Income inequality throughout the pandemic; how the elasticity of hand sanitizer and face masks are an example on income inequality due to the pandemic

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Contents:

Introduction:

Aim of my project:

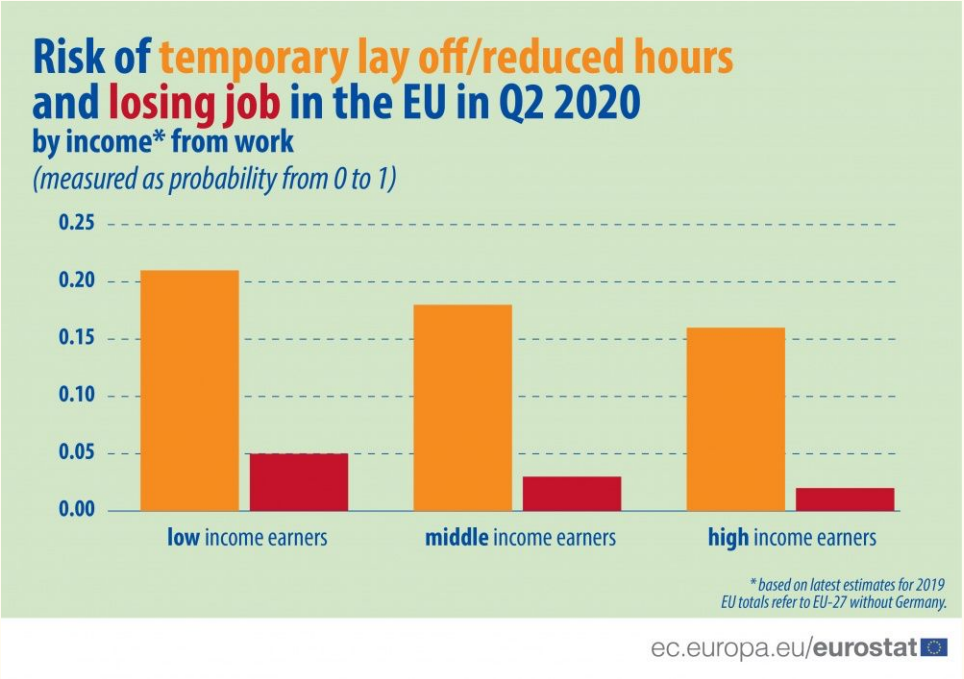
1. compare the elasticity of two important goods for combatting COVID-19, hand sanitizer and face masks, before and after the start of the pandemic.
2. analyse if the type of good they are has changed, and how this may impact income inequality.
3. provide suggestions for measures the government could take to limit this effect, and reduce the impact of covid-19 on income inequality.

The effect of the pandemic on income inequality:

it is clear that the covid-19 pandemic has disproportionately affected those worse off. According to the united nations department of economics and social affairs “The COVID-19 crisis is hitting the poorest and most vulnerable people... the hardest and... it is exposing the profound inequalities that exist within and among countries and is exacerbating those inequalities.”

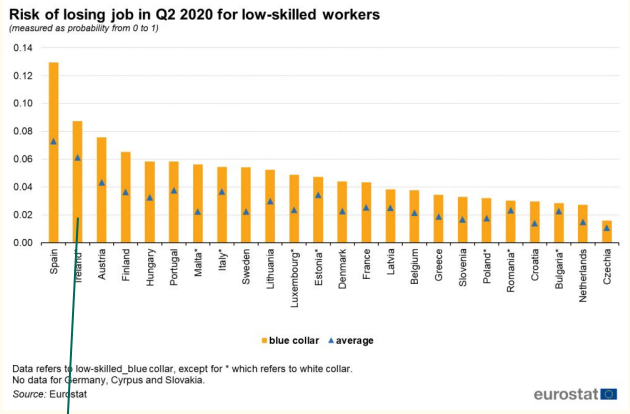
The effect of the pandemic on income inequality:

Not only has the pandemic brought job losses to many people across the country, but these job losses tend to affect lower skilled workers, who's skills aren't easily transferable to working from home. Unfortunately, this is particularly evident in the food and accommodation sector.

