

TEACHING AND ASSESSING OF OUTPUT TAXES AND SUBSIDIES. WHEN IS A LINE A SUPPLY CURVE?

Abstract

The aim of this paper is to describe the approaches used to teach the imposition of a tax or a subsidy by popular secondary school and first year tertiary texts, and compare them with documents circulated by NZCETA (New Zealand Commerce and Economics Teachers Association), as well as NCEA examinations and marking schedules.

The analysis undertaken shows there are a range of approaches to teaching the effects of a tax or subsidy on the market, specifically how producer surplus is calculated. A common approach is one that suggests an output tax or subsidy creates a new supply curve, but the approach often then goes on to calculate the post tax or subsidy producer surplus from the original supply curve. Many of the texts are at odds to the document released by NZCETA in 2009 which stated that the imposition of a subsidy or a tax does not create a new supply curve, because it results in a change in revenue rather than a change in costs of production.

An analysis of previous NCEA examinations shows the accepted convention at level one is that the imposition of a tax or subsidy does create a new supply curve. At level three it is more ambiguous, with any new curve created often called S_{+tax} or $S_{+subsidy}$ rather than S_1 as it is at level one.

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Keywords: NCEA, Economics Education, Taxes, Subsidies

Introduction

The catalyst for this paper was a document which was circulated to NZCETA (New Zealand Commerce and Economics Teachers Association) members in 2009. NZCETA is the professional association of economics teachers in New Zealand secondary schools. The document outlined some tips for the teaching of the effect on the market of the imposition of a tax or a subsidy. The main crux of the document was that the supply curve (or demand curve) does NOT shift as the result of a tax or a subsidy on output. Taxes and subsidies were seen as changes to revenue rather than costs of production. This contradicts the majority of current texts at the secondary school and first year tertiary level, which describe shifts of the supply/demand curve resulting from changes in costs of production arising from an output tax or subsidy. There are also anomalies between these texts when describing the effect on producer surplus of an output tax or subsidy.

In the experience of the author of this paper, the confusing issue for some 100 level microeconomics students is that having described a change in costs of production arising from the imposition of an output tax, which results in a new supply curve, producer surplus is then calculated from the original supply curve in most texts, with no explanation as to why the new supply curve is not used.

The aim of this paper is to describe the approaches used by popular secondary school and first year tertiary texts, and compare them with documents circulated by NZCETA, as well as NCEA examinations and marking schedules.

Method

The analysis of popular secondary school and first year tertiary texts is similar to the approach used by Ferraro and Taylor (2005), and later discussed by O'Donnell (2009) with reference to the teaching of the concept of opportunity cost. The selection of which texts to compare was based on the 11 years secondary school teaching experience, and 6 years tertiary 100 level lecturing of the author of this paper. The 100 level tertiary text used is the popular *Principles of Microeconomics – Fifth Edition* by N. Gregory Mankiw. (2009). At the secondary level, *Senior Economics* By Geoff Evans (2001) and *Economic Concepts and Applications – The Contemporary New Zealand Environment* by Susan St John and James Stewart (1998) were used as common year thirteen texts. *NCEA Level 3 Economics*, a popular year thirteen study guide by Maggie Williamson (2007) was also compared. As was the popular year thirteen work-book by Dan Rennie (2003) *Understanding Economics Part a – resource allocation via the market system: Teacher's Edition*.

For the purpose of this paper, the focus will be on the teaching of a tax and or subsidy levied on the seller.

Discussion

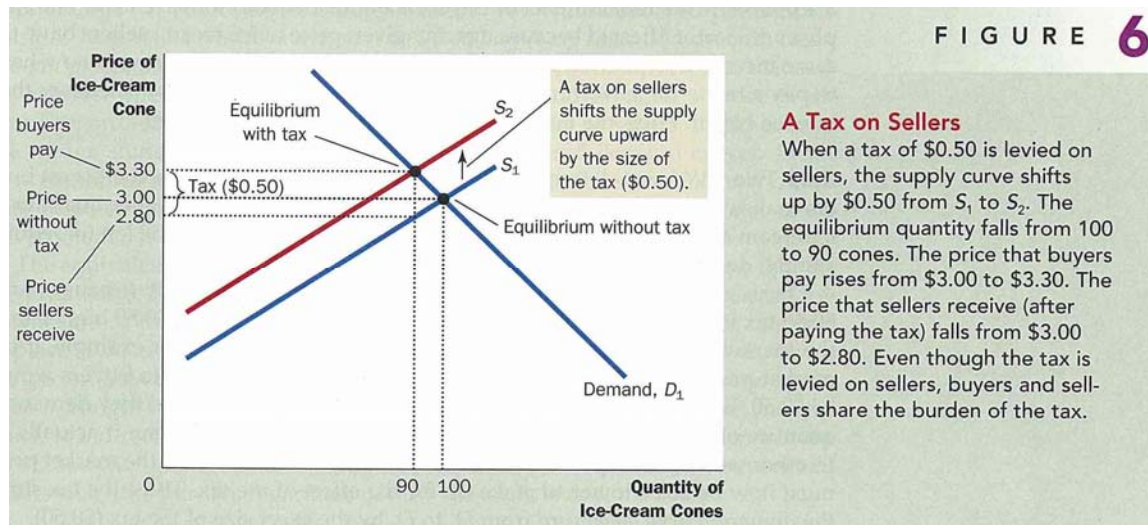
Principles of Microeconomics – Fifth Edition by N. Gregory Mankiw.

As an example of a tax levied on the seller, Mankiw uses the example of a 50 cent tax levied on an ice cream seller. The tax is described as making a business less profitable at any given price, so shifts the supply curve. Because the tax raises the cost of producing and selling ice cream, it reduces the quantity supplied at every price. The supply curve shifts to the left (or equivalently, upward). Interestingly, the tax isn't simply described as an increase in a firm's costs of production, but as an increase in the cost of producing *and selling* ice cream. Mankiw then goes on to describe the effect of the tax on price and revenue.

“For any market price of ice cream, the effective price to sellers – the amount they get to keep after paying the tax is \$0.50 lower. Whatever the market price, sellers will supply a quantity of ice cream as if the price were \$0.50 lower than it is. Put differently, to induce sellers to supply any given quantity, the market price must now be \$0.50 higher to compensate for the effect of the tax”. (p. 124).

The text goes on to describe the tax as analogous to a seller placing a bowl on the counter, and being required to place \$0.50 in the bowl after the sale of each cone.

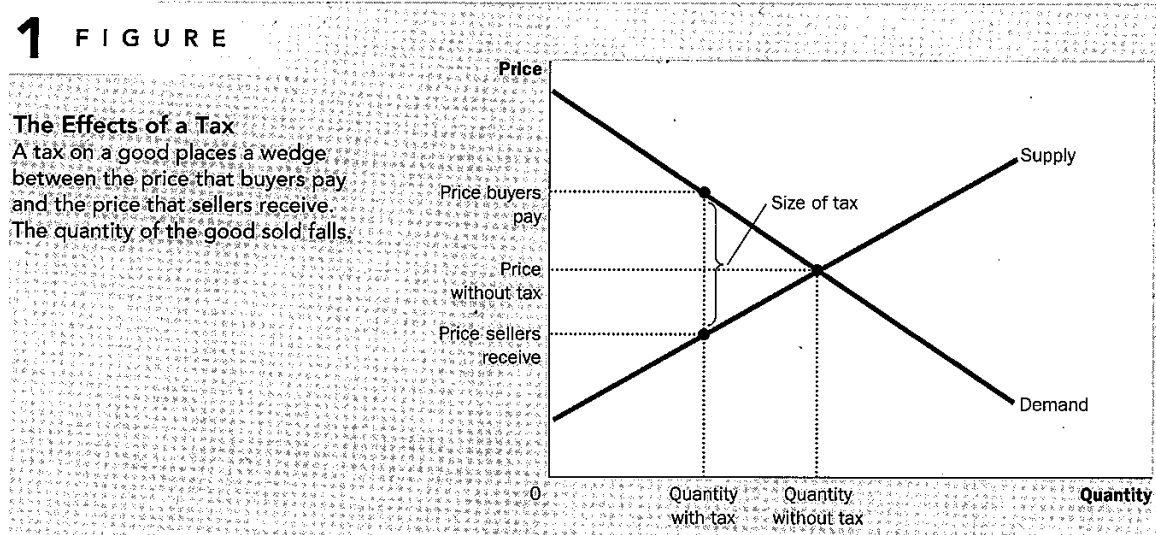
The supply curve shift is shown in the figure below. (Mankiw, 2008, p. 125).



