How to almost knock down a market inadvertently and not fail in the attempt?
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How to almost knock down a market inadvertently and not fail in the attempt? The case of the tax on "luxury cars" in Argentina

¿Cómo casi destruir un mercado sin querer y no fallar en el intento? El caso del impuesto sobre los "automóviles de lujo" en Argentina

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Abstract

Under the pressure of a growing capital outflow, by the end of 2013 the Argentine government implemented what was known as the tax on "luxury cars". Even when not explicitly declared, the main objective was to reduce imports of most expensive cars to reduce the trade deficit of the automotive sector, which was contributing heavily to the capital account deficit. Even when the policy could be categorized as "successful" in terms of reducing a USD 4.5 billion deficit in 2013 to one of just over USD 0.7 billion in 2014, it had a devastating and lasting impact on the internal market, that just in 2013 had achieved a record in sales. We obtain that during the first year of the implementation of the tax, the overall impact on sales of models reached by the tax was 53.7%. Despite some differences, the negative impact took place throughout the whole year. Not surprisingly, cars reached by the highest tax rate were most affected, as well as carmakers that produce more expensive varieties. However, even when the measure may have been designed to have a direct impact on a small part of the market, the negative effects extended to the whole market.

Keywords: Internal Tax, Automotive Sector, Impact Evaluation, Argentina.

JEL Code: A10, D04, H20.

Resumen

Bajo la presión de una creciente salida de capitales, a fines del año 2013 el gobierno argentino implementó lo que se conoció como el impuesto a los "autos de lujo". Aunque no declarado explícitamente, el objetivo principal era reducir las importaciones de los automóviles más caros para reducir el déficit comercial del sector automotriz, que contribuía de manera importante al déficit de la cuenta de capital. Más allá del hecho de que la política podría calificarse de "exitosa" en cuanto a la reducción de un déficit de USD 4.500 millones en 2013 a uno de poco más de USD 700 millones en 2014, tuvo un impacto devastador y duradero en el mercado interno, que apenas un año antes, en 2013, había alcanzado un récord de ventas. Los resultados muestran que durante el primer año de la aplicación del impuesto, el impacto global en las ventas de los modelos alcanzados por el mismo fue del 53,7%. A pesar de algunas diferencias, el impacto negativo se produjo a lo largo todo el año 2014. No sorprende que los automóviles alcanzados por la tasa del 50% fueran los más afectados, así como los fabricantes de modelos más caros. Sin embargo, incluso cuando la medida puede haber sido diseñada para tener un impacto directo en una pequeña parte del mercado, los efectos negativos se extendieron a la totalidad del mismo.

Palabras clave: Impuesto Interno, Sector Automotriz, Evaluación de Impacto, Argentina.

Código JEL: A10, D04, H20.

I. Introduction

By the end of November 2011, and after a deepening in the rate of capital outflows, the Argentine government started to implement a set policy measures directed to restrict access to foreign currencies, and especially to reduce capital outflows. The main measure was known as *"cepo cambiario"*, which meant the need to obtain a previous authorization to buy foreign currency, imposing increasing restrictions on imports, the sending

of profits abroad, etc. Later other measures followed, such as the implementation of non-automatic import licenses.[1] Despite these and other measures, the Capital Account of the Balance of Payment continued to deteriorate. Even more, the difficulties in access to the foreign currency market have a negative effect on the evolution of exports, especially from sectors highly dependent on imported inputs.

In December 2013, the government implemented yet another measure. Law 26929 established an internal tax on the sales of cars whose producer prices were above two thresholds: $A 170 thousand and $A 210 thousand.[2] Even when it was not a measure designed to directly impact on the foreign currency market, the idea behind it was to reduce substantially the sales of the most expensive cars, which were, in most cases, imported from abroad, representing a small share of the automotive market.

In terms of its impact on the currency trade balance, we could say that the measure was a success, reducing the foreign trade deficit of the automotive sector[3] from USD 4.5 billion in 2013 to one of just USD 0.7 billion in 2014. This change was the result of a massive reduction in imports, from USD 15 billion in 2013 to USD 9.5 billion in 2014, but also an important reduction in exports by USD 1.8 billion. Among other reasons behind this turnaround was the reduction in the overall economic activity, and not least the increasing difficulties in importing intermediate inputs, on which the automotive sector is highly dependent.

