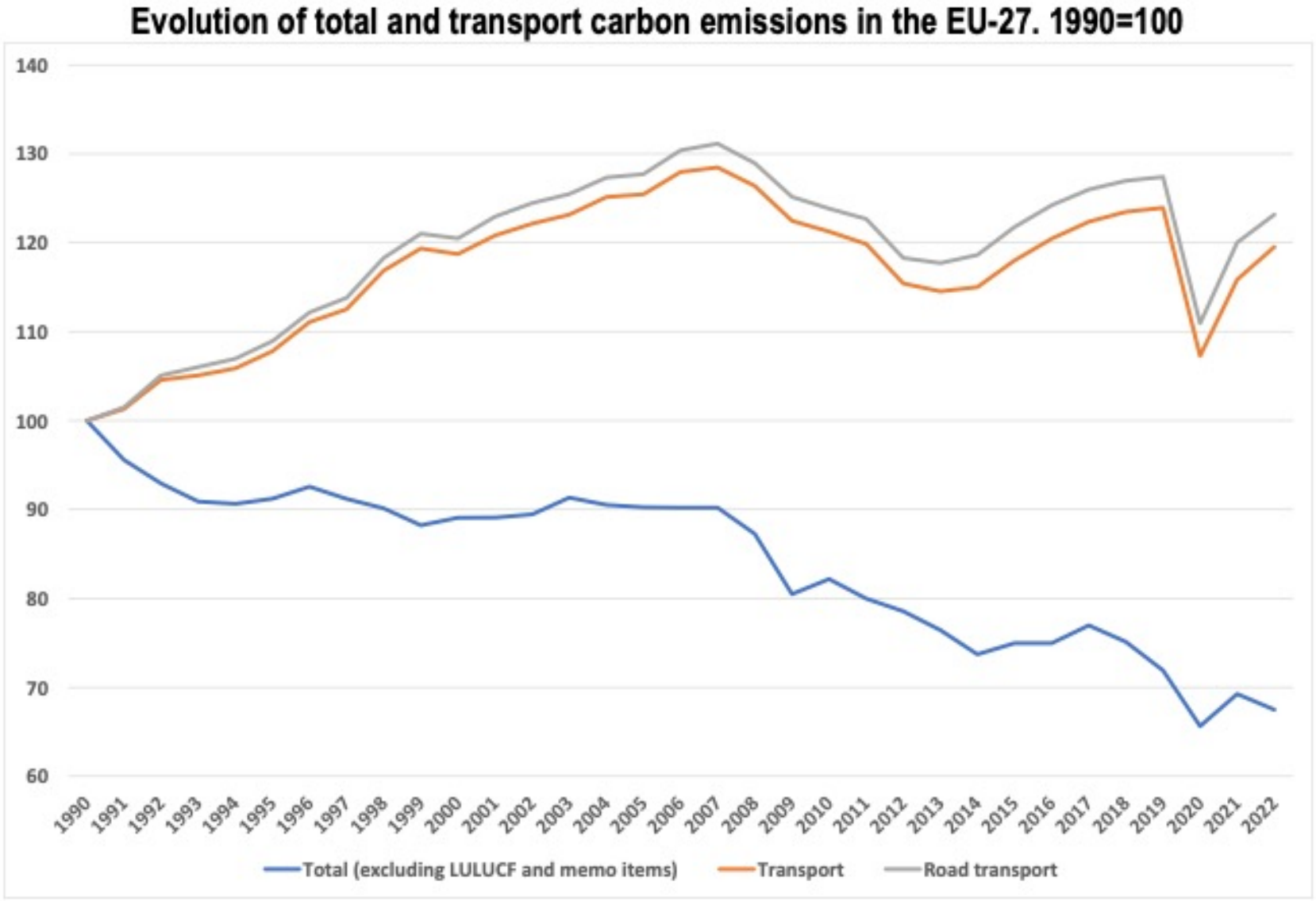
	Final price (%)	Demand and CO_2 emissions (%)	Variation in revenues, Millions of euros (% of IVPEE, IEE and VAT revenues)			
			IVPEE	IEE	VAT	Total
Residential electricity	-2,46%	0,50%	-372,31	-15,27	-65,91	-453,48 (-10,1%)
Non-residential non-electro-intensive electricity	-3,74%	0,76%	-468,88	-19,29	-	-488,17 (-44,0%)
Non-residential electro-intensive electricity	-3,74%	0,76%	-286,86	-1,77	-	-288,63 (-83,49%)
Total	-	0,68%	-1.128,04	-36,32	-65,91	-1.230,28 (-20,7%)

Electricity tax reduction

Figure 2. Distributional impact of P1 by equivalent income deciles



Note: Average percentage change in equivalent income by income deciles.



Source: Eurostat

ECONOMÍA >

Bruselas congelará fondos europeos si no se aprueba antes de marzo la subida fiscal al diésel

La Comisión aprueba una nueva adenda con retrasos y cambios en el plan de recuperación

Una gasolinera en Madrid, el 2 de septiembre de 2024.
CLAUDIO ÁLVAREZ

ANTONIO MAQUEDA

Madrid - 20 DIC 2024 - 05:45 | Actualizado: 20 DIC 2024 - 17:22 CET

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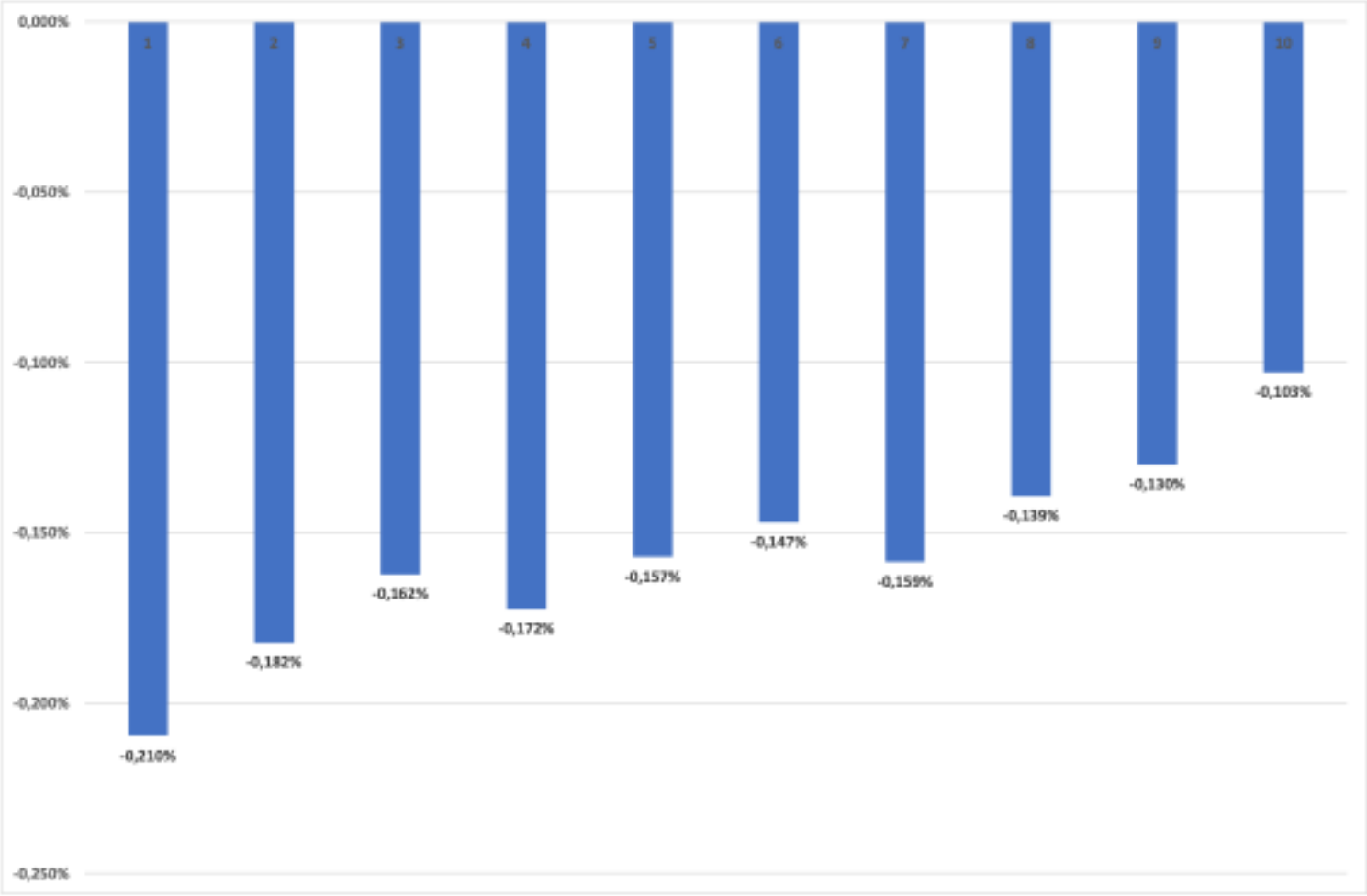
Table 8. Impacts on prices, demand, emissions and revenues of P5