Later in the text, the effect of a tax on producer surplus is discussed. Producer surplus is described as measuring the benefit to sellers of participating in a market, and is the amount a seller is paid minus the cost of production. It is then stated that because the supply curve reflects sellers' costs, we can use it to measure producer surplus. *“The area below the price and above the supply curve measures the producer surplus in a market. The height of the supply curve measures sellers' costs, and the difference between the price and the cost of production is each seller's producer surplus”* (p. 145).

Note the supply curve is now said to represent costs of production rather than the costs of producing and selling a good. However, when showing the effect of a tax on the market, Mankiw does not show any supply or demand curve shifts resulting from the tax.

“Figure 1 shows these effects. To simplify our discussion, this figure does not show a shift in either the supply or demand curve, although one curve must shift. Which curve shifts depends on whether the tax is levied on sellers (the supply curve shifts) or buyers (the demand curve shifts). In this chapter we can simplify the graphs by not bothering to show the shift. The key result for our purposes here is that the tax places a wedge between the price buyers pay and the price sellers receive”. (Page 160)



(Mankiw, 2008, p. 160).

To measure the gains and losses from a tax on a good, the impact on sellers is included. Mankiw states that the benefit received by sellers in a market is measured by producer surplus – *“the amount sellers receive for their goods minus their cost”*. (p. 161)

Figure 3 shows the effect of a tax on producer surplus.

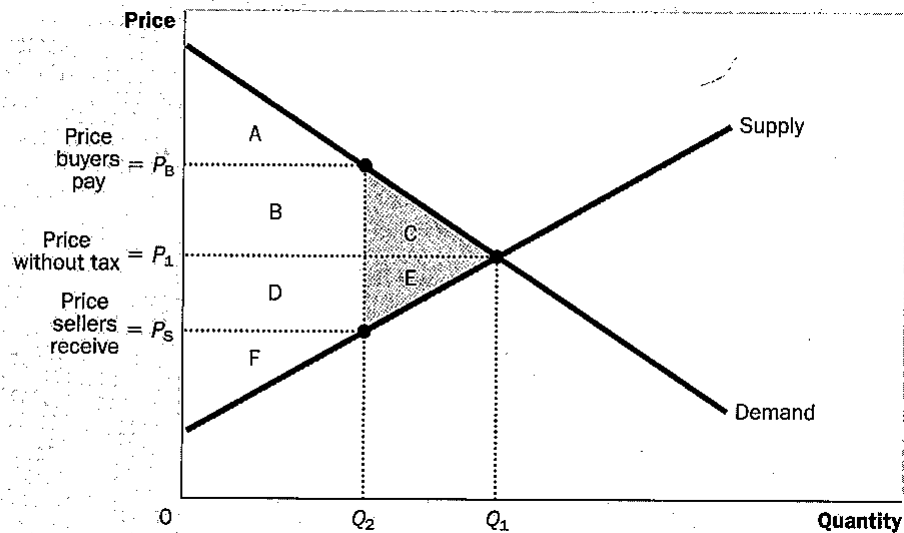
3 FIGURE

A tax on a good reduces consumer surplus (by the area B + C) and producer surplus (by the area D + E). Because the fall in producer and consumer surplus exceeds tax revenue (area B + D), the tax is said to impose a deadweight loss (area C + E).

How a Tax Affects Welfare

	Without Tax	With Tax	Change
Consumer Surplus	A + B + C	A	-(B + C)
Producer Surplus	D + E + F	F	-(D + E)
Tax Revenue	None	B + D	+(B + D)
Total Surplus	A + B + C + D + E + F	A + B + D + F	-(C + E)

The area C + E shows the fall in total surplus and is the deadweight loss of the tax.

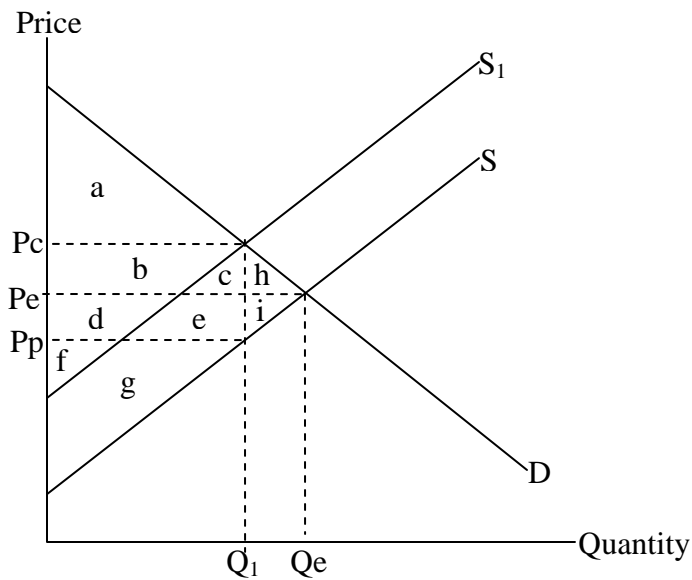


(Mankiw, 2008, p. 162).

Before the tax, producer surplus is represented by the areas D + E + F, because the supply curve reflects sellers' costs (p 162). After the imposition of the tax, producer surplus is identified as area F.

This identification of producer surplus after the tax can be confusing for students, as producer surplus is calculated from the original supply curve. A common student query is why is the post-tax producer surplus calculated from the pre-tax supply curve, when producer surplus is calculated as the area above the supply curve and below the price, and the imposition of a tax shifts the supply curve upward?

One plausible explanation, is that when dealing with linear supply curves, the size of the post-tax producer surplus of area F would be the same size were it calculated from the post-tax supply curve. The diagram has identified the size of the post-tax producer surplus, if not the exact area on the diagram. However, students may find this concept more difficult to grasp than not "simplifying" the diagram, and showing the new supply curve. The diagram would then look something like the following:



Consumer surplus shrinks from a, b, c & h to a.
 Producer surplus shrinks from d, e, i, f & g to b, d & f.
 Government Tax Revenue is b, c, d & e.

Mankiw does not cover the imposition of a subsidy in the above context.

Senior Economics by Geoff Evans (2001)

Evans describes the supply curve as consisting of the firm's MC curve above AVC with marginal costs described as the additional cost of producing the next unit of output ($MC=TC_1-TC_2$).

He goes on to state that "When a consumer buys a good or service in New Zealand, part of the purchase price is passed on by the seller to the government in the form of a sales tax or Goods and Services Tax (GST). These taxes increase the producer's costs and therefore will reduce supply from S to S₁, as shown in the diagram below" (p. 131).

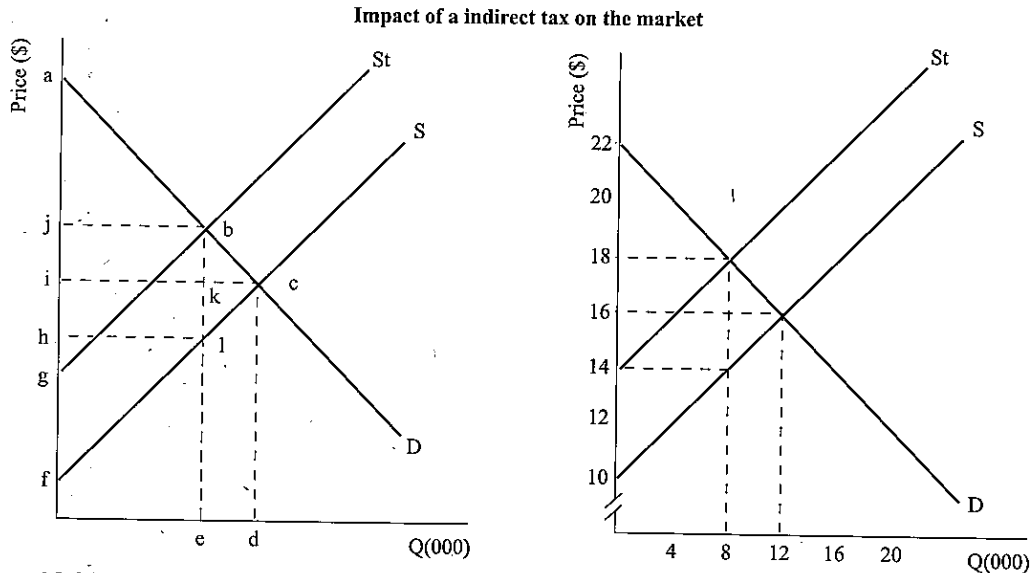
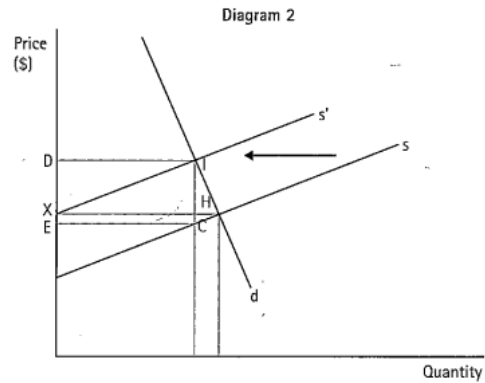
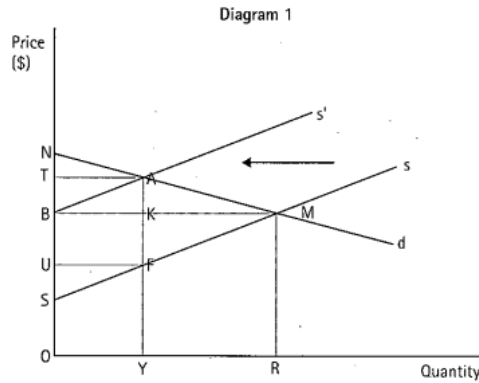