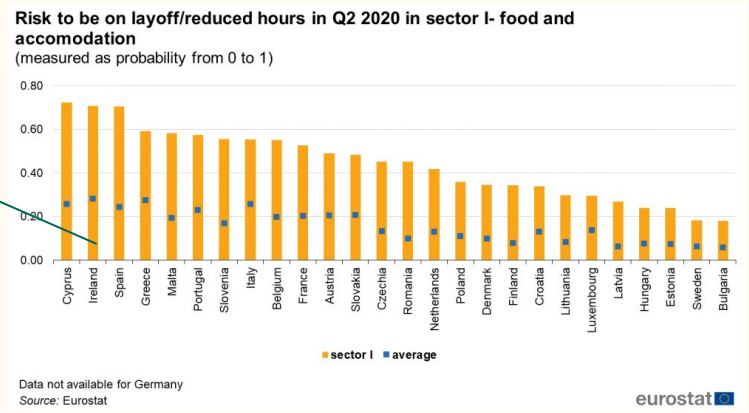


The effect of the pandemic on income inequality: graphs

Irish employees are some of the worst off in Europe, regarding job losses for low skilled workers, and job impacts in the food and accommodation sector due to COVID-19. This has a negative effect on the already prominent issue of income inequality in Ireland.



Ireland



Why look at elasticity?

One way to see how the pandemic has impacted income inequality is by looking at the elasticity of commonly consumed goods.
Through the analysis of PED we can see how consumer expenditure patterns have changed. This can help inform us on how people view certain goods, and how much they are prepared to spend on them.
The proportion of income spent on a good is also a factor that determines the elasticity of a good. The greater the proportion of income spent on a good, the more elastic is the demand for the good is. So, it is possible to presume that the more elastic a good is, the more a change in price will affect people with lower incomes, once again worsening income inequality.
Through analysing the elasticities of hand sanitizer and face masks, I aim to see if they type of good they are has changed since the start of the pandemic, and determine what this means for income inequality.

Why look at hand sanitizer and face masks?

Throughout the COVID-19 pandemic there has been a surge in demand for hand sanitiser and face masks. According to Nielsen, a global market research company, there was a 75% increase in hand sanitizer sales in March 2020, compared to march of 2019. This to be due to panic buying as well as increased health fears.

One of the key aspects in slowing the spread of covid-19, and protecting ourselves from the virus is the use of personal protective equipment, PPE. The most common forms of PPE are face masks and hand sanitizer. However, these goods generally weren't consumed before the pandemic. They are now an additional cost of the pandemic, that impacts everyone, especially people with lower incomes, who may have to consider the opportunity cost of buying hand sanitizer or another healthcare product.

I have chosen to analyse these products as they have, impacted the most people, had the largest growth in demand and are the most accusable and widely used for of PPE. The way we consume these goods will be a good indicator of the effects of the pandemic on income inequality.

What is price elasticity of demand(PED)?

The definition of PED is, the percentage or proportionate change in demand for a good in response to a change in price.

It is calculated using the formula:

$$\frac{\Delta Q}{\Delta P} \times \frac{P1 + P2}{Q1 + Q2}$$

Sustainable development goal 10:

Income inequality is a central aspect of sustainable development goal 10, which aims to reduce inequalities.
The aim of SDG 10 is “to reduce inequalities in income as well as those based on age, sex, disability, race, ethnicity, origin, religion or economic or other status within a country”.
Through analysis of the types of good hand sanitizer and masks are, it will be possible to conclude the potential effect the pandemic has had on income inequality. I also aim to provide suggestions for measures the Irish government could take to reduce this impact.

Sustainable development goal 3

The elasticity of hand sanitizer and face masks tie into SDG 3, to “ensure healthy lives and promote well-being for all at all ages” as they are used to stop the spread of illnesses, such as COVID-19. This idea of wellbeing is an element of social sustainability.Part of achieving this is ensuring everyone has access to sanitization.