	Final price (%)	Consumption (%)	CO_2 emissions (%)	Additional revenues (Millions of euros)		
				I.E.H	VAT	Total
Residential diesel	9,34%	-1,88%	-1,88%	1.471	266,24	1.737,24 (17,0%)
Non-residential diesel	9,82%	-1,97%	-1,97%	884,08	-	884,08 (25,9%)
Total	-	-1,65%	-1,60%	2.355,09	266,24	2.621,33 (14,5%)

Source: Spanish WB on Tax Reform (2022)

Equal diesel and gasoline tax rates

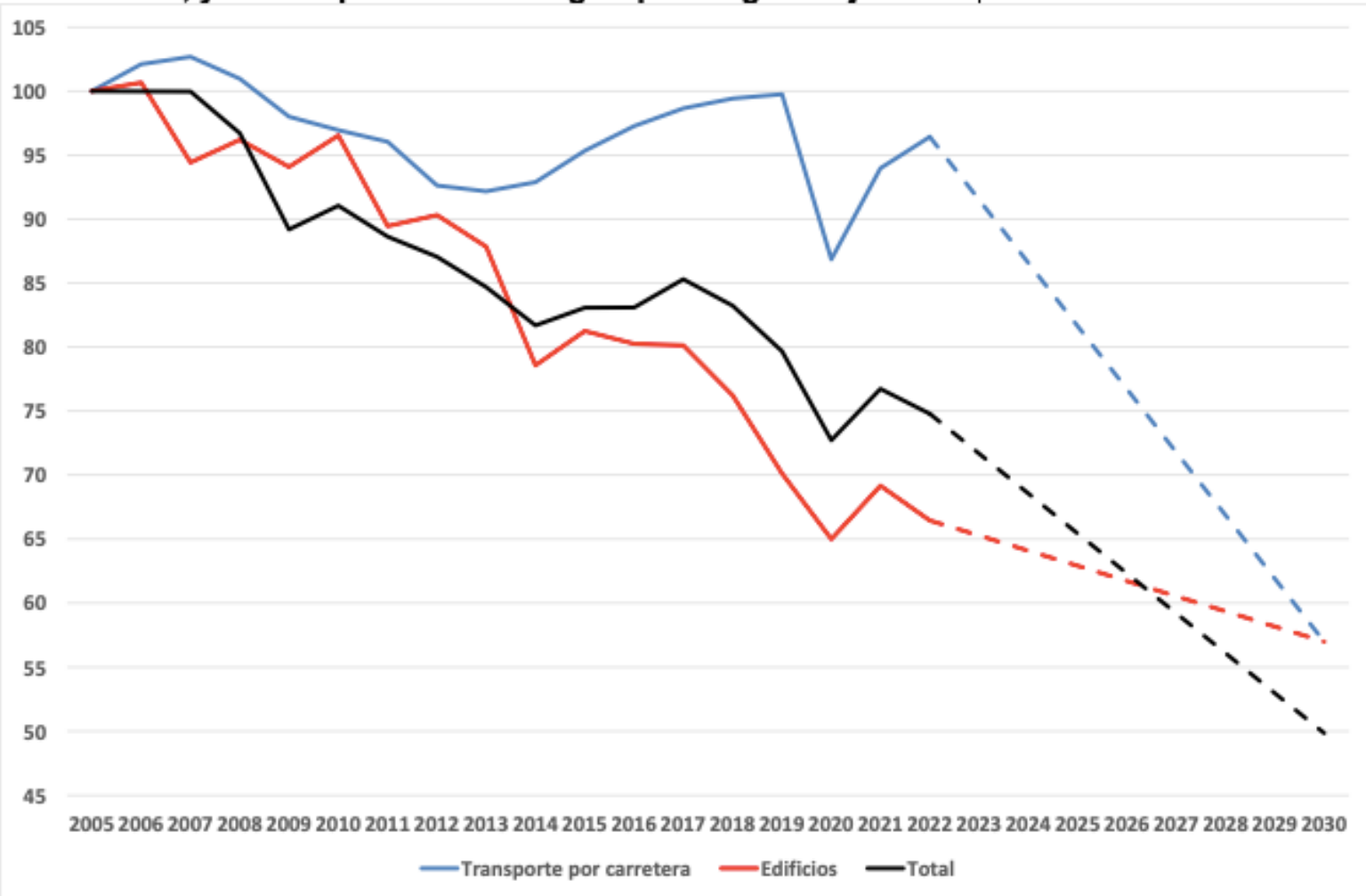
Figure 7. Distributional impact by income deciles of equivalent income of P5



Note: Average percentage change in equivalent income by income deciles.

ETS-2

Evolución (2005-2022) de las emisiones de GEI totales, del transporte por carretera y de los edificios, y senda que deberían seguir para lograr objetivos a 2030. UE-27. 2005=100



Fuente: EEA (2024a, 2024b) y elaboración propia

Nota: En el caso de las emisiones totales, se consideran las emisiones netas, una vez deducidas las absorciones. El objetivo de reducción del 55% de las emisiones totales netas de GEI con respecto a 1990 se traduce en una reducción del 50,1% con respecto a 2005.

ETS-2

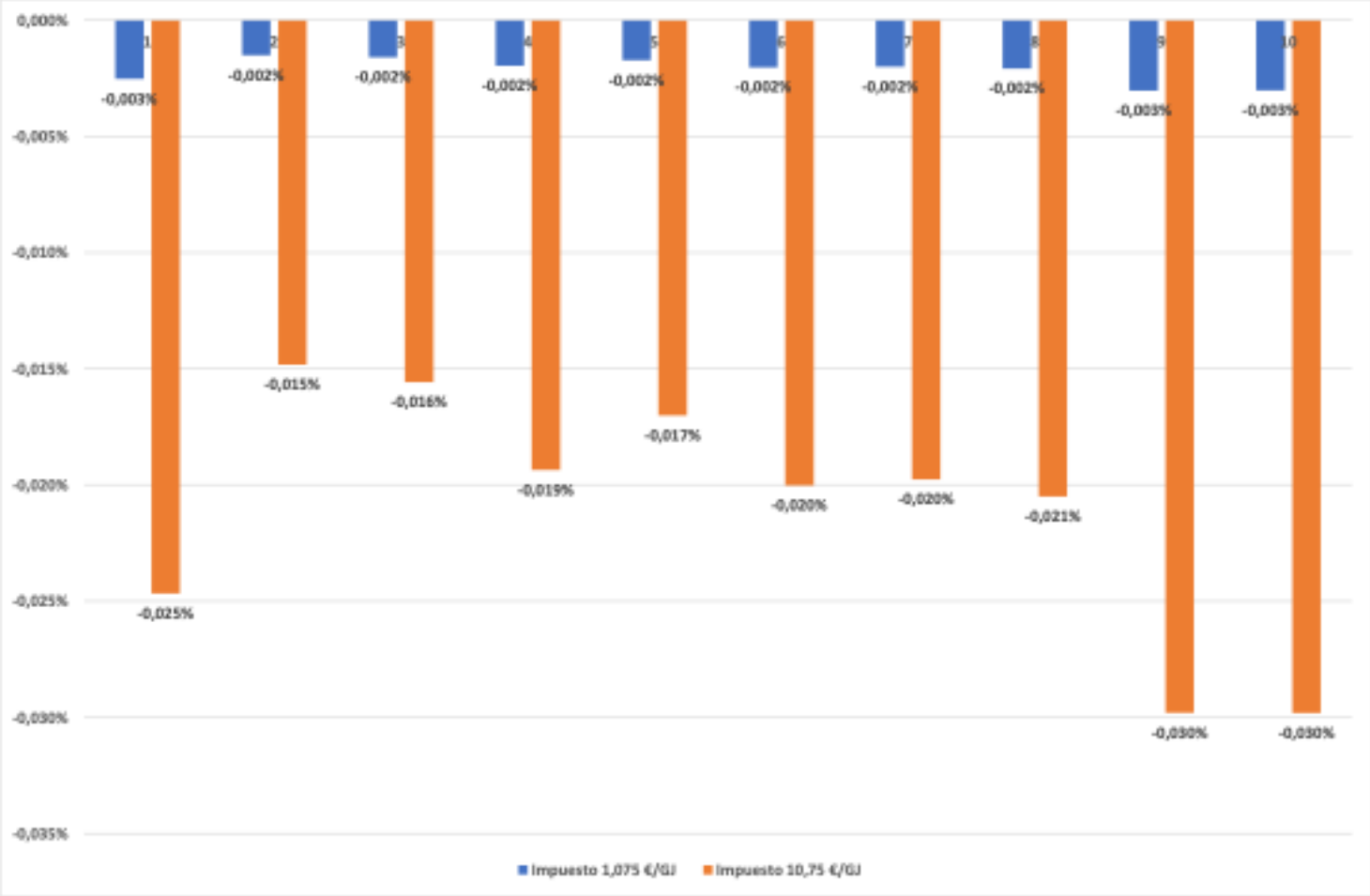
Accisas sobre los carburantes de automoción y los combustibles para calefacción en los países europeos y diferencia con las accisas mínimas. Sector residencial. 2025