Figure A9.30

(Evans, 2001, p. 131)

Evans states that the supply curve shifts vertically upwards (effectively, a shift to the left) by the amount of the tax (jh or bl) per unit, and that producer surplus is reduced from icf to hlf. He also defines producer surplus as “the monetary value to a seller of supplying a commodity, over and above the cost necessary to produce the goods. It is shown by the area between the price and the supply curve” (p. 420).

Aside from the fact that GST is a percentage tax, so the new curve would not be parallel to the existing curve, just as Mankiw does, Evans states that the tax shifts the supply curve; then proceeds to calculate the post-tax producer surplus from the original supply curve. A similar method is used in the treatment of a subsidy. He states the effect of a subsidy as the opposite to that of an indirect tax, and defines a subsidy as payment by government to producers in order to reduce the costs of production. This is shown in the figure below.



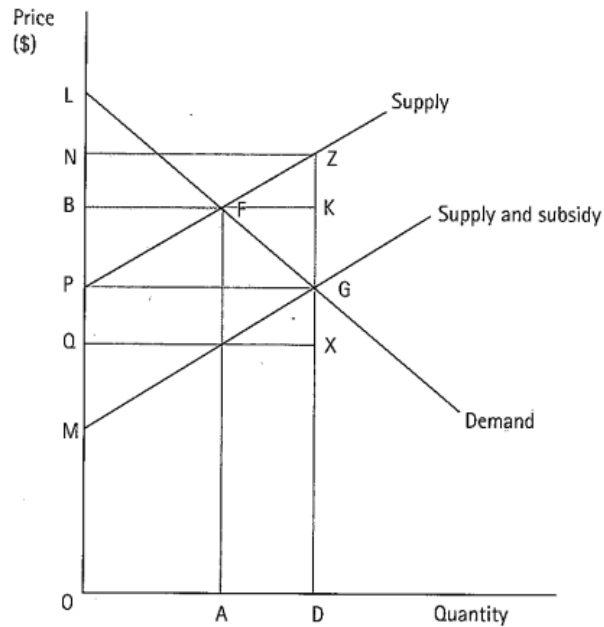
c Use Diagram 1 to give letters to identify the areas indicated. (CS = consumer surplus, PS = producer surplus, DWL = deadweight loss)

(i) CS before	BMN	(ii) CS after	TAN
(iii) Consumer incidence tax	TAKB	(iv) DWL in total	MAF
(v) PS share DWL	KMF	(vi) Total loss of consumer surplus	TAMB
(vii) PS before	BMS	(viii) PS after	UFS
(ix) Producer incidence tax	BUFK	(x) CS share DWL	KAM
(xi) Total loss of PS	FUBM	(xii) Consumer spending before	BORM
(xiii) Consumer spending after	TOYA	(xiv) Producer revenue before	BORM
(xv) Producer revenue after	UOYF	(xvi) Government tax revenue	FUTA
(xvii) Price paid consumer before	OB	(xviii) Price received producer before	OB
(xix) Price paid consumer after	OT	(xx) Price received producer after	OU
(xxi) Quantity sales before	OR	(xxii) Quantity sales after	OY

(Rennie, 2003, p. 240).

A subsidy is described as a payment by government to firms to keep their costs down, that requires shifting the supply curve downward to the right by the \$ subsidy. Interestingly, when the producer surplus is calculated from a worked subsidy example, the post subsidy area of producer surplus is calculated from the *post subsidy* supply curve. This is shown in the worked example below.

2 a Use the diagram to answer the questions that follow in the table.



Give letters to represent the following	Letter answer
(i) Price paid consumer before	OB
(ii) Price paid consumer after	OP
(iii) Consumer spending before	BOAF
(iv) Consumer spending after	PODG
(v) Consumer surplus before	FBL
(vi) Consumer surplus after	PLG
(vii) Gain in consumer surplus	PGFB
(viii) Producer surplus before	FBP
(ix) Producer surplus after	PMG
(x) Producer revenue before	BOAF
(xi) Producer revenue after	NODZ
(xii) Cost to government of the subsidy	PGZN
(xiii) Deadweight loss of the subsidy	FZG

(Rennie, 2003, p. 246).

Rennie also produces a similar workbook for use at Year Eleven. The same explanation is given for the treatment of a tax or subsidy, in that an indirect tax will decrease supply, which requires shifting the original supply curve upward to the left by the amount of the tax. A subsidy is described as a payment by government to firms to keep their costs down. Firms will increase supply, requiring a shift of the original supply curve downward to the right by the amount of the subsidy.

The year eleven curriculum however, does not require discussion of producer or consumer surplus, so whether or not the new supply curve is used to calculate producer surplus is beyond the scope of the Year Eleven Course, and thus not discussed in the text.

Economic Concepts and Applications – The Contemporary New Zealand Environment by Susan St John and James Stewart

St John and Stewart define an indirect tax as a payment to government which is added to the price of goods or services in their glossary, but describe a tax as a cost of production to the supplier in the text.

“When a tax is imposed, suppliers treat it in the same way as any cost increase and are willing to supply any given quantity only at a higher price. The supply curve shifts vertically upwards by a distance equivalent to the per-unit tax” (p. 79).