Data collection:

Data collection:sources

The data I needed for my project was the price and quantity of imported hand sanitizers and face masks. I chose to only account for imported products, as it was easy to assume that they were being consumed or bought, rather than trying to estimate the amount of domestic production that was bought.
The main sources I used for my data were:

1. The World Integrated Trading solutions (WITS):
    a. a database created by the world bank in conjunction with the UN (United Nations). I used their data on trade and imports, that were sorted by country and commodity code for import statistics on hand sanitizer.
2. The Central Statistics Office (CSO):
    a. Unfortunately, the information I was looking for was not on their website, so I had to email the Department of Trade within the CSO to find the relevant information regarding hand sanitizer imports in 2020, and face masks and related products imports between 2020 to 2018.

Data collection:steps

1. Find the Harmonized System (HS) number or internationally recognized commodity code for hand sanitizer and similar disinfectant product and face masks and similar products, using “findhscodes.com”
    a. HS code for hand sanitizer and related products: 380894
    b. HS code for face masks and related products: 63079092/63079098
2. Apply this code to online trade databases such as the WITS, CSO, Eurostat, and the International Trade Center until the relevant information is found.
    a. For the 2018 and 2019 figures on hand sanitizer I used the WITS database. It had a section for hand sanitizer imports to Ireland for 2018 and 2019, by weight in kilograms and price in ‘000s US dollars.
    b. For the rest of the data I contacted a member of the trade department in the CSO, and requested the relevant information, as it wasn’t published
3. converted the 2020 data, or hand sanitizer, from euros to US dollars, and tons to kilograms using the average exchange rate for the year, which was €1 to $1.14 and estimated a forecast for the remaining three months of 2020, by dividing the total price and quantity by 9 and multiplying by 12.
    a. I did this so that all the hand sanitizer data would be in the same units.
    b. It was not necessary to do this for face masks, as that data was already in one unit

Data limitations:

1. I had to use two different sources, so there may be some differences in the way they recorded their information
2. I had to convert the units of the 2020 data. I estimated the price conversion using the average exchange rate for the year. However, this may not be an exactly accurate representation of the figures.
3. There were no specific HS codes for hand sanitizer and face masks, and each code contained data for related products.
4. There are many different types (disposable, cotton etc...), however there is not enough data to compare them specifically

Data:

Data: hand sanitizer

	2018	2019	2020 (jan-sep)	2020 (12 month estimate)
Price (000's USD)	21751	21332.63	35471	47294
Quantity (kg)	8267470	6327220	8684000	11576666
Unit price	38	29.65	24.4	24.4

Data: face masks:

	2018	2019	2020
Price (ooo's Euro)	22450	22593	286969
Quantity (tonnes)	2392	2663	6529
Unit price	9.38	8.48	43.95

Calculations

Calculations: hand sanitizer:

I applied the figures to the formula for PED and got the following results:

years	Calculation	result
2018-2019	$\frac{8267470-6327220}{38-29.65}\times\frac{38+29.65}{8267470+6327220}$	1.07
2019-2020(JAN-SEP)	$\frac{6327220-8684000}{29.65-24.4}\times\frac{29.65+24.4}{6327220+8684000}$	-1.61
2019-2020(12 months)	$\frac{6327220-11576666}{29.65-24.4}\times\frac{29.65+24.4}{6327220+11576666}$	-3.01

Calculations: face masks

I applied the figures to the formula for PED and got the following results:

years	calculation	result
2018-2019	$\frac{2392-2663}{9.39-8.48}\times\frac{9.39+8.48}{2392+2663}$	-1.052
2019-2020	$\frac{2663-6529}{8.48-43.95}\times\frac{8.48+43.95}{2663+6529}$	0.621

Analysis

Before the pandemic: hand sanitizer

During the period of 2018 to 2019 hand sanitizer was elastic, and a Veblen (status symbol good that relies on exclusivity to be valuable) or luxury good. An elastic good has an absolute value greater than one and it is a luxury good because it has a positive PED. This means it does not follow the law of demand, and as price increases so does demand. A 1% increase in price will cause a 1.07% increase in demand.