However, the implementation of the tax had also devastating and lasting impacts on the whole market, with a reduction in sales of new cars by almost 31% in 2014 and a further 8.3% in 2015, and with production dropping by 28.2% and 15.1%[4] respectively. The magnitude of the fall in sales is evident from Figure 1, with a reduction of 47.5% in the case of car models

1.These were known as *"Declaración jurada anticipada de importación"* (Early affidavit import), which by mid-2015 were declared in violation of WTO regulations. From January 2016 they are not in force.

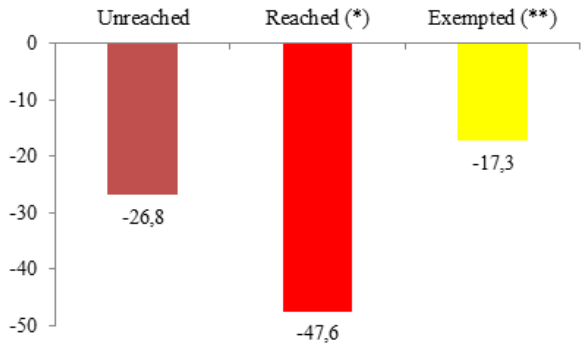
2. About USD 27000 and USD 33000 respectively, at the moment of the Law being passed. These thresholds were updated at the end of 2014, and once again in June 2015 distinguishing also between domestically produced and foreign models.

3. Code 34 of the International Standard Industry Classification (Revision 3): Manufacture of motor vehicles, trailers and semi-trailers.

4. This figure excludes the production by one unidentified car maker.

for which the tax reached at least one variety, however, sales of unreached car models also dropped by 26.8%, while for exempted vehicles there was a reduction of 17.3%. Figure 2 shows clearly that after the implementation of the new tax rates, reached varieties fell much abruptly than unreached ones did. From Figure 2 we can observe that both series exhibit a quite similar temporal pattern before the implementation of the new tax rates.

Figure 1: Annual growth rate of sales of 0 Km vehicles: 2014



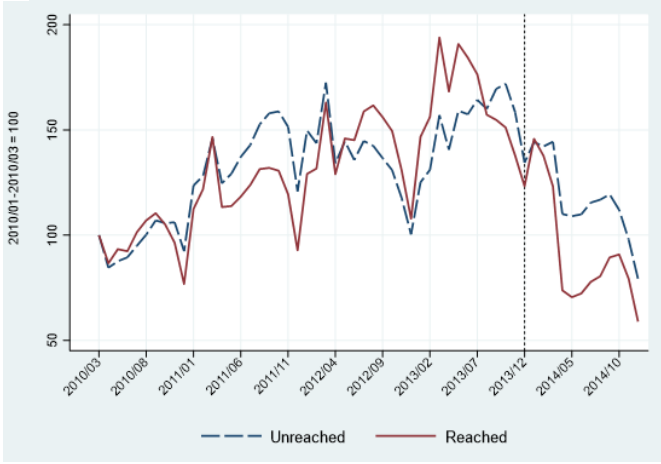
(*) The tax reached at least one variety of the car model in 2014.

(**) Trucks, heavy trucks, and other heavy vehicles.

Source: own calculations based on ACARA.

An interesting pattern arises when we look at the evolution of prices. As Table 1 reports, all prices started to increase as soon after the new tax rates were in force, with prices of varieties reached by the car doing at a faster pace. However, by the end of 2014 prices of unreached varieties have increased almost in the same percentage of those varieties subject to the 30% tax rate. This result may find its explanation in the fact that as the new tax rates came into force, carmakers saw an opportunity to also increase the prices of cars which were not taxed because their prices fell below the reference values, but which were the closest substitutes for those affected by the 30% rate. As 2014 progressed, the evolution of the average price of the car models that were not reached by the tax meant a reduction of the price gap generated at the beginning of the implementation of the tax with respect to the models for which some of their varieties were reached by the different tax rates. This pattern may help explaining why as the new tax rates were implemented, the entire market experienced an astonishing reduction in sales, and not only those varieties reached by the new rates.

Figure 2: three-month moving average sales



Source: own calculations based on ACARA.