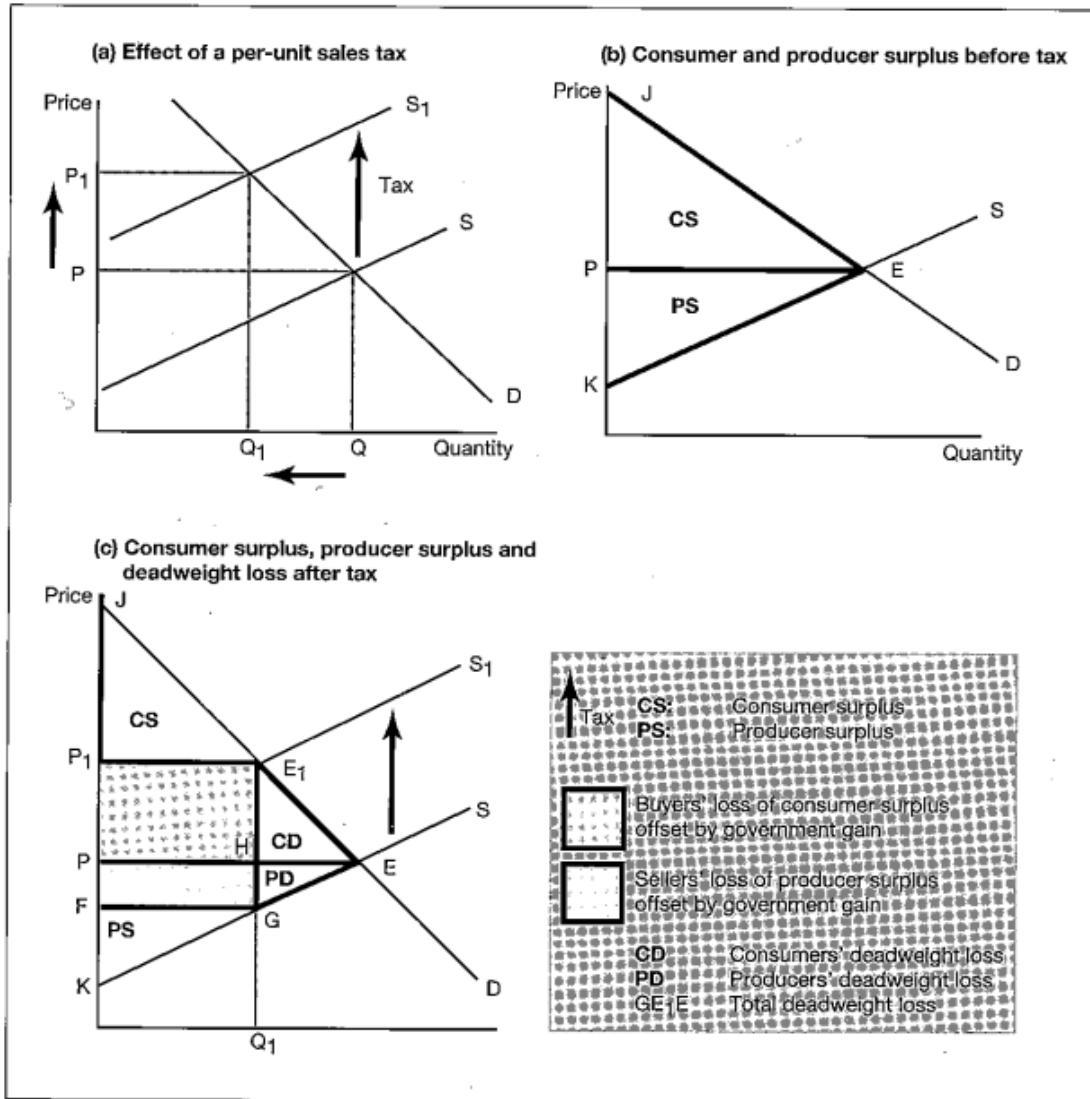
Similarly, a subsidy is described

“as effectively offsetting a portion of the producer’s costs, enabling them to increase supply without any prior increase in market price. When the subsidy is applied the supply curve will shift outward and downward by the vertical amount of the subsidy” (p. 81).

Producer surplus is described as the difference between the equilibrium price actually received and the cost at which goods would willingly be supplied.

Given these definitions, the effect of an imposition of an indirect tax on market efficiency is shown in the diagram below:

FIGURE 3.10 DEADWEIGHT LOSS



(St John & Stewart, 1998, p. 64).

Before the imposition of the tax, producer surplus is identified as area KPE. The effect of the tax on producers is described below:

“For producers, the price received has fallen because of the tax. The net fall is the difference between the tax and that part of it passed to consumers by the rise in price: from P to F . Thus producer surplus has been reduced to KFG ”. (p. 63)

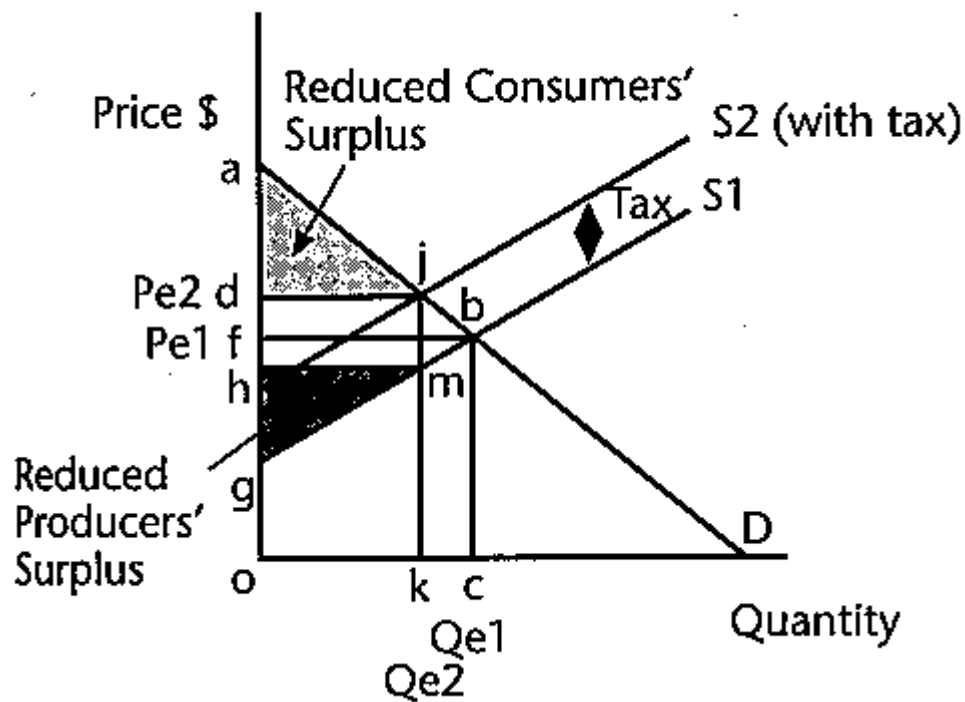
Once again, the post tax producer surplus has been calculated from the original, pre tax supply curve, with no discussion as to why. Further, the effect on producers is described as a reduction in price received, rather than an increase in costs as described earlier in the text. No comparable discussion is included in the text on the imposition of a subsidy.

NCEA Level 3 Economics by Maggie Williamson.

Williamson is the author of a popular study guide at the Year 13 level. She describes the supply curve as being representative of the marginal cost curve, which shows the additional cost of producing each item.

Williamson follows the now familiar pattern of describing an indirect tax as increasing the costs of supply.

“An indirect tax effectively increases the supplier’s costs, a determinant of supply. To the original supply curve, S1, is added the amount of the tax. As the same amount of tax is added at each level of output, the supply curve moves upwards by the amount of the tax. The distance between S1 and S2 is the amount of the tax. This has the effect of a reduction in supply” (page 103).



(Williamson, 2007, p. 103).

The producers' surplus is described as reducing from fbg to hmg .
Once again, the post tax producer surplus is calculated from the pre tax supply curve, with no explanation as to why.

NZCETA Viewpoint

In 2009, the document shown in appendix one was circulated by NZCETA. It definitively states that sales taxes and subsidies do NOT change costs of production, and thus do not shift the supply curve. This stance is at odds with that taken in the textbooks analysed above. To establish what approach is considered “correct” for the National Certificate of Educational Achievement externally assessed achievement standards, an analysis of past examinations was carried out on levels one and three. Level two was not included, as the course covers macro as opposed to micro concepts.

NCEA Examination Analysis

An analysis of previous level one external examination reveals that a question about the effect of a sales tax or a subsidy has been asked in the standard titled *Describe the market and market equilibrium(AS 90198)* in 2006, 2007, 2008 and 2009. The relevant questions and answers are shown in appendices two to five. In every question, there is a shift of the supply curve to a new supply curve labeled either S_1 or S' . Calculation of producer surplus is not a concept that is covered in Level One, so whether producer surplus is calculated from the original or the new supply curve is redundant.

An analysis of previous level three external examination reveals that a question about the effect of a sales tax or a subsidy has been asked in the standard titled *Describe an economic problem, allocative efficiency, and market responses to change* in 2005, 2007, and 2009 and 2010. These are shown in appendices six to nine.

In 2005, the imposition of the tax creates a new supply curve S^T . The petrol tax is described as “shifting the supply curve”. The producer surplus is not asked for before or after the imposition of the tax. In 2007, it is unclear if S_{subsidy} is a new supply curve. The effect on producer surplus is shown as a dollar increase of \$25m. How the dollar figure is arrived at is not shown. It could be calculated from S or S_{subsidy} . In 2009, the question asks for the dollar amount of the pre-tax producer surplus, but not the post-tax producer surplus. The question clearly states that the tax creates a new supply curve, with the sentence “The effect of this tax is shown in Graph 3 above by the supply curve $S_{+\text{tax}}$ ”. In 2010, producer surplus is not requested, with the emphasis being on the tax incidence for goods with different elasticities, and the different prices and quantities. The question is unclear on whether or not the $S_{+\text{GST Rise}}$ curves are new supply curves or not.

Clearly, at level three, there is more ambiguity about whether or not a tax or subsidy creates a new supply curve. In two years the new line is described as being a new supply curve, in two years it is not. This ambiguity is created in part by the labeling of the new line as $S_{+\text{Tax}}$ or $S_{+\text{Subsidy}}$. This could be interpreted as a line which helps find the new equilibrium price and quantity (The NZCETA view), or it could be interpreted as a new supply curve.