Befour the pandemic: face masks

During the period of 2018 to 2019 face masks were elastic as they had a PED with an absolute value greater than one. They also had a negative value, this means that demand for hand sanitizers follows the law of demand, and a 1% increase in price will cause a 1.052% decrease in demand.

However, the value is close to unitary elasticity .

Before the pandemic face masks were not needed by the general population and were mainly imported by the government for hospitals. This may be the reason they have an almost unitary PED value.

After the pandemic: hand sanitizer

During the period 2019 to 2020 (January to September) hand sanitizer is still elastic, it has an absolute value greater than one. However, it is no longer a luxury good, as the PED is now a negative value. This shows that it follows the law of demand, and as prices increase demand falls. A percentage change in price causes a larger change in demand. A 1% increase in price will cause a 1.61% decrease in demand.

As time goes on the forecasted figure (for 12 months of 2020) shows that it will continue to become more elastic with a 1% increase in price will cause a 3.01% decrease in demand. To meet this surge in demand more substitutes have become available, causing it to become a normal and elastic good (this is discussed in “fall in price section”). This increase in elasticity is surprising as generally necessities have a lower elasticity. This may have been caused by an inaccuracy in the calculated figure, that presumes demand will stay the same through 2020. However, production will probably fall as the virus becomes more controlled. Hand sanitizer is now more widely demanded.

After the pandemic: face masks

During the period 2019 to 2020 face masks were inelastic, they had an absolute value of less than 1. This means that a percentage change in price will cause a smaller percentage change in demand. They also have a positive PED, which indicates they do not follow the law of demand, and a 1% increase in price will cause a 0.621% increase in demand.

This may be because face masks are now considered a necessary item by many people. They are a required part of daily life, and we can't live without them. This would explain why they are price inelastic, and why they don't follow the law of demand.

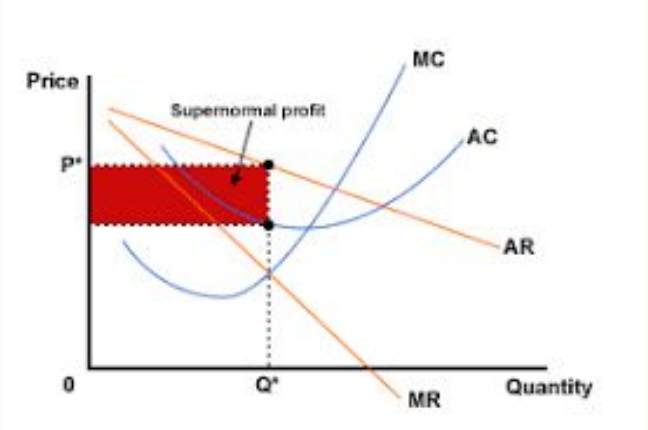
Change in price?

Change in price: hand sanitizer

Between 2018 and 2020 the unit price for hand sanitizer went down by €15. This is surprising, as generally during periods of a positive a demand shock, the price rises, as the shortage in supply, caused by increased demand, drives the price. This fall in price may be due to the market for hand sanitizer being in monopolistic competition. In this market structure there is an area for supernormal profits in the short run, this can be seen in the graph.

Throughout the pandemic there has been an increase in the number of firms producing hand sanitizer. For example, even Clonakilty distillery in Cork began to produce hand sanitizer to meet the surge in demand. As more firms enter the market this area for supernormal profits goes down, due to an increase in competition, forcing firms to decrease prices to remain competitive.