	Gasolina (€/1000 l)	Diésel (€/1000 l)	Gas Natural Calefacción (€/GJ)	Gasóleo Calefacción (€/1000l)	Diferencia con la accisa mínima			
					Gasolina (€/1000 l)	Diésel (€/1000 l)	Gas Natural Calefacción (€/GJ)	Gasóleo Calefacción (€/1000l)
Accisa mínima	**359,00**	**330,00**	**0,3**	**21**	-	-	-	-
Alemania	654,50	470,40	1,53	61,35	295,50	140,40	1,23	40,35
Austria	482,00	397,00	0,30	98,00	123,00	67,00	0,00	77,00
Bélgica	600,16	600,16	0,77	17,26	241,16	270,16	0,47	-3,74
Bulgaria	363,02	330,30	0,00	330,30	4,02	0,30	-0,30	309,30
Chipre	429,00	400,00	2,60	74,73	70,00	70,00	2,30	53,73
Croacia	512,31	406,13	1,08	56,14	153,31	76,13	0,78	35,14
Dinamarca	626,53	410,54	9,23	331,03	267,53	80,54	8,93	310,03
Eslovaquia	514,00	368,00	0,37	368,00	155,00	38,00	0,07	347,00
Eslovenia	496,93	458,78	2,01	195,22	137,93	128,78	1,71	174,22
España	472,69	379,00	0,65	96,71	113,69	49,00	0,35	75,71
Estonia	563,00	399,00	1,41	399,00	204,00	69,00	1,11	378,00
Finlandia	685,40	503,80	5,85	265,10	326,40	173,80	5,55	244,10
Francia	682,90	594,00	2,35	156,20	323,90	264,00	2,05	135,20
Grecia	700,00	410,00	0,30	280,00	341,00	80,00	0,00	259,00
Hungría	399,17	373,93	0,00	373,93	40,17	43,93	-0,30	352,93
Irlanda	541,84	425,72	2,81	47,36	182,84	95,72	2,51	26,36
Italia	728,40	617,40	1,19	403,21	369,40	287,40	0,89	382,21
Letonia	532,00	440,50	1,06	108,50	173,00	110,50	0,76	87,50
Lituania	466,00	466,00	0,30	60,00	107,00	136,00	0,00	39,00
Luxemburgo	559,08	452,55	2,53	116,96	200,08	122,55	2,23	95,96
Malta	359,00	330,00	0,84	172,09	0,00	0,00	0,54	151,09
Países Bajos	789,10	516,25	16,58	516,25	430,10	186,25	16,28	495,25
Polonia	422,65	391,12	0,32	54,14	63,65	61,12	0,02	33,14
Portugal	481,26	337,21	0,31	337,21	122,26	7,21	0,01	316,21
R. Checa	508,07	393,72	0,34	26,12	149,07	63,72	0,04	5,12
Rumanía	508,20	465,76	0,47	465,76	149,20	135,76	0,17	444,76
Suecia	451,63	378,36	9,93	378,28	92,63	48,36	9,63	357,28

Fuente: European Commission (2025) y elaboración propia

Kerosene tax (aviation)

Figure 6. Distributional impact of P4A by equivalent income deciles



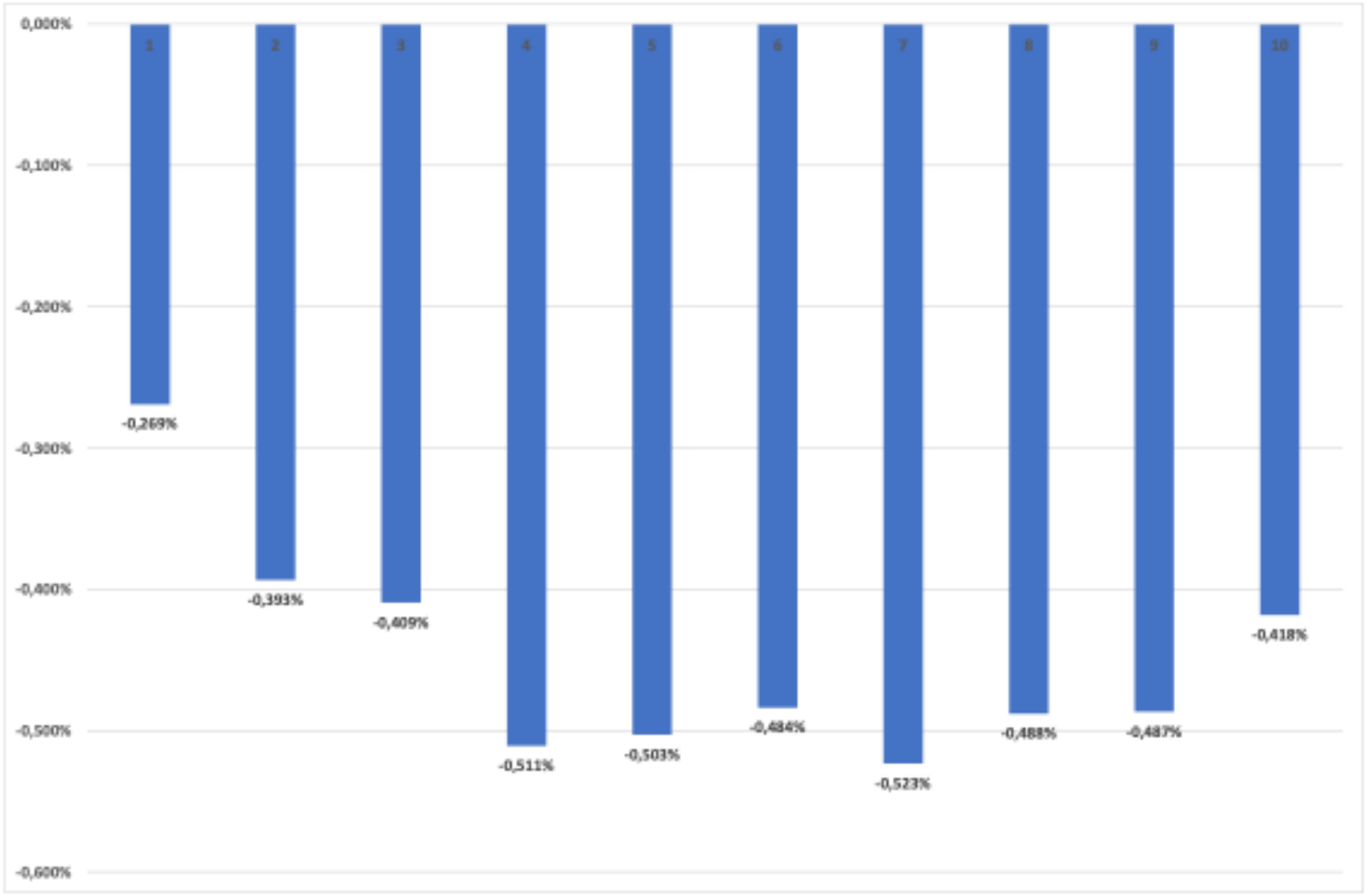
Note: Average percentage change in equivalent income by income deciles.

Table 13. Impacts on prices, demand/emissions and revenues of P1, P3 and P6

	Final price (%)	Consumption and CO_2 emissions (%)	Additional revenues (Millions of euros)					
			IVPEE	I.EE	I. CO_2	FNSSE	VAT	Total
Residential electricity	-11,63%	2,36%	-372,31	-731,47	--	-912,12	-318,47	-1.422,25 (-31,7%)
Non-residential non-electro-intensive electricity	-17,37%	3,53%	-468,88	-583,69	--	-1.255,29	--	-1.052,57 (-94,8%)
Non-residential electro-intensive electricity	-14,18%	2,88%	-286,86	-53,60	--	-762,46	--	-340,45 (-98,5%)
Gasoline 95	15,47%	-3,91%	--	-116,63	692,87	311,42	155,37	1.043,03 (23,7%)
Residential diesel	27,76%	-5,58%	--	1.167,48	2.183,67	841,72	753,69	4.946,57 (48,4%)
Non-residential diesel	29,19%	-5,87%	--	713,21	1.300,58	501,32	--	2.515,11 (73,6%)
Residential natural gas	21,81%	-5,28%	--	42,58	503,48	276,64	129,76	952,45 (97,2%)
Non-residential natural gas Non-EU ETS sectors	48,55%	-11,75%	--	218,05	755,03	414,85	--	1.387,94 (2.733,8%)
Non-residential natural gas EU-ETS sectors	22,25%	-5,39%	--	311,72	--	583,91	--	895,63 (1.343,7%)
Total	--	-3,07% -3,90%*	-1.128,04	967,66	5. 435,63	--	720,34	8.925,47 (35,6%)