Conclusion

It is clear there are different approaches to the handling of taxes and subsidies both within secondary school, and between secondary school and first year tertiary. In the case of the Rennie text, there is even a different approach to calculating producer surplus between a tax and a subsidy within the one text. A common practice appears to be to state the tax or subsidy creates a new supply curve, but then use the original supply curve to calculate the new producer surplus with no explanation as to why. This can be confusing for some students, and seems unnecessary.

The aim of this paper is to describe the approaches used by popular secondary school and first year tertiary texts, and compare them with the document circulated by NZCETA, as well as NCEA examinations and marking schedules. It does not attempt to state which approach is the correct one. What has been highlighted through this analysis is that students studying in first year tertiary microeconomics classes may well have a diverse range of experiences in how they have been taught the imposition of taxes and subsidies at secondary school.

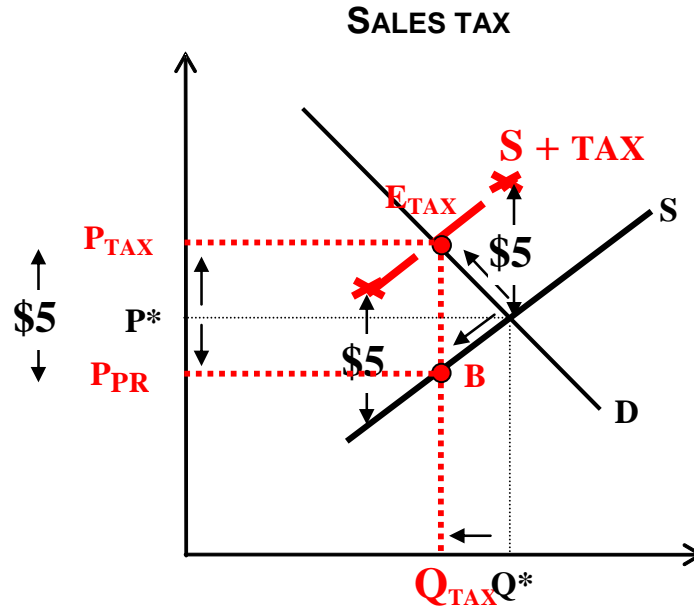
References

- Evans, G. (2001). *Senior Economics*. Auckland, New Zealand: Pearson Education New Zealand Limited.
- Ferraro, P. J. and Taylor, L. O. (2005). Do Economists Recognize an Opportunity Cost When They See One? A Dismal Performance From The Dismal Science'. *Contributions to Economic Analysis and Policy*, 4(1), Article 7.
- Mankiw, N. G. (2009). *Principles of Microeconomics*. Mason, OH, USA: Cengage Learning.
- O'Donnell, R. (2009). The Concept of Opportunity Cost: Is It Simple, Fundamental Or Necessary? *Australasian Journal of Economics Education*, 6(1), p. 21-37.
- Rennie, D. (2003). *Understanding Economics Part a – resource allocation via the market system: Teacher's Edition*. Takapuna, Auckland, New Zealand: New House Publishers Ltd.
- St John, S. & Stewart, J. (1998). *Economic Concepts and Applications: The Contemporary New Zealand Environment*. Auckland, New Zealand: Addison Wesley Longman New Zealand Limited.
- Williamson, M. (2007). *NCEA Level 3 Economics: Year 13 Study Guide*. Newmarket, Auckland, New Zealand: ESA Publications (NZ) Ltd.

Appendix One

Teaching Sales Taxes (without shifting the supply curve??)

Note a sales tax DOES NOT change costs of production so shouldn't shift supply



1st Find the after sales tax price paid by consumers

Method (e.g. a \$5 dollar sales tax)

1. Locate the point (with an x) that is \$5 directly above the current equilibrium
2. Locate a second point (with an x) to the left side of the D curve that is \$5 directly above the S curve
3. Join these 2 x's with a line (called S + tax) and where it crosses the demand curve is the after tax price paid by consumers
 - label this point E_{TAX}
 - draw a horizontal dotted line back to the Y axis from E_{TAX} and label this P_{TAX}

Note the higher price paid by consumers (P_{TAX}) causes the *quantity demanded* (ie movt along the D curve) to fall from Q^* to Q_{TAX}

2nd Find the after tax price received by producers

Method

1. Locate Q_{TAX} by dropping a dotted line vertically from E_{TAX} to the X axis (remember to label it Q_{TAX})
2. Identify the point (call it B) where the Q_{TAX} line cuts the S curve
3. Draw a dotted line from B to Y axis and label this price P_{PR}

1. Locate Q_{SUB} by dropping a dotted line vertically from E_{SUB} to the X axis (remember to label it Q_{SUB})
2. Extend the Q_{SUB} line up until it meets the S curve, identify this point (call it B)
3. Draw a dotted line from B to Y axis and label this price P_{PR}

Note the higher price received by producers (P_{PR}) causes the *quantity supplied* (ie movt along the S curve) to rise from Q^* to Q_{SUB}

3rd Identify the dollar amount of the subsidy

→ it is the difference between P_{SUB} and P_{PR} (in this eg = \$5)

4th Identify the total subsidy paid out by the government

→ it is the rectangle $P_{SUB} E_{SUB} B P_{PR}$

Appendix Two
Level One 2006 90198

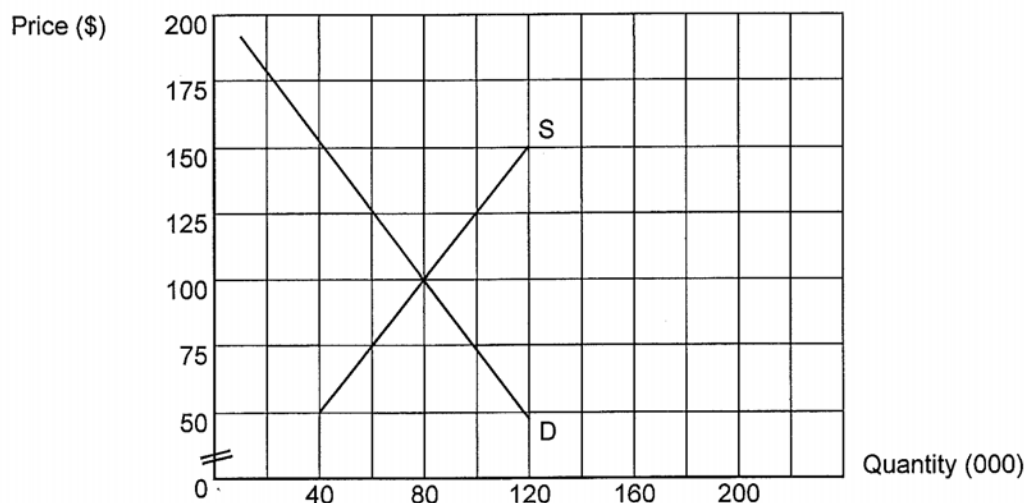
QUESTION SIX

Sir William Stewart, a leading scientist in the UK, recently urged parents to stop their children from using mobile phones until more is known about their safety. It is thought that young children might be more vulnerable to fields given off by such phones because of their thinner skulls and developing nervous systems.

Source: www.timesonline.co.uk

There is increasing pressure on the government to act in order to control the use of mobile phones. As a result, the government decides to apply an indirect tax of \$50 for each mobile phone sold.

Graph 3
The Market for Mobile Phones



(a) On Graph 3, show the effect of the tax on mobile phones. Use dotted lines to show the new **equilibrium price** (label as P_2) and the new **equilibrium quantity** (label as Q_2).