Table 1: average percentage change in prices (w.r.t. December 2013)

	Unreached	Reached (tax rate)		
		0/30/50%(*)	30%	50%
January 2014	3.6	33.5	22.7	90.3
February 2014	19.9	62.8	37.4	116.1
March 2014	23.8	75.5	35.4	118.0
April 2014	24.9	74.9	36.6	121.4
May-14	24.9	66.7	37.3	122.5
June 2014	27.7	72.3	38.7	119.2
July 2014	28.6	73.3	39.3	120.0
August 2014	30.3	74.3	42.0	123.5
September 2014	34.7	76.8	43.7	125.8
October 2014	36.5	76.5	44.8	127.2
November 2014	40.6	81.5	45.4	128.6
December 2014	48.2	86.2	46.0	129.9

(*) It includes car models whose varieties during the year 2014 were reached by different tax rates.

Source: own calculations based on ACARA.

Were these side effects on the rest of the sector unforeseen by policy makers? Even when there is no direct answer to this question, we believe that in the light of other policies pursued by economic policymakers at the time, a positive response could be an educated guess. The reason behind this assertion is that if we look at the set of policies implemented over several years, it would seem that there was an (implicit?) understanding that the economic system works as separate compartments, with an astonishing inability, on the edge of even malpractice to recognize that agents and markets in an economy are parts of an interrelated system.

The objective of the paper is twofold. On the one hand, to quantify, through the use of some standard econometric techniques, the impact the implementation of the tax "on luxury cars" had on sales, both on car models directly reached by the tax as well as on those that were not directly affected. On the other hand, to raise awareness on the importance of proper design of policy measures. As we show later, the case under analysis, whose intention was originally directed to affect only a small and specific part of the automotive market, had a devastating impact on the entire sector. The next section briefly discusses the dataset we work with, while in section 3 we lay out the empirical approach and present the results. Section 4 is of summary and conclusions.

II. DATA

Using two separate datasets for cars 0 Km, one with monthly information on sales and the other with monthly information on prices[5], we managed to build up a new and until now unavailable database for the period January 2013 to December 2014.[6] The comparison of these two years is quite informative for our purposes because after that the most important part of the world economic crisis that began at the end of 2008 was over, the domestic car market experienced an important upward tendency reaching in 2013 a record of sales[7], dropping abruptly in 2014 during the first of the two years the new tax was in force.

5. Prices are "suggested sale prices" by car makers to car dealerships. There is no information on prices actually set by car dealerships.

6. We thanks the collaboration of ACARA (*Asociación de Concesionarios de Automotores de la República Argentina)* for the provision of the raw data.

7. With a minor proportion of models produced locally, especially for high-brand models, this explains in part the magnitude of the foreign trade deficit experienced by the sector in 2013.

In both datasets, we have information on the carmaker, the car model, and within each model the different varieties. However, we need to deal with some issues that do not allow us to merge the two datasets directly at the variety level. The first issue is that either because of real changes or marketing policies, the identification of vehicles at the variety level changes substantially over time, so, in many cases, it is not possible to have data for the entire period for a given variety. The second issue is that the definitions of the varieties by carmakers are not necessarily identical to the ones available on the sales dataset, with the latter determined by the official denomination at the moment the car is registered after being sold. Because of these two problems, we are forced to work at the car model level.[8]

With prices set at the level of variety, and so if whether the tax reached a variety, there is a need to decide how to deal with those cases where some varieties of a car model fell under the tax, while others did not, and also when some varieties were reached by the rate of 30%, while others by the rate of 50%. Here we adopt two alternative criteria:

i) in a given month of 2014 we identify a car model as reached by the tax if at least one variety fell under the tax, either with the 30% or 50% rate,

ii) in a given month of 2014 we distinguish between models fully and partially reached, as well as in function of the applied tax rate. In this way, we work with three groups: i) all varieties were reached by the 30%, ii) all varieties were reached by the 50%, iii) all other possible combinations.