Note: *Change in CO_2

Figure 15. Distributional impacts by equivalent income deciles of P1, P3 and P6



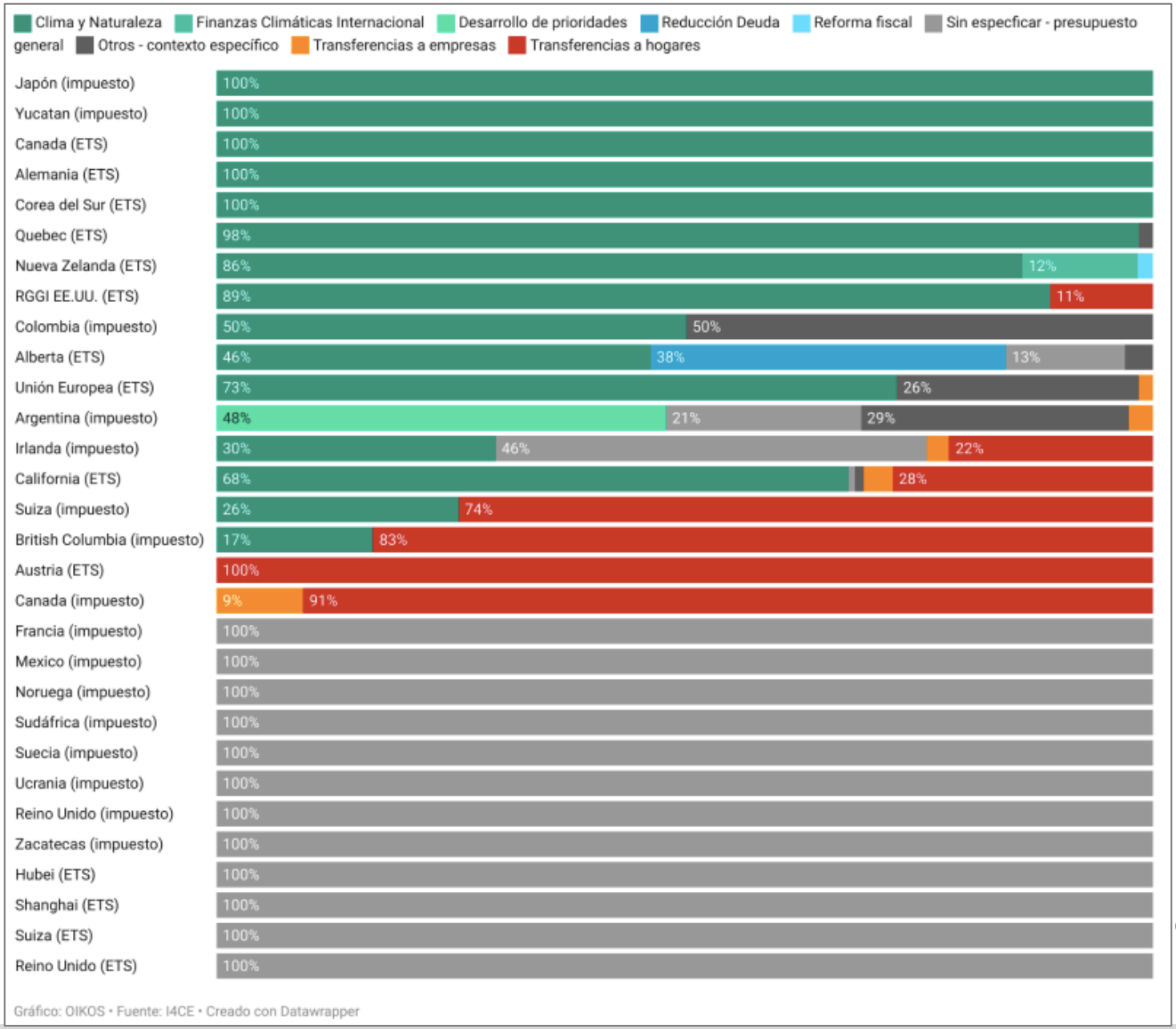
Note: Average percentage change in equivalent income by income deciles.

Source: Spanish WB on Tax Reform (2022)

- **Fiscal policies and compensations**
  - *Ad hoc* (income groups, etc.) or general
  - Short-term or long-term (stock)
  - On prices or income

  - Within specific taxes (price or stock)
  - Green tax reform fashion
  - Use of expenditure
    - Price subsidy vs direct cash transfer
    - Subsidy to change of stock

Carbon pricing across the world



Oikos (2025)

Viernes 18 de junio de 2021 ELPAÍS 13

OPINIÓN

Una compensación justa en la transición verde

XAVIER LABANDEIRA

Para proteger los avances hacia la sostenibilidad se debe minimizar la desigualdad en el reparto de costes de la política climática, dando ayudas no en general, sino de manera selectiva a los más afectados

En las últimas semanas ha quedado claro que el camino a la descarbonización de nuestras economías no será fácil. A pesar de que la población de los países avanzados declara una preocupación creciente por los problemas del cambio climático, se multiplican las protestas ante el aumento de los precios energéticos causados por las políticas climáticas y en algunos lugares empieza a discutirse la acelerada expansión de las renovables. El fenómeno, que empieza a sentirse con fuerza en España, es generalizado; como botón de muestra, el resultado negativo del referéndum suizo del pasado domingo sobre la ley de cambio climático, avalada por casi todas las fuerzas políticas. En la disparidad entre deseos y praxis de la población, sin duda las cuestiones distributivas (quiénes, aparentemente, se benefician y quiénes asumen los costes de la transición) representan un papel fundamental.

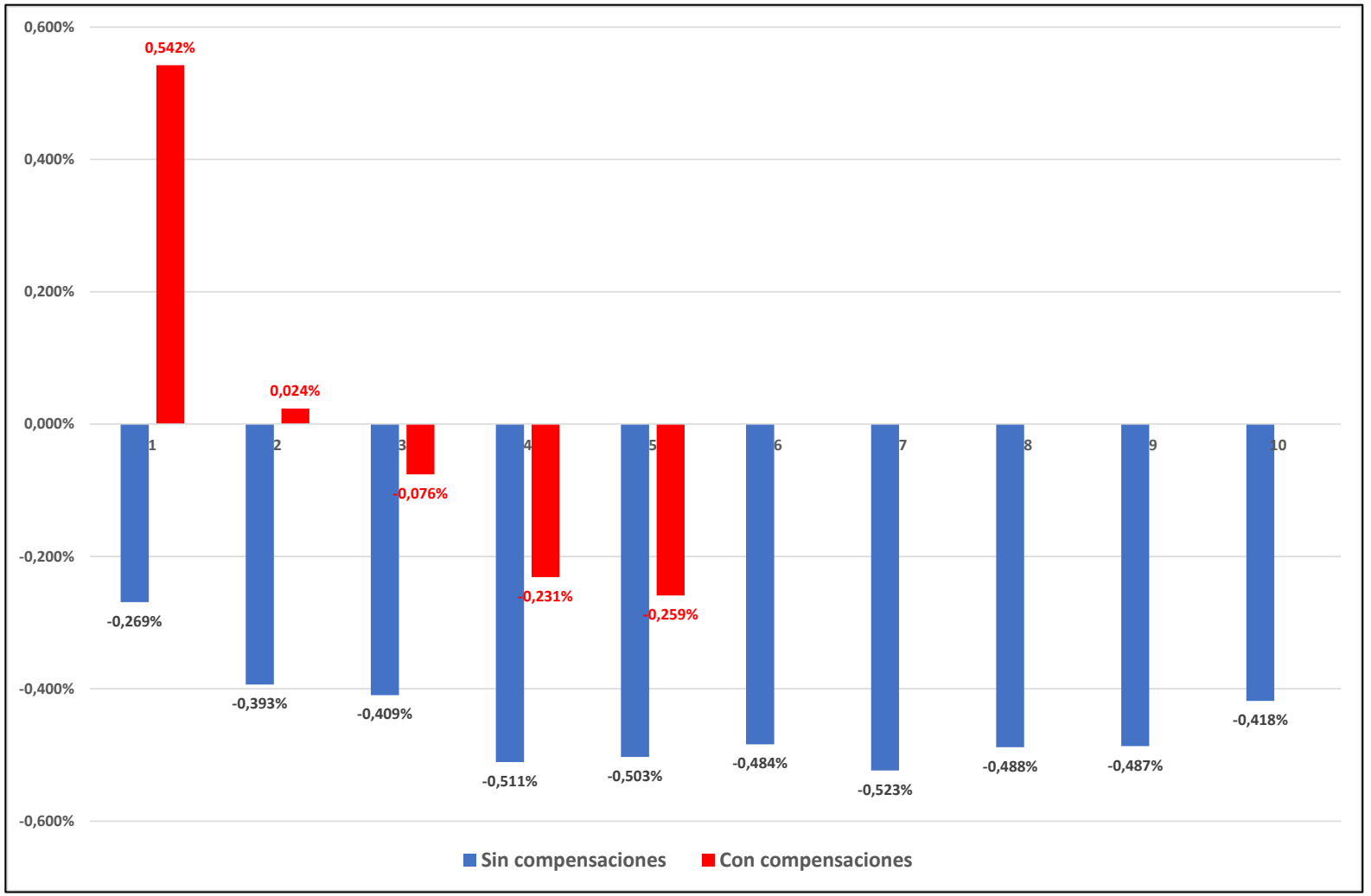
No deja de sorprender que la solución a un problema esencialmente distributivo como el cambio climático, causado por las mayores emisiones de los más pudientes y

tuación correctora de la política climática; deben concentrarse exclusivamente sobre los más vulnerables (territorios, sectores y grupos de renta); y deben ser capaces de revertir íntegramente los efectos negativos en el corto plazo y de resolver el problema distributivo en el medio plazo.