This may also be due to the profit maximisation rule for elastic goods. Many firms may of decreased price to increase profits, as hand sanitizer is an elastic good



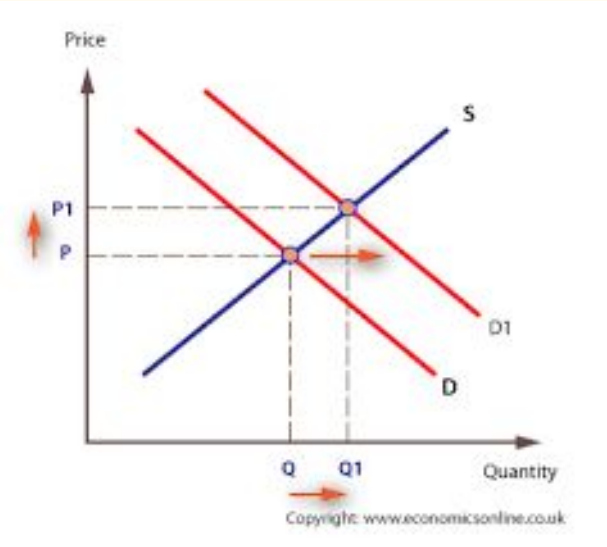
[graph showing long run equilibrium in monopolistic competition from www.sanandres.esc.edu.ar]

Change in price: face mask

During the period 2018 to 2020 the unit price of face masks rose form 9.38 to 43.95. This may be because generally during periods of a positive a demand shock, the price rises, as the shortage in supply, caused by increased demand, drives the price up.

The demand curve has also shifted right, causing an increase in equilibrium price for face masks.

This may also be due to the profit maximisation rule of inelastic goods. Firms may of increased prices to increase profits after the start of the pandemic, as face masks are inelastic.



Graphs:

Method:

According to core econ, the slope of a demand curve for different goods can be found

by using the formula, change in price divided by change in quantity ($\frac{\Delta P}{\Delta Q}$)

I will then multiplied the slope by 1,000, to get the visual effect and applied it to the equation of the line formula:

Y-Y1=M(X-X1), where M = slope and (X1,Y1)=a point on the line

By using this formula I will be able to compare the change in elasticity due to the pandemic visually.

Hand sanitizer:

2019/2018 -red

- PED:1.07
- Equation:Y-38=4.3(X-8267470)

2019/2020(jan-sep)-blue

- PED:-1.61
- Equation: Y-29.65=-2.2(X-6327220)

2019/2020(estimate)-green

- PED:-3.01
- Equation:Y-29.65=-1.0(X-6327220)

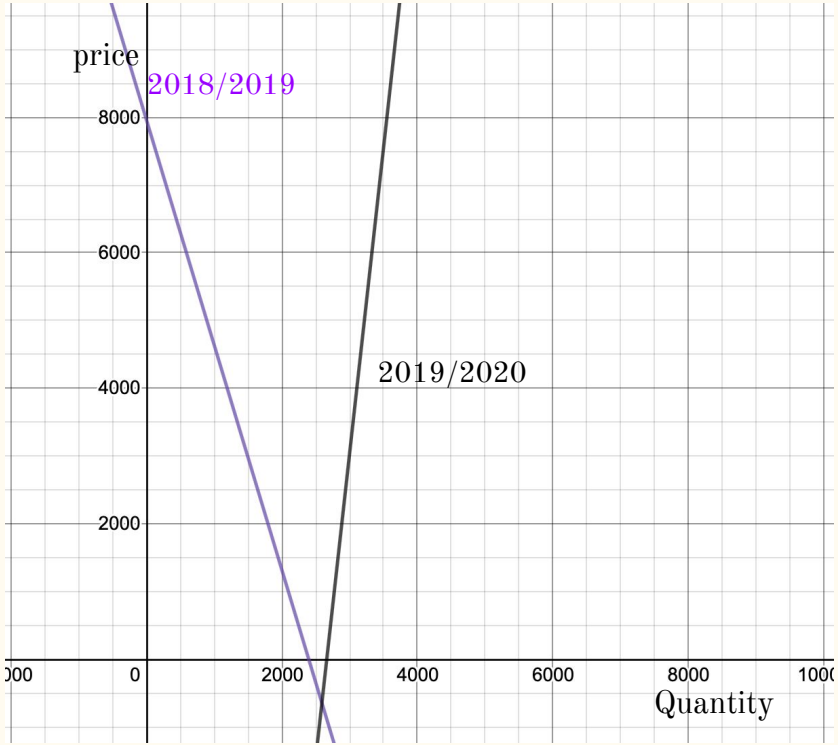
Face masks:

2018/2019- purple

- PED:-1.052
- Equation: y-9.38=-3.321(x-2392)

2019/2020- black

- PED:0.621
- Equation: y-8.48=9(x-2663)



Impact on inequality

Hand sanitizer

One of the contributing factors of a goods PED is the proportion of income spent on the good. the greater the proportion of income spent on a good the more elastic it is. Hand sanitizers elasticity has increased, and is forecast to keep increasing. This indicates that the percentage of income spent on it will also continue to increase.
This highlights one of the effects the pandemic has had in worsening income inequality. The proportion of income spent on a good widens gap, as opportunity cost in this situation applies to people with lower incomes more than people with higher incomes. This may force people to choose between hand sanitizer and another health product, once again showing the effects of income inequality.
A study by the American Journal of Food Distribution Research also showed that lower income shoppers were more price sensitive, and were impacted more by price changes. This could mean that they are more sensitive to a sharp rise in elasticity, in comparison to people with higher incomes. This widens the gap between rich and poor and worsens income inequality, negatively impacting Ireland's ability to achieve SDG 10.
However, the pandemic did cause the unit price of hand sanitizer to go down. This has a positive impact on income inequality as it makes hand sanitizer more affordable and accessible. This may of been because to increase profits on an elastic good, a firm needs to decrease prices.

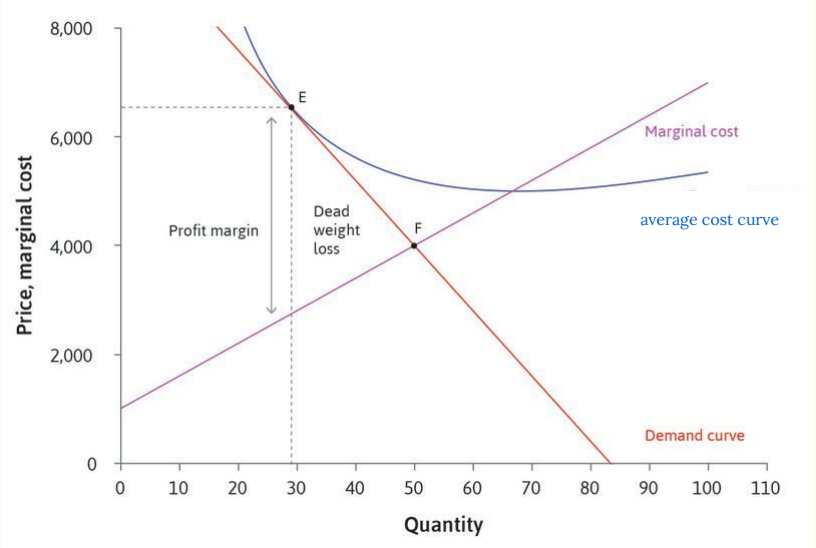
Face masks

The inelastic demand of face masks has many interesting, and potentially negative implications for income inequality, as a result of the pandemic.
The PED of face masks is a perfect example of how the pandemic has changed the way we consume certain goods. Before the pandemic it was elastic, and a normal good. However, after the pandemic, it was inelastic, and did not follow the law of demand. This change from elastic to inelastic, means firms can take advantage of consumer expenditure patterns, and charge higher prices for necessities as consumers aren't sensitive to price change. The increase in unit price indicates that they are already doing this. This could have a disproportionate effect on lower income workers, many of whom have already lost their job due to the pandemic, and therefore increase income inequality.

Face masks:

The graph on the left shows how a good with less elastic demand has a larger area for profit maximisation.

The steeper the demand curve, or the more elastic the good, the larger area a firm has to increase and maximise profits.



[Graph from core econ showing a firm facing less elastic demand]

Overall

The change in elasticity seen in both goods may lead to a widened divide in income inequality.