(b) What is total consumer spending before the tax? \$ _____

(c) State the price:

(i) the consumer pays after the tax \$ _____

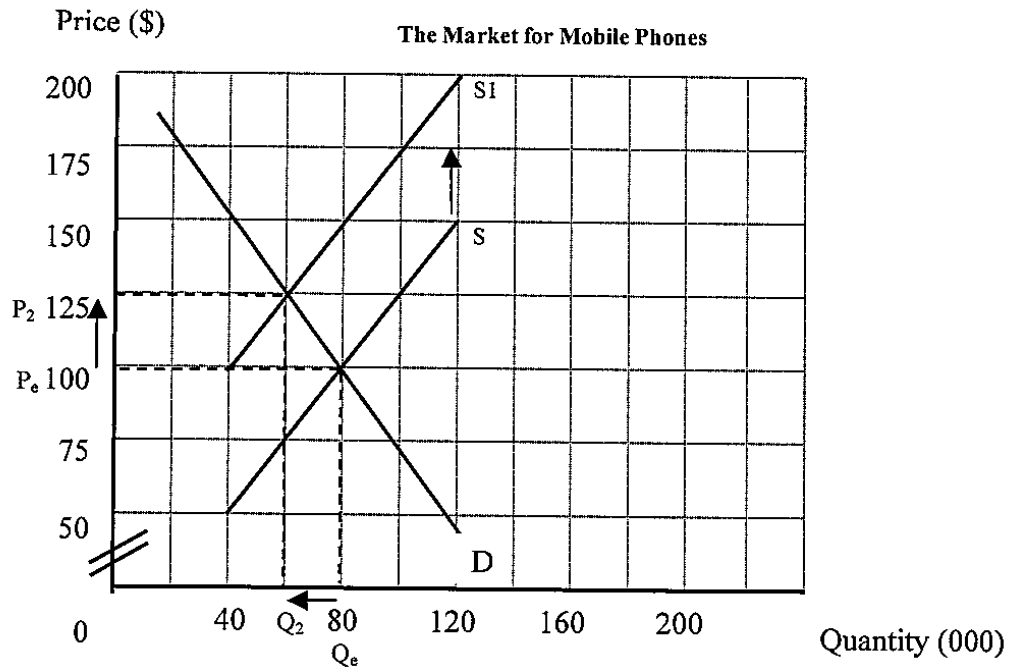
(ii) the supplier receives after the tax. \$ _____

(d) How much revenue does the government collect from this tax? **SHOW WORKING.**

\$ _____

As the marking schedule graph below shows, the effect of the tax is to shift the supply curve from S to S_1 . There is clearly a new supply curve labeled S_1 . There is no discussion of the effect of the tax on producer surplus.

Graph 3

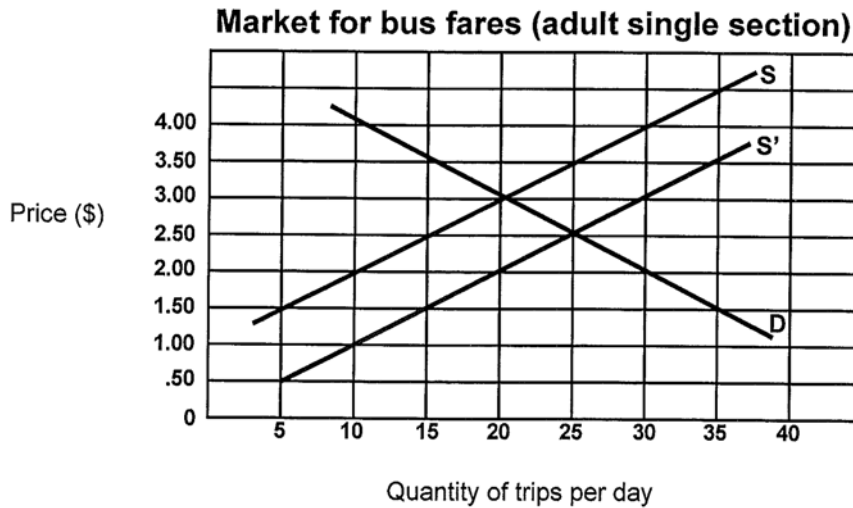


Appendix Three
 Level One 2007 90198

QUESTION SIX

To help reduce the demand for petrol, local councils have been urged to subsidise bus fares.

The graph below shows the effect of a subsidy provided to a local bus company for a single section adult fare.



- (a) (i) State the amount of subsidy per trip. \$ _____
- (ii) State how much the bus company receives per trip. \$ _____
- (b) **Explain** the effect of a subsidy on the **revenue** of the bus company.

The imposition of a subsidy results in the new line S'. Although it is not specifically stated, the labeling suggests S' is a new supply curve, as opposed to a line labeled S_{+subsidy}, which would be a little more ambiguous. There is no request for any kind of surplus calculation.

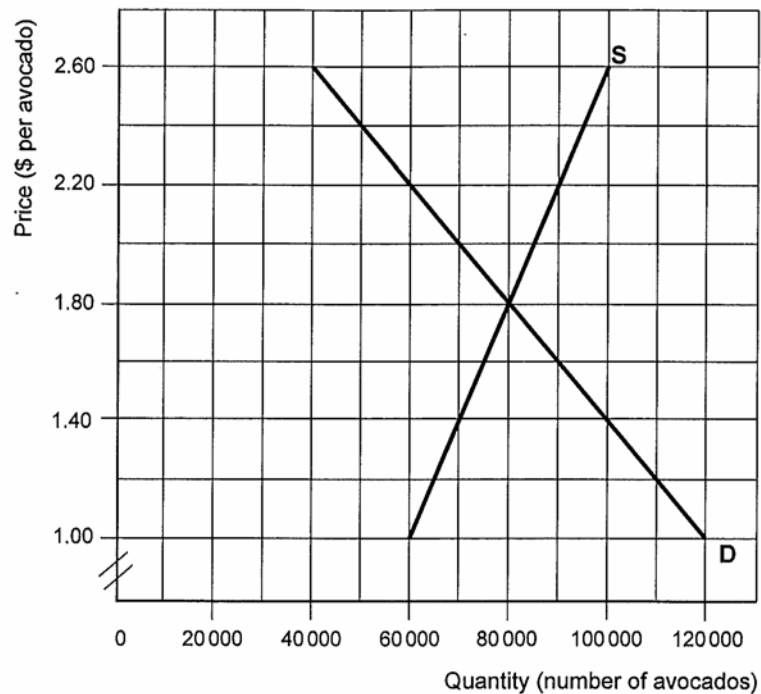
Appendix Four

Level One 2008 90198

Agreeing that avocados have been shown to have health benefits, the Government decides to provide a subsidy to avocado growers.

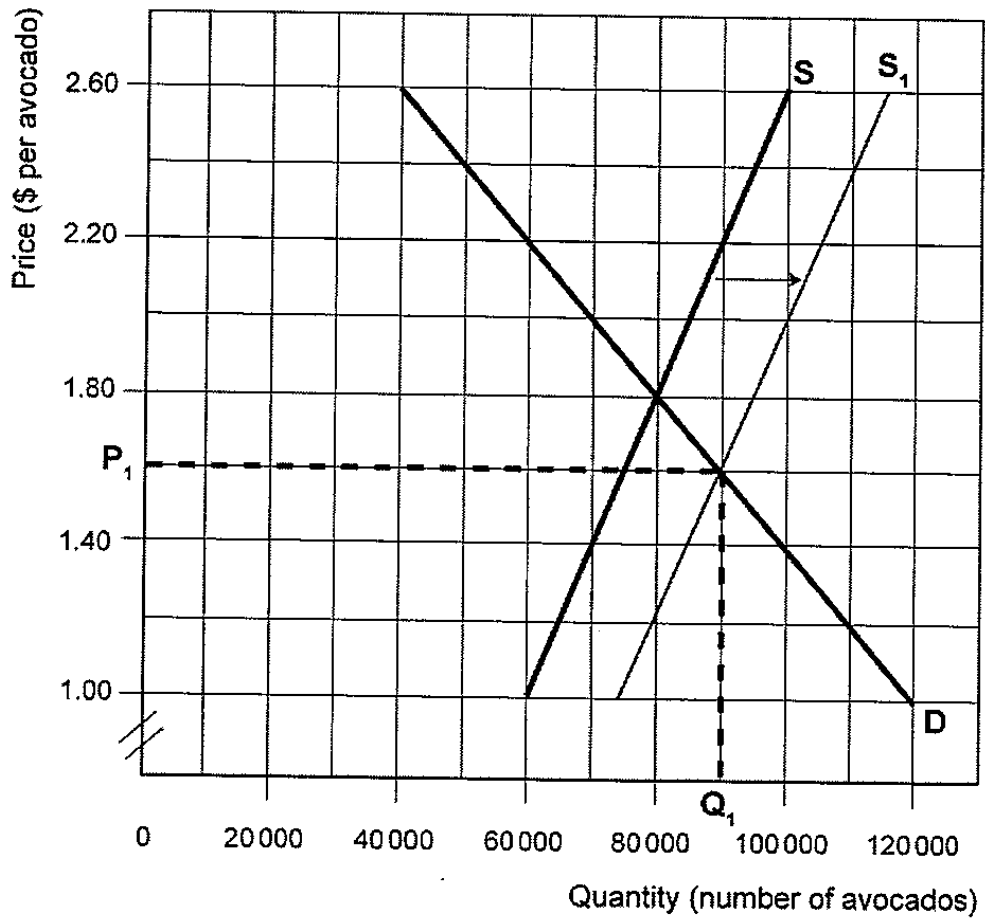
- (b) On Graph Three below, show the effect of a \$0.60 **subsidy** per avocado. Use dotted lines to indicate:
- the new equilibrium **price** (label as P_1)
 - the new equilibrium **quantity** (label as Q_1).