In summary, we have a balanced panel with 155 car models for which we have consistent data on prices and sales. Of the car models for which the tax reached at least one variety, in 4 cases the tax rate was in all cases 30%, in 51 was always 50%, and in the remaining 42 cases there is a mix of situations. For the year 2014, when the tax was in force, we have 1860 observations, with 696 corresponding to cases where no variety fell under the tax, 972 observations where all varieties for a given car model were reached by the tax, and 192 observations with a mixed situation, some varieties reached by the tax while others were not. Finally, because in 243

8. The impossibility of working at a greater level of detail most likely means that our estimates are underestimating the true magnitude of the negative impact.

observations we have zero sales, and because our dependent variable is measured in logs, the sample we work with is 3477 observations.[9]

III. EMPIRICAL METHODOLOGY AND RESULTS

To obtain a first estimate of the impact of the internal tax on sales, we apply a Difference-in-Difference (DD) equation of the following form:

$$\ln S_{it} = \alpha_0 + \alpha_1 d_{2014} + \alpha_2 d_T + \alpha_3 \left(d_{2014} \times d_T \right) + \alpha_4 d_{PCA} + u_{it}$$

where S_{it} are sales of model i in month t, d_{2014} is a dummy variable for the year 2014 that captures aggregate factors that would cause changes in S_{it} even in the absence of the implementation of the tax in that year, d_T is a dummy variable equal to 1 if car model i was subject to the tax (belongs to the treated group), which captures possible differences between the treatment and control groups before the tax, d_{PCA} is a dummy variable equal to 1 for car models of which some varieties were included in the *ProCreAuto* plan, implemented between July and December 2014 under which the government subsidized the interest rate on loans to buy some locally produced models, u_{it} is an error term assumed to be i.i.d. Our coefficient of interest is α_3, which measures the difference in the average changes in sales for the treated and control groups because of the tax:

$$\hat{\alpha}_3 = \text{Average change in E } (\ln S_{it} \mid d_T=1, d_{PCA}) \\ \text{- Average change in E } (\ln S_{it} \mid d_T=0, d_{PCA})$$

We also modify equation (1) accordingly to allow α_3 to vary depending on the month of 2014, car maker, and the tax rate.

A potential drawback of equation (1) is that it does not allow to control for the unobserved heterogeneity amongst car models since it assumes that within each group, treated and not treated, there is no heterogeneity. Since our dataset has a panel structure, with car models observed in 2013

9. Our sample represents 96% of sales in 2013 and 92% in 2014. We exclude models with very small and intermittent sales in both years, but more important, we exclude models that were introduced to the market later in 2013, as well as those that were withdrawn early in 2014. In the first case it appears the Ford K (2.5% of sales in 2013), while in the second case two models stand out: Toyota Etios (3.9% of sales in 2014) and Citroen C4 Lounge (1.3% of sales in 2014).

before the implementation of the tax and also in 2014 when the tax was in force, to account for the unobserved heterogeneity among car models, we also estimate a fixed effect model:

$$\ln S_{it} = \beta . d_{iT} + \phi d_{PCA} + \lambda_t + \eta_i + u_{it}$$

where λ_t is a monthly effect, η_i is a car model fixed effect, and d_{iT} ($=d_{2014}$ x d_T) is a dummy variable equal to 1 in all months of the year 2014 if car model i was subject to the tax, and 0 otherwise. Similarly to equation (1), the coefficient β is the difference-in-difference estimator but now it differentiates the means of the same units over time (Imbens and Wooldridge, 2007). As before, we also adapt equation (2) to allow coefficient β to vary depending on the month of 2014, car maker, and the tax rate. As pointed out before, an advantage of equation (2) over (1) is the former allows to control for the unobserved heterogeneity among car models, and by the inclusion of a set of monthly effects we can control for the heterogeneity over time of changes in aggregate factors that may have affected the whole market.

Both previous specifications are aimed at answering the question of what was the effect of the tax on car models reached by the tax (the treated group) *vis* a *vis* car models that because their prices were unreached (the untreated group). However, another important and different question is to what extent the tax also affected unreached car models, compared to the hypothetical situation in which the tax had not existed. Here we can expect the effect to go in either direction. For instance, if reached and unreached car models are close substitutes, we could expect a positive effect on sales of cheaper cars that fell short of the tax thresholds. On the contrary, if the implementation of the tax had a depressing effect on the whole market, then all car models, even those that were not reached by the tax, would have seen their sales diminished.