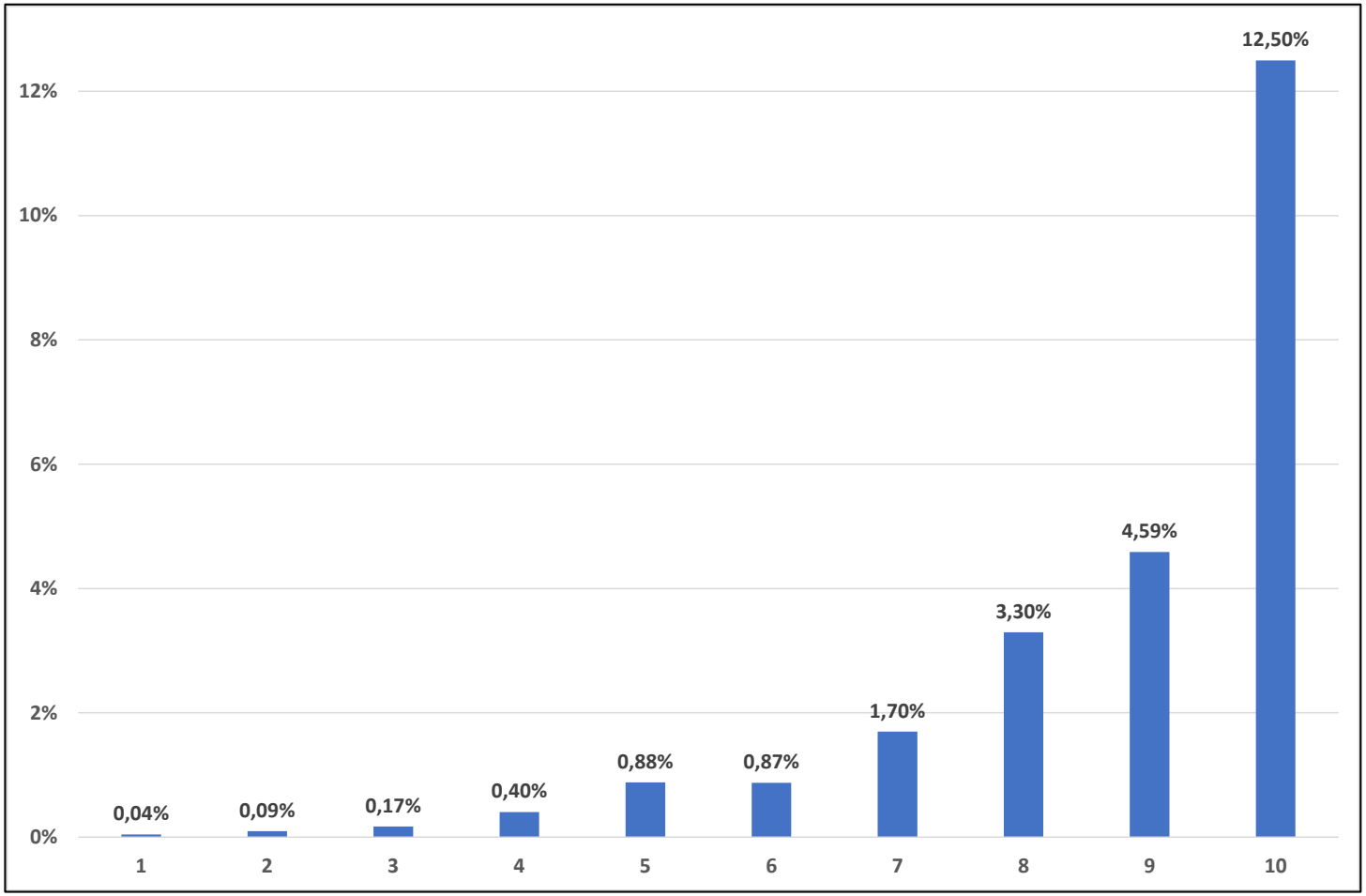
No tiene sentido, por ello, retrasar el progreso de la transición manteniendo artificialmente bajos los precios de los productos energéticos, en particular los combustibles fósiles, para proteger a los que menos tienen. Primeramente, porque esto evita que se adopten los cambios de comportamiento e inversión necesarios para la corrección climática, engordando aún más la bola de nieve a la que me referí antes. Por si fuera poco, estas medidas tan burdas acaban beneficiando, con la excusa de proteger a ciertas capas sociales, a los que más tienen por sus elevados consumos energéticos. Precisamente, por eso no tienen sentido estrategias compensatorias generalizadas, de *café para todos*, y urge ser muy selectivo en su aplicación. Entre ellas destaca lo que podríamos denominar *cheque verde*, una cantidad monetaria que sirva para

https://n9.cl/aumbl

Compensations through transfers unrelated to prices



Households who purchased cars by decile of equivalent income. Spain 2023 (EPF)