Graph Three: The Market for Avocados



As the marking schedule graph below shows, the effect of the subsidy is to shift the supply curve from S to S_1 . There is clearly a new supply curve labeled S_1 . There is no discussion of the effect of the subsidy on producer surplus.

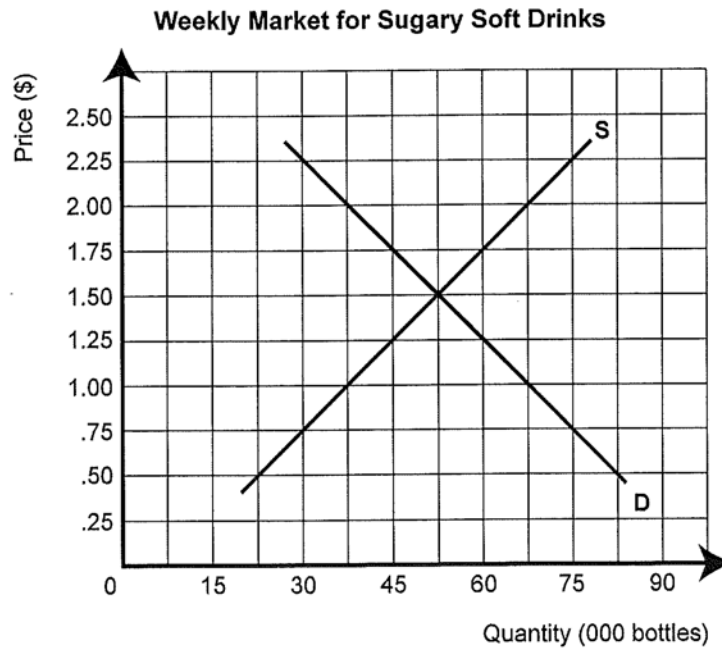
Graph Three



Appendix Five
 Level One 2009 90198

Consumers who drink a lot of sugary soft drinks over a long period of time may be in danger of developing a disease called diabetes. To reduce the chances of this happening to people, the government considers putting a sales tax on sugary soft drinks.

The graph below shows the market for sugary soft drinks.

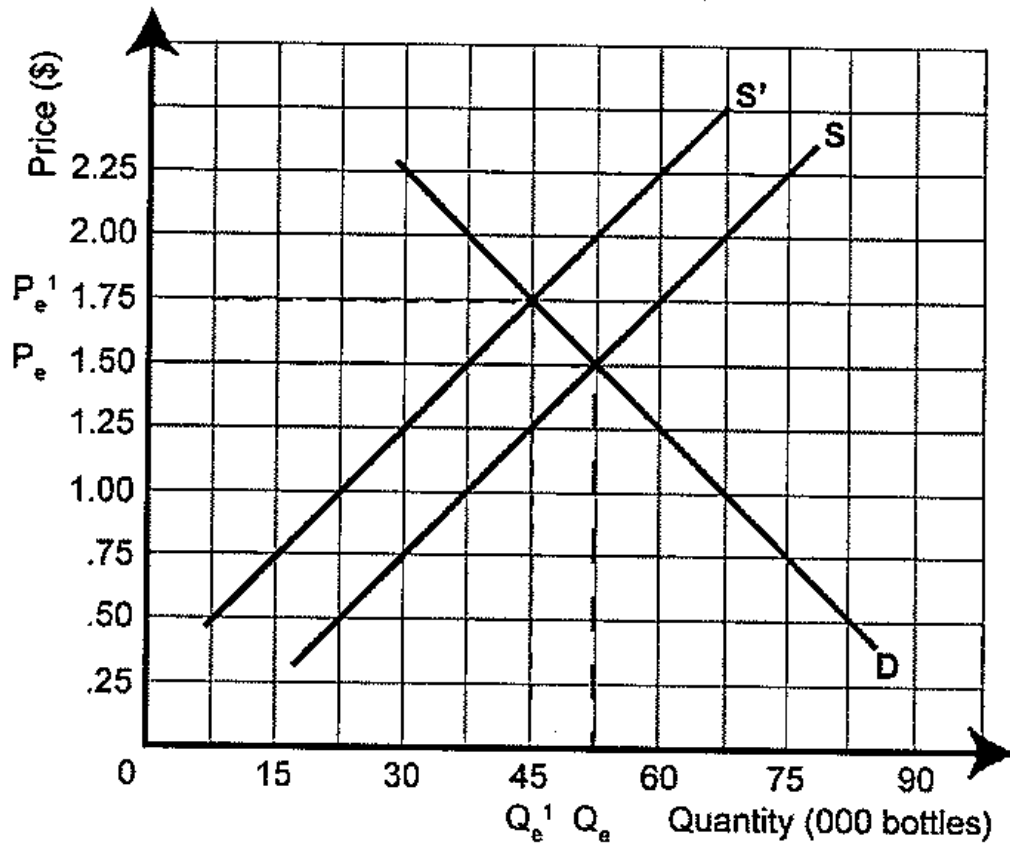


- (b) On the graph above:
- (i) label the original equilibrium price P_e and the original equilibrium quantity Q_e
 - (ii) shift and label the appropriate curve to show the effect of a **50c per bottle sales tax** on sugary soft drinks
 - (iii) label the new **equilibrium price** and **quantity**.
- (c) **Calculate** the amount of **revenue** per week the government would **collect** on this tax.
 Show your working.

_____ = \$ _____

As the marking schedule graph below shows, the effect of the tax is to shift the supply curve from S to S_1 . There is clearly a new supply curve labeled S_1 . There is no discussion of the effect of the tax on producer surplus.

Weekly Market for Sugary Soft Drinks



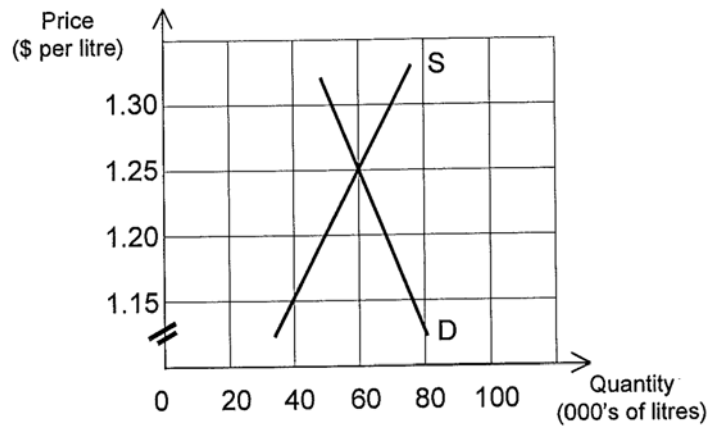
The imposition of a tax results in the new line S'. Although it is not specifically stated, the labeling suggests S' is a new supply curve, as opposed to a line labeled S_{+tax}, which would be a little more ambiguous. There is no request for any kind of surplus calculation.

Appendix Six
Level Three 2005 90630

QUESTION TWO

On 1 April 2005, the Government imposed a 5-cent-per-litre tax on petrol. They hope to raise \$2 billion for a roading programme that is to be implemented over the next 10 years.