To answer to this last question, we compare the aggregate evolution of sales of car models that because of their prices were not reached by the tax (which constitutes now the *pseudo* treated group) with three categories of vehicles that were left on purpose outside from the tax: light trucks, heavy trucks, and other heavy vehicles (these three categories constitute the untreated group). The intuition behind this exercise is as follows: if car models that were not directly reached by the tax were not affected by it, then, after

controlling for other factors, there should be no systematic difference in the evolution of sales when compared with vehicles that were excluded explicitly from the tax:

$$\ln S_{it} = \beta . d_{iT} + \lambda_t + \eta_i + u_{it}$$

In equation (3), the unit of analysis is not the car model as before, but aggregate sales of car models not reached by the tax, light trucks, heavy trucks, and other heavy vehicles, respectively. Since now we are comparing more heterogeneous types of vehicles than in the analysis carried out so far, we also extend equation (3) to allow for a specific trend for each of the four groups of vehicles, which helps to control for other factors that may explain differences in the evolution of sales not explained by the implementation of the tax. In this way, we relax the assumption that in the absence of the treatment, the treated and untreated groups would show the same time evolution. However, we could not reject the null hypothesis that the four categories of vehicles share a common time evolution after controlling by the effect of the tax.[10]

III.1. Results

Tables 2 to 5 present the results for different specifications and estimators.[11] The first two columns in Tables 2 and 3 show the results from the Difference-in-Difference (DD) and fixed-effect panel data (PD) estimators in which we compare car models reached by the tax (the treated group) with car models that because of their prices were not reached (the untreated group). In column 3 (labeled Pseudo T), using a fixed-effect estimator, we compare car models because their prices were not reached by the tax (the *pseudo* treated group) with other vehicles that were left purposely out from the tax (the untreated group[12])[13]. In Table 2, we estimate a single overall effect, while in Table 3, this is allowed to vary over time. In Tables 4 and 5, the comparison is again between reached and unreached car models, but now allowing for differential effects according to the tax rate (Table 4) and car makers (Table 5).

10. These results are available from the authors upon request.

11. For a matter of space, we only report the results for the variables we are interested. The complete results are available upon request.

12. Trucks, heavy trucks, and other heavy vehicles.

13. We also tried with a specification that allowed for each type of vehicle to have a different time trend, however the null that time trends were statistically equal was not rejected. Results are available upon request.

Table 2: Common effect across all dimensions

	DD	PD	Pseudo T.
	-0.2976*	-0.7705***	-0.1498**
Observations	3,477	3,477	96
R-squared	0.455	0.538	0.829
Number of id		155	4

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Differential effects across time

	DD	PD	Pseudo T.
January 2014	0.7972***	-0.3705***	0.0636
February 2014	-0.1663	-0.6838***	-0.1935
March 2014	-0.5038***	-0.9364***	-0.1410
April 2014	-0.3121*	-0.8087***	-0.0861
May-14	-0.2584	-0.8651***	-0.0622
June 2014	-0.3757**	-0.8434***	-0.0657
July 2014	-0.4749***	-1.0558***	-0.0240
August 2014	-0.4720***	-1.0334***	0.0259
September 2014	-0.3039*	-0.8471***	-0.1834**
October 2014	-0.3861**	-0.7056***	-0.3108**
November 2014	-0.5493***	-0.5980***	-0.4122**
December 2014	-0.7223***	-0.5166***	-0.4112**
Observations	3,477	3,477	96
R-squared	0.464	0.544	0.863
Number of id		155	4

*** p<0.01, ** p<0.05, * p<0.1.

Table 4: Differential effects across tax rates

Tax rate	DD	PD
30%	-0.6628*	-0.8022**
50%	-1.0866***	-0.8548***
0/30/50% (#)	0.4726**	-0.6860***
Observations	3,477	3,477
R-squared	0.493	0.539
Number of id		155

*** p<0.01, ** p<0.05, * p<0.1

(#) It includes car models whose varieties during the year 2014 were reached by different tax rates.