Change in household income by decile from clean vehicle subsidies in Spain, 2023

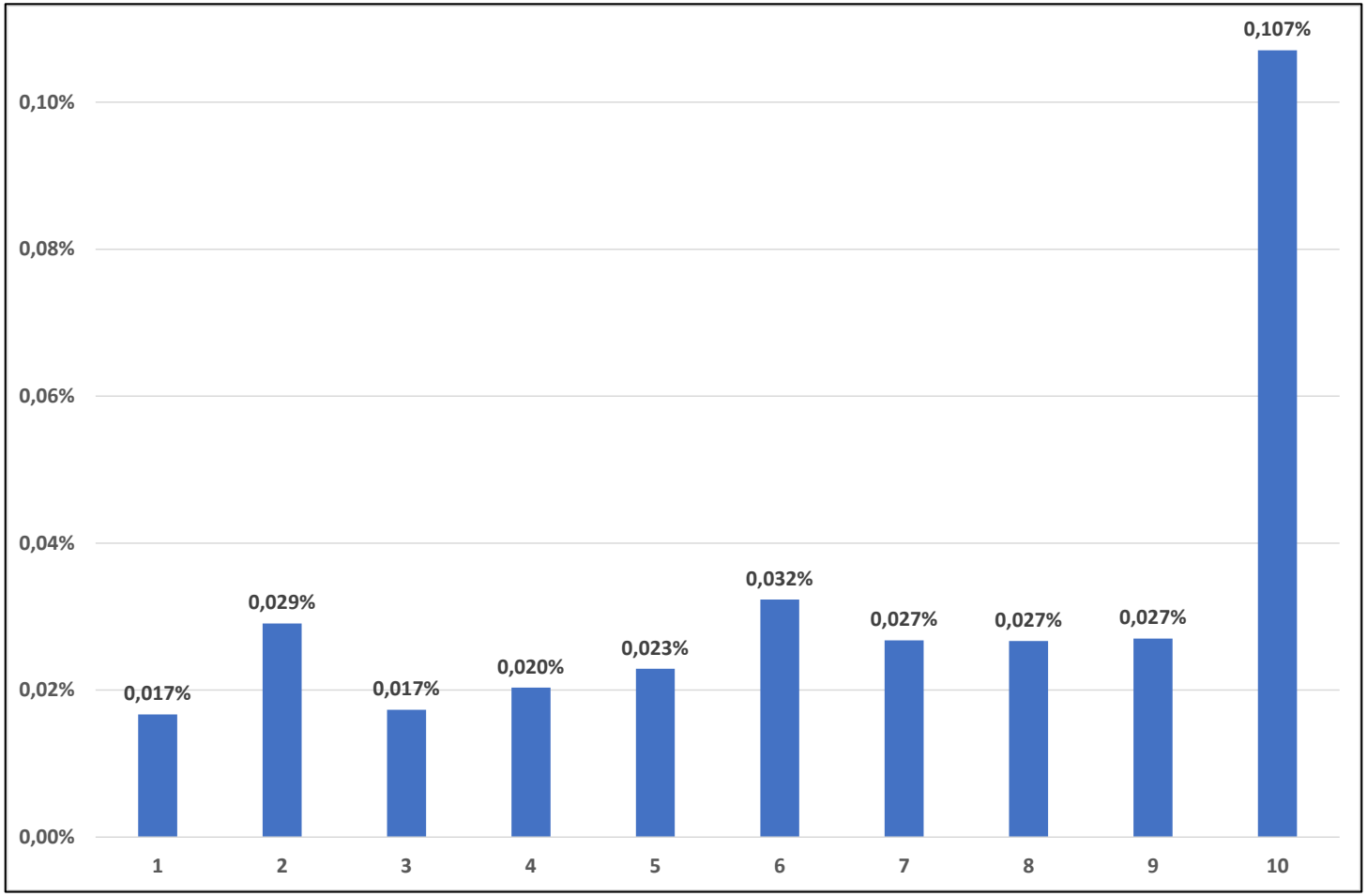
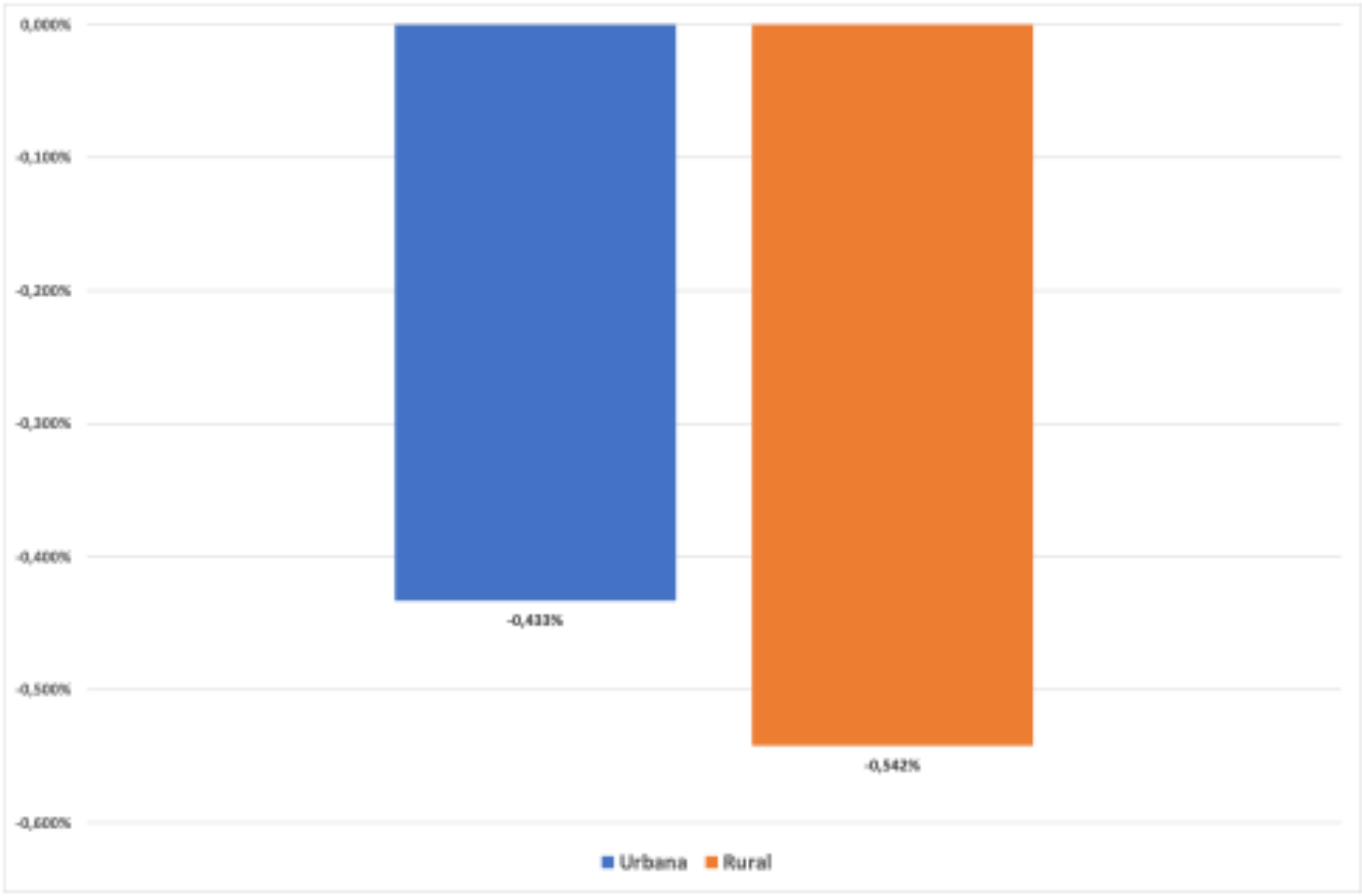


Figure 17. Impact on the equivalent income of rural/urban areas of P1, P3 and P6



Note: Average percentage change in equivalent income by income deciles.

Source: Spanish WB on Tax Reform (2022)

Constraints in practice…

Measures implemented by European countries to tackle the 2022 energy crisis and expenses

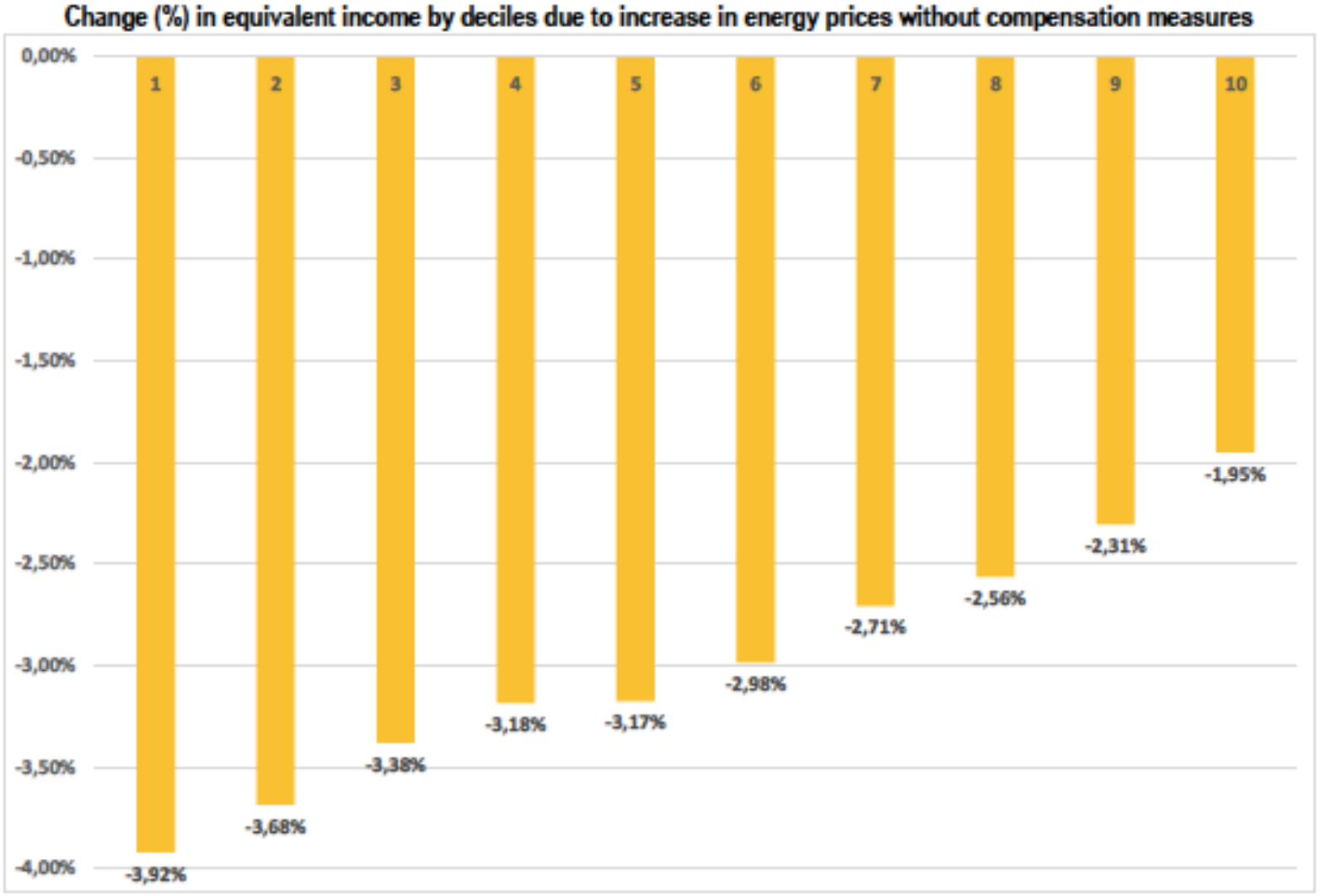
	Reduced energy tax/VAT	Retail price regulation	Wholesale price regulation	Transfers vulnerable groups	Mandates to state-owned firms	Windfall profits tax/regulation	Business support	Other	Expenses (% GDP)
Austria	X	X		X			X	X	2.6
Belgium	X	X		X			X	X	0.8
Bulgaria	X	X		X		X	X		5.3
Croatia	X			X			X		4.2
Cyprus	X			X	X				0.8
Czech R.	X	X		X			X	X	3.4
Denmark	X	X		X					2.1
Estonia	X	X		X			X		1.0
Finland	X			X			X	X	0.5
France	X	X	X	X	X		X	X	2.8
Germany	X	X		X			X		7.4
Greece	X			X	X		X		5.7
Hungary	X	X				X	X		-
Ireland	X			X		X	X	X	0.9
Italy	X			X		X	X		5.1
Latvia	X			X			X		3.2
Lithuania				X			X	X	6.6
Luxemburg	X	X		X			X		3.3
Malta			X		X				7.0
Netherlands	X	X		X					5.1
Norway	X			X			X		2.0
Poland	X	X		X		X			2.2
Portugal	X		X	X	X		X		3.3
Romania	X	X		X		X	X		3.5
Slovakia		X		X	X		X		3.7
Slovenia	X			X			X		1.0
Spain	X	X	X	X			X		3.2
Sweden	X			X		X		X	0.3
United Kingdom	X	X		X			X	X	3.5