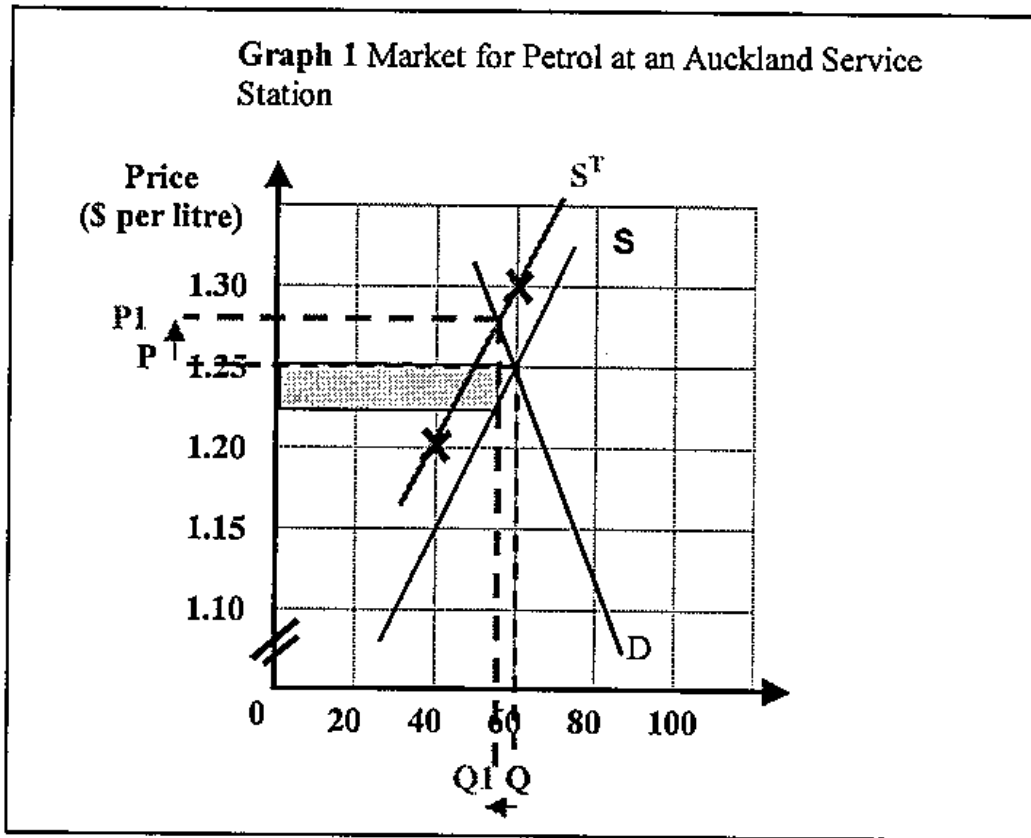
GRAPH 2
Market for Petrol at an Auckland Service Station



- (a) On GRAPH 2, use appropriate labelling to **show** the effect that a 5-cent-per-litre tax will have on the **petrol market equilibrium price and quantity**.
- (b) **Explain** how the petrol market moves to the new market equilibrium following the introduction of the petrol tax.

- (b) (1) The petrol levy shifts the supply curve to S^T (as the levy reduces the revenue earned by producers at each output level, reducing their profitability and causing less to be supplied) \rightarrow excess demand at the old equilibrium (\$1.25)

Appendix B – for Question Two (a)



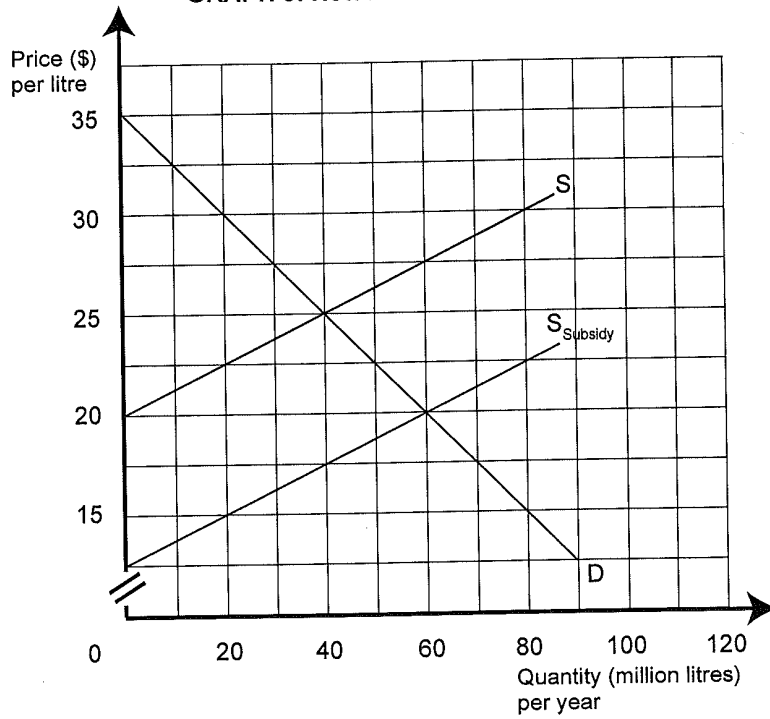
Appendix Seven
Level Three 2007 90630

QUESTION FIVE

Economists believe subsidies have uneven impacts on consumers and producers, and are allocatively inefficient.

The effect of a subsidy of **\$7.50 per litre of wine** is shown on GRAPH 5 below.

GRAPH 5: New Zealand Market for Wine



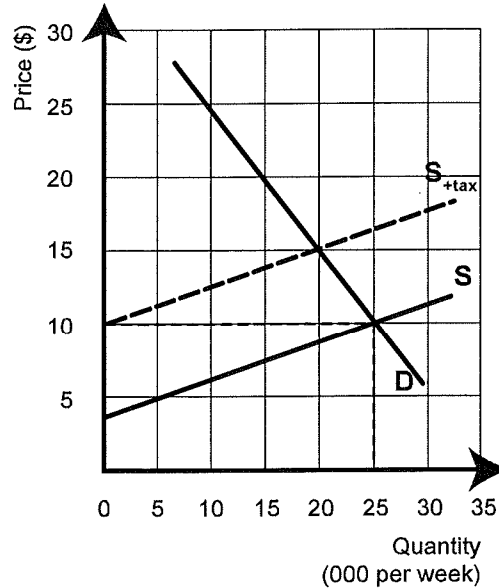
Appendix Eight
Level Three 2009 90630

QUESTION THREE

Part A

In 2008, the Australian government announced a substantial excise tax on Ready to Drink Alcoholic Drinks (RTDs). There has been some discussion on whether New Zealand should do this as well.

Graph 3: Market for Ready to Drink Alcoholic Drinks (RTDs)



Assume the government places a **tax** of \$7 per drink on RTDs. The effect of this tax is shown in Graph 3 above by the supply curve S_{+tax} .

- (a) After the tax has been **put in place**, state:
- (i) the **new price** consumers would pay per RTD \$ _____
 - (ii) the **amount** retailers will receive for themselves per RTD \$ _____
 - (iii) the **new quantity** of RTDs that would be sold per week. _____
- (b) **Fully explain** the effect of the tax on RTDs by **calculating**:
- (i) the **tax** revenue received by the government \$ _____
 - (ii) the **change in total consumer spending** on RTDs \$ _____
 - (iii) the **change** in RTD suppliers' **after-tax** revenue \$ _____
 - (iv) the Producer Surplus **before** the tax \$ _____
 - (v) the change in Consumer Surplus **due to** the tax. \$ _____

Appendix Nine
Level Three 2010 90630

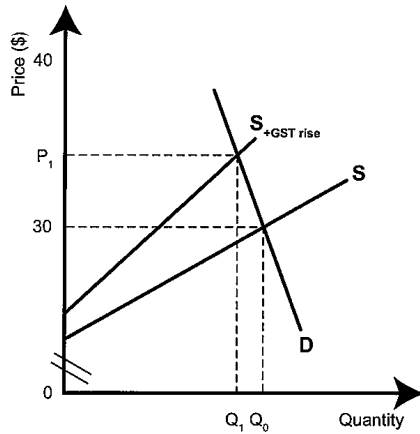
QUESTION THREE

Assessor's
use only

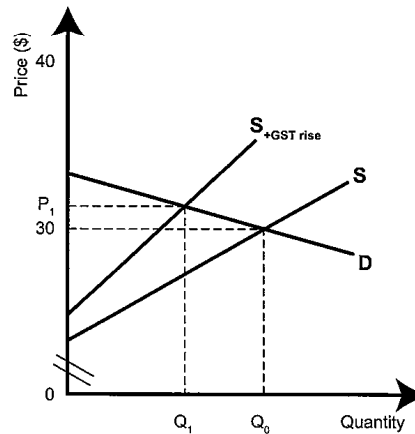
In the May 2010 Budget, the Government announced that GST was being raised to 15 per cent.

The graphs below show the effect of a GST increase on two different markets. Both markets have a current equilibrium price of \$30 and a current quantity of Q_0 .

Graph Three: Market for Bus Passes



Graph Four: Market for Restaurant Main Courses

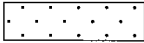


Part A

- (a) Describe the market forces that have caused the equilibrium in each market to shift to P_1, Q_1 .

Part B

- (b) Show the effect of a GST increase on the markets in Graph Three **and** Graph Four by:

- (i) identifying the **price** the producer receives **after** paying the GST increase (P_2)
- (ii) shading the **incidence** of the GST increase on the **consumer** 
- (iii) shading the **incidence** of the GST increase on the **producer** 