Table 5: Differential effects across carmakers

Carmaker (&)	DD	PD
ALFA ROMEO	-1.2135***	-0.6529***
AUDI	-1.2186***	-1.2890***
BMW	-1.9517***	-1.1115***
CHEVROLET	0.9991	0.0904
CHRYSLER	-2.2574***	-0.4071***
CITROEN	-0.7268	-1.0226**
DODGE	0.5859***	-0.6494***
FORD	-1.1846***	-0.0275
HONDA	-0.0453	-0.3360**
HYUNDAI	-0.1617	-0.3767
JEEP	-0.5280*	-0.6714***
KIA	-0.8810*	-1.1064**
MERCEDES BENZ	-0.7509**	-0.6209***
MITSUBISHI	-0.7351***	0.0082
NISSAN	-1.3959**	0.0807
PEUGEOT	1.3567**	-0.2352
PORSCHE	-2.0607***	-0.6970***
RENAULT	0.4679**	-0.6549**
TOYOTA	0.8705	-0.3580
VOLKSWAGEN	-0.0268	-0.6633***
VOLVO	-1.9952***	-0.9719***
Observations	2,875	2,875
R-squared	0.466	0.581
Number of id		125

(&) For Chery, Fiat, and Smart, no car model was reached by the tax.

*** p<0.01, ** p<0.05, * p<0.1

The application of the tax on most expensive cars had a very important impact on sales of models reached by the tax in comparison with those that because of their prices were left out. As reported in Table 2, the overall impact was between 25.7% (DD estimator) and 53.7% (PD estimator). But it also significantly affected the sales of varieties not reached by the tax (because of their price) in comparison with vehicles that were left purposely out; in this case the estimated effect is about 14%.

When we allow the effect to vary over time, and looking at the estimates from the fixed-effect model, the magnitude of the impact is between 31% (January 2014) and 58% (July 2014) for the comparison between reached and unreached car models. When the comparison is made between unreached car models with exempted vehicles, some differences emerge relative to the reached/unreached comparison. For this last case, the negative impact took place over the whole year, with the larger magnitudes during the period March-September 2014, especially July and August, while for the unreached/exempted case the estimates are negative and statistically significant in the last four months of 2014, with the impact in November and December 2014 approaching that for the reached/unreached comparison. A possible reason for this finding is that by the end of 2014, and because of the increasing inflationary process Argentina was experiencing, there were strong expectations about an increase in the threshold prices over which the tax would reach a car variety. These expectations, which were later fulfilled, could have induced a further reduction in sales of both reached and unreached varieties (which are closer substitutes), while a similar impact on exempted vehicles did not take place. It seems this was the case, with the drop in sales of unreached models approaching and even surpassing, in October 2014, that of reached models during the last months of 2014.

Finally, with regards to the effects according to the tax rate (Table 4) and car makers (Table 5), the results are in line with what was a priori expected. In the first case, the negative impact on models that fell under the 50% tax rate is almost 40% higher than for models reached by the 30% rate. In the second case, it is possible to observe an important heterogeneity (between 3% and 77%), with car manufacturers of more expensive models affected harder, especially those who do not have local production in Argentina. For carmakers with local production, the most affected were Citroen (66%), Volkswagen (58%) and Renault (57%), followed by Honda, Peugeot, and Toyota (39%-40%), while for Ford and Chevrolet even when the estimated coefficients are negative, they are not statistically significant. In the case of Fiat, no model was reached by the tax.

IV. Summary and conclusions

As a response to an increasing outflow of foreign capital, the Argentinean government designed a set of policy measures directed to turn

around, or at least to reduce, the rate at which capital flows were leaving the country. One of the most important measures, whose implementation started in February 2012, was a widespread system of non-automatic import licenses. Another measure, which was not less controversial, was implemented earlier in November 2011, implying the need of having a previous approval to buy foreign currency, as well a tax on foreign transactions when using either debit or credit cards, as well on the purchase of tickets for international travels and international tourism packages. Despite these explicit measures, and others that were implemented less formally (some on the edge of illegality), the outflow of foreign capital, if something did, increased continuously. Confronted with a scenario that was deteriorating sharply, the government implemented yet another measure, a tax on sales of more expensive cars, which in Argentina are almost completely imported.

As a result of the new tax, but also due to other reasons, the trade balance of the automotive sector experienced a drastic change, going from a stunning USD 4.5 billion deficit in 2013 to one of just over USD 0.7 billion in 2014. However, as our analysis shows, the new tax had devastating effects on the whole market, which had reached record sales only the previous year, and not only on those car models that were reached by the tax, which constitute a smaller share of the market. These results, which for any competent policymaker should not have been unforeseeable, highlight the importance of a careful, responsible and well-informed policy design.

V. References

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