Source: Sgaravatti *et al.* (2022)

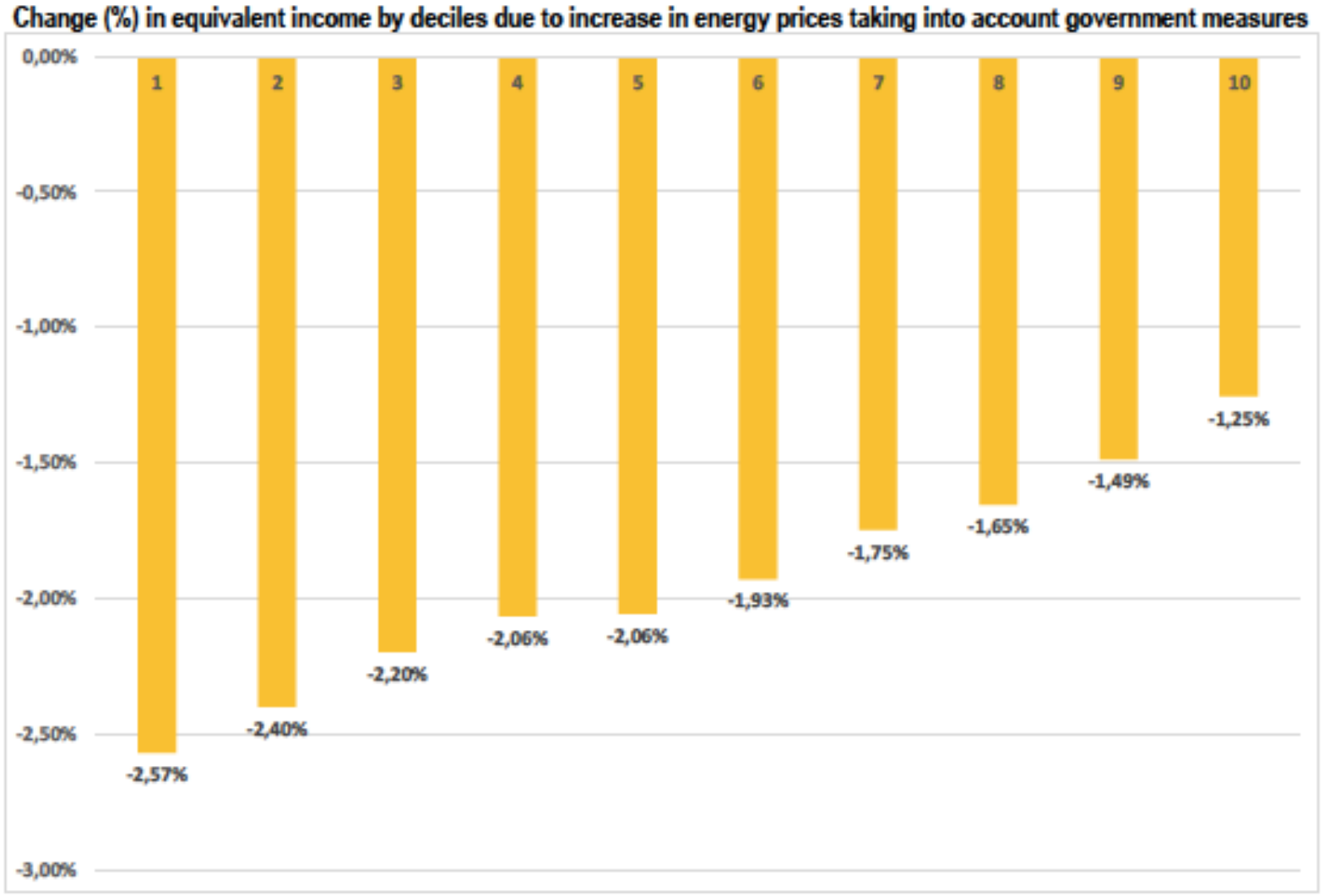
Residential impacts of energy price increases, without compensatory interventions, on demand, emissions and public receipts

	Price increase (%)	Demand/ emissions (%)	Change in public receipts (million euro and % increase)			
			Generation tax	Excise tax	VAT	Total
Electricty	96.30%	-19.55%	370.02 (58.09%)	482.67 (57.93%)	2083.90 (57.93%)	2936.60 (57.95%)
Gasoline 95	36.20%	-9.16%	-	-268.56 (-9.16%)	351.96 (23.73%)	83.39 (1.89%)
Diesel	40.50%	-8.14%	-	-569.95 (-8.14%)	1157.89 (29.06%)	587.95 (5.35%)
Natural gas	40.60%	-9.83%	-	-15.05 (-9.83%)	252.53 (26.79%)	237.48 (21.67%)
Total	-	-10.77% (demand) -9.91% (emissions)	370.02 (58.09%)	-370.88 (-3.40%)	3846.28 (38.43%)	3845.42 (17.83%)