Face masks in particular shows worrying signs for income inequality as they are more important than hand sanitizer in slowing the spread of the virus.

Their PED shows that firms may take advantage of their inelasticity and raise prices to increase profits, and the increase in unit price indicates they already are.

This will widen the gap, and affect people more who are lower income earners or who have lost their jobs.

Suggestions for the government

Suggestions for the government:

The elasticity of these goods can be used by the government when making policy regarding lowering the impact of the pandemic on income inequality.

Knowledge of PED and how it has changed in reaction to the start of the pandemic reveals a lot about consumption patterns, and provides an indication of how firms may react.

Based off my calculations i would make the following suggestions to the government:

Hand sanitizer

My research has shown that the unit price of hand sanitizer has fallen since 2018. This is good for Irish government policy and achieving SDGs 3 and 10 as it will be easier to provide hand sanitizer for all people, and the PED value indicates the price will continue to fall.

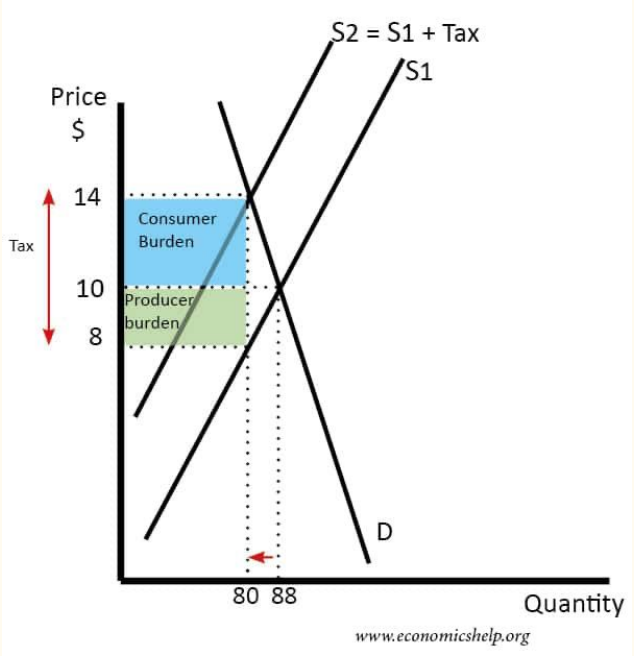
I would encourage the government to continue to monitor hand sanitizer prices. If necessary, they should implement plans to help people with lower incomes, and ensure everyone has access to this vital product. However, as hand sanitizer is so elastic, it is unlikely the prices will rise too much.

Face masks

The graph shows the effects of adding tax to inelastic goods.

Firms are able to raise the prices, knowing that consumers will still buy them, and they will increase their profits by raising prices

However, by removing tax you could shift the supply curve left, and move the equilibrium position down. This would ensure face masks are affordable for everyone, achieving SDG 3 and slowing the effects of income inequality as a result of the covid-19 pandemic



[graph showing: The impact of a tax on an inelastic good, from economics help.org]

overall

The government should monitor the changes in consumer patterns in relation to essential goods for slowing the pandemic.

Hand sanitizer elasticity and price change indicates that it will remain relatively accessible and the price will not change too much. This is good for achieving SDG 10, and reducing inequality.

However, face masks, arguably the most important personal mesure we can take, has an inelastic PED. the government should monitor the prices of face masks closely, and if necessary introduce price controlling or other measures to ensure everyone has access to them. These measures will allow the government to achieve SDG 10, and limit the impact of the pandemic on widening income inequality.

Conclusion:

conclusion:

The elasticities of both goods has changed in reaction to the start of the pandemic. His has many interesting implications for the irish government, and helps us understand part of how the pandemic will further worsen income inequality.

My research has shown that essential goods for protecting and preventing the spread of COVID-19 could widen the gap between rich and poor, as the PED of face masks changed to an inelastic value.

The government should be aware of this change,how it impacts income and wealth inequality, and consider implementing an appropriate policy to reduce this impact.

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