Student ID# 4
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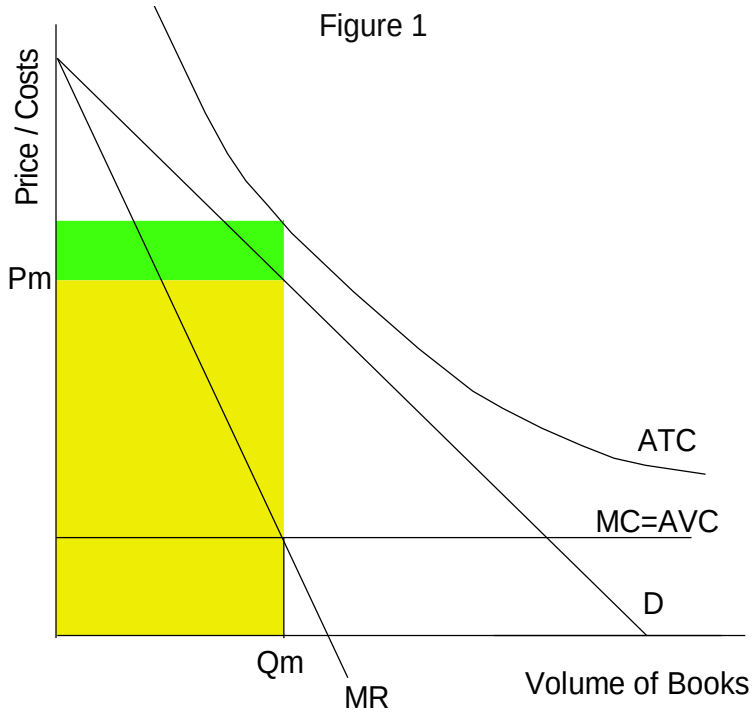
Economics Senior Exercise

I. Pricing Literature

A.

Prior to the entry of Barnes and Nobel, Amazon.com dominated the online book market. From 1995 to 1997, Jeff Bezos was the only person capitalizing on a revolutionary business idea that allowed people to read online reviews made by other readers and then purchase books at a competitive and often times lower price then at the local bookstore. The market structure during this two-year period was clearly a monopoly. Amazon did not have any particular patents or special rights that allowed them to be the largest player in the industry, but for the simple reason that Amazon was a revolutionary internet based company, they enjoyed monopoly power. The internet is so new to consumers that people are still a little hesitant about abandoning older methods of consumerism and utilizing online resources. Amazon came on the scene at the right time and provided a completely new service to customers that immediately drove up revenues. Amazon had a name and consumers that made the switch to online purchases went with someone they knew. As often is the case with internet companies, other smaller internet startups could not compete and the first one with the idea wins because that company will grow rapidly due to the wide reach of internet based companies. An internet company can be based out of one city and sell their product around the world. Amazon took advantage of the large market and his company rapidly became monopolistic in online book sales.

As a monopoly, the following is a plausible graph of Amazon's economic situation.

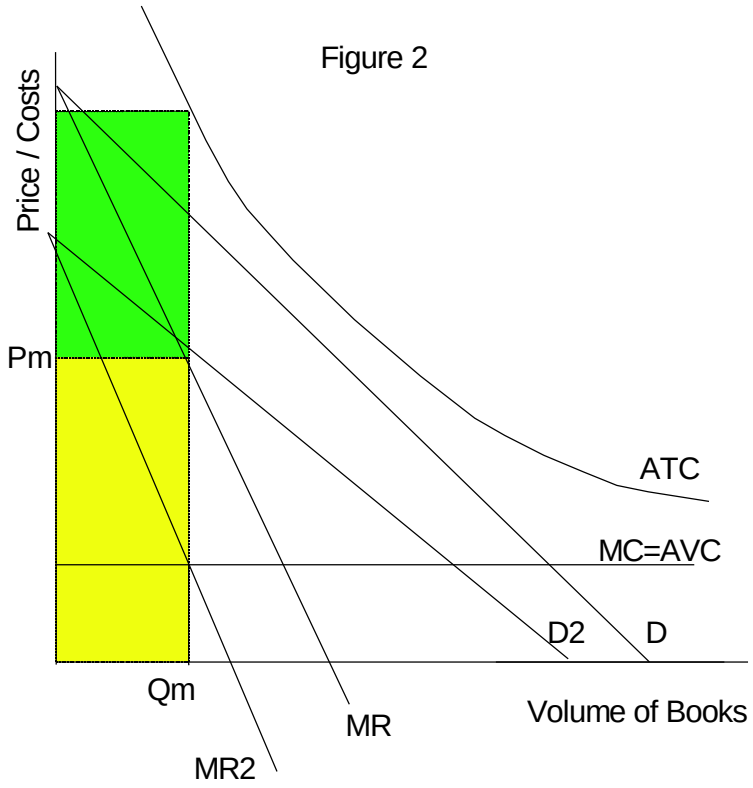


The demand curve (D) is shown to be downward sloping, which is a key element in displaying monopoly power. The ability for Amazon to affect the price and quantity of books sold in the market is a characteristic of this type of market structure. The marginal revenue (MR) curve is derived from the demand curve and works out to be half way between the demand curve and the vertical axis. For simplicity of the graph, I have choose to draw a constant marginal cost curve (MC) equal to average variable cost (AVC). I have also drawn in an average total cost curve (ATC) that is plausible considering that we know that Amazon is losing money.

To determine the monopoly quantity and price in this market, Amazon behaves like all firms do, and sets marginal revenue equal to marginal cost. As long as the additional revenue from an additional unit of output is greater then the cost of that unit, the firm should increase production. So, from this intersection, extend down to the horizontal axis and this is the monopoly quantity (Q_m). Now, at Q_m, one must determine the price to set for these units of output. The demand curve represents the maximum willingness to pay for any quantity of output, so extend up from Qm to the demand curve and over to the vertical axis to find the monopoly price (P_m).

Now, since we have Q_m and P_m, we can compute total revenue and total cost and subtract to find the economic profit. Total revenue is equal to Q_m times P_m and is graphically shown by the yellow area on the graph. Since we drew in the ATC curve previously, the total cost is simply Q_m times ATC (Q_m). The yellow and green regions together on the graph represent total cost. Thus subtracting we find the economic profit (green) and since total cost is greater than total revenue, the profit is negative and as was stated, Amazon.com is losing money.

Once Barnesandnoble.com enters the market, this has an adverse effect on Amazon.com. The impact is shown in figure 2.



Since two companies are now sharing the online book market, they are acting more like a duopoly. Both of them have some degree of market power, but neither completely controls the price level in the marketplace. As shown in figure 2, the demand curve for Amazon.com will shift in to D_2 since at any given price level, the quantity of books sold will be divided between the two competing companies. D_2 will also become slightly more elastic as customers are more sensitive to price as there are now substitutes in the market. Marginal revenue also changes as a result but the cost curves all stay the same. There is a new equilibrium quantity and price (Q_e and P_e). The quantity has fallen and so has the price. Total revenue and total cost are again shaded as above and at least in the way it is drawn here, total economic loses have increased for Amazon.

B.

Dynamic pricing is a type of price discrimination. In particular, this type is called first-degree price discrimination because the firm is charging different prices to different customers in the same market. Amazon employs this pricing practice for the simple reason that it increases total revenue. Normally, for example in part A of this problem, a monopolistic firm determines the quantity it wants to produce and determines the price for that quantity by looking at the demand curve. By setting a particular price though, all customers to the left of that quantity (if you think of the demand curve as consumers who line up in order of their willingness to pay) are willing to pay more then the price that you set. This results in a benefit to the consumer