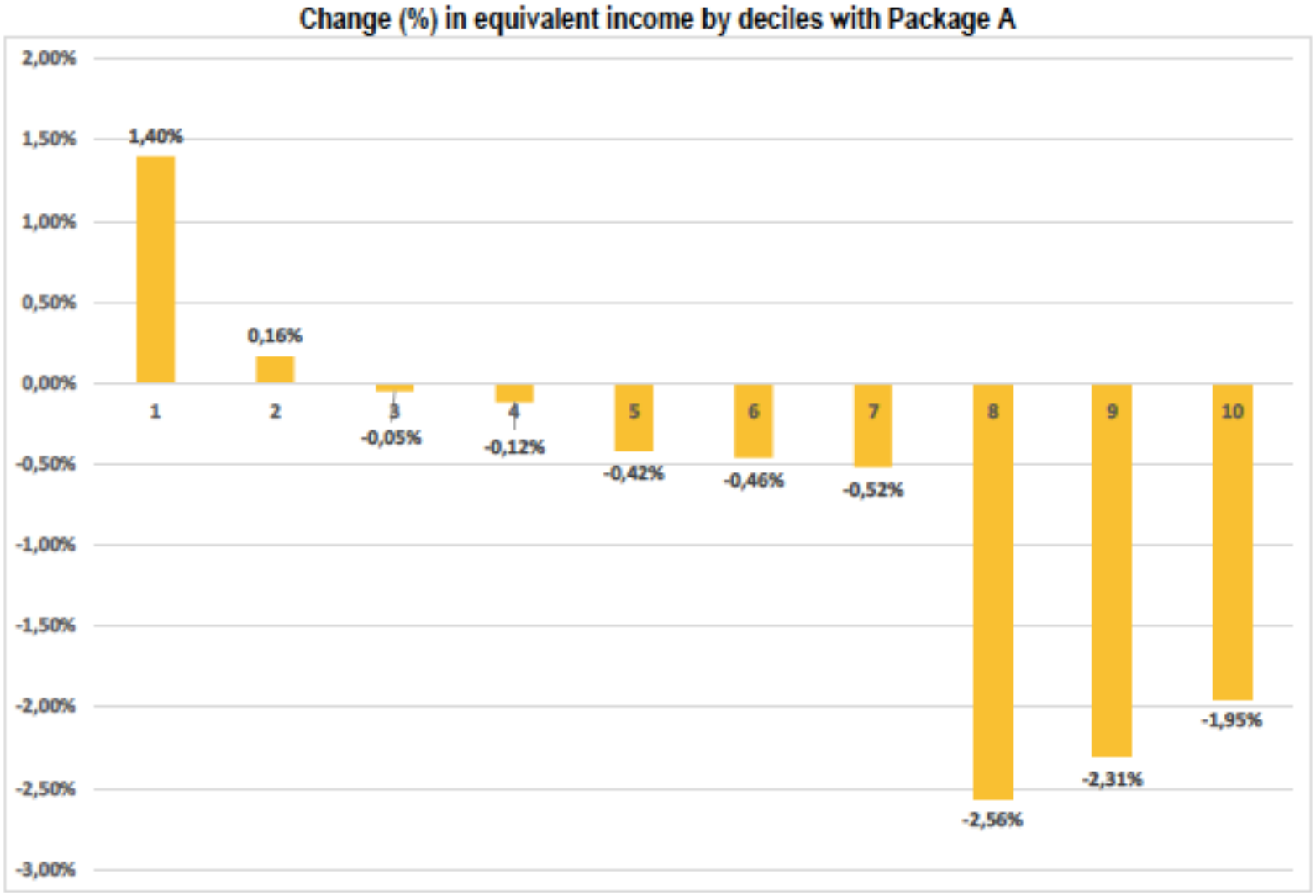
No compensatory policies



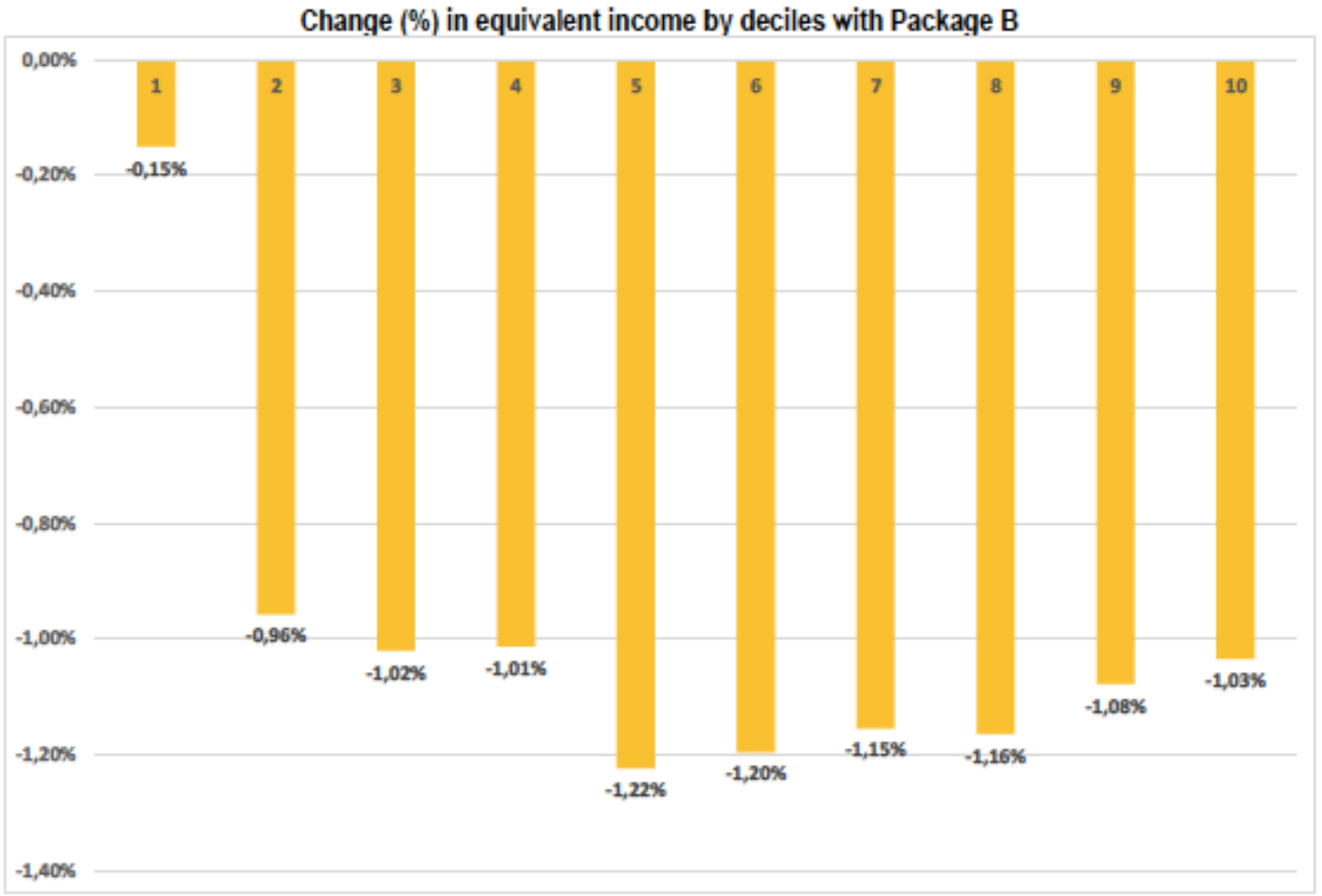
Actual compensations by the Spanish government



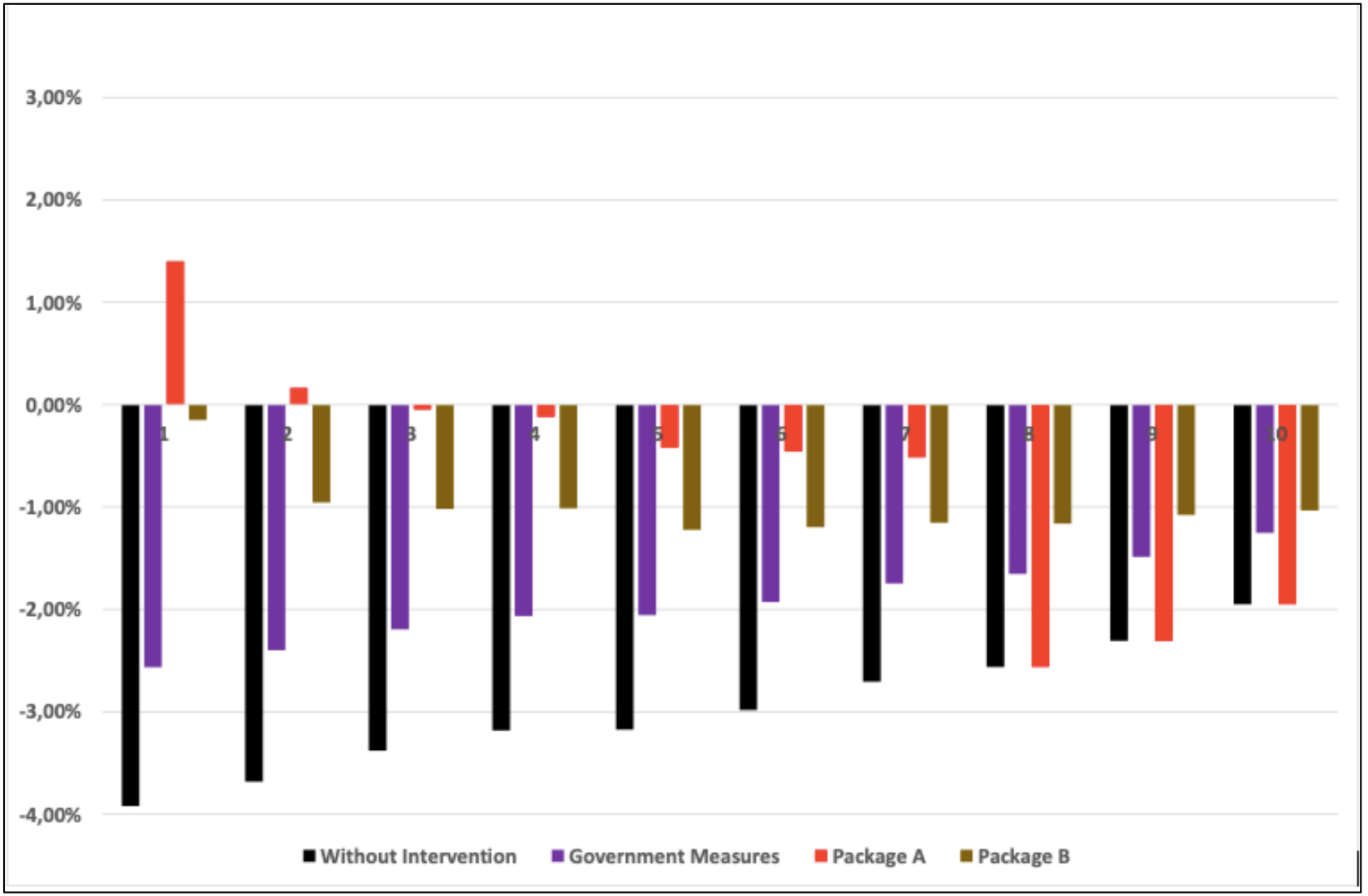
‘White-book’ type compensation



Equal lump-sum to all households



Comparison of distributional outcomes



- **New approaches**
  - Why?
    - Income and wealth polarisation
    - Poverty
    - Unequal climate responsibilities and impacts
  - How?
    - Selection of 'less-damaging' instruments
    - Changes in the design of environmental instruments
    - Taxing wealth for climate change mitigation?

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TRIBUNA

Cambio climático, impuestos y equidad: instrucciones de uso

No tenemos que inventar nada nuevo ni generar confusión innecesaria, simplemente emplear desde ya los impuestos existentes

Un grupo de residentes lleva sus pertenencias en la provincia de Punjab durante las inundaciones de Pakistán del verano pasado.
SHAHID SAEED MIRZA (AFP)

XAVIER LABANDEIRA

10 FEB 2023 - 12:27 CET

https://n9.cl/ozpkc

Conclusions

- Climate change brings about huge distributional effects, from many angles
- Offsetting negative distributional impacts is crucial for a feasible transition
- Fiscal policies should play a big role
- Proper design and implementation are needed: well-targeted, incentive-compatible and long-term approaches
- Public sectors must adapt deeply to this new compensatory landscape
- Sub-optimal policies might be occasionally necessary to facilitate progress in decarbonisation due to pervasive trade-offs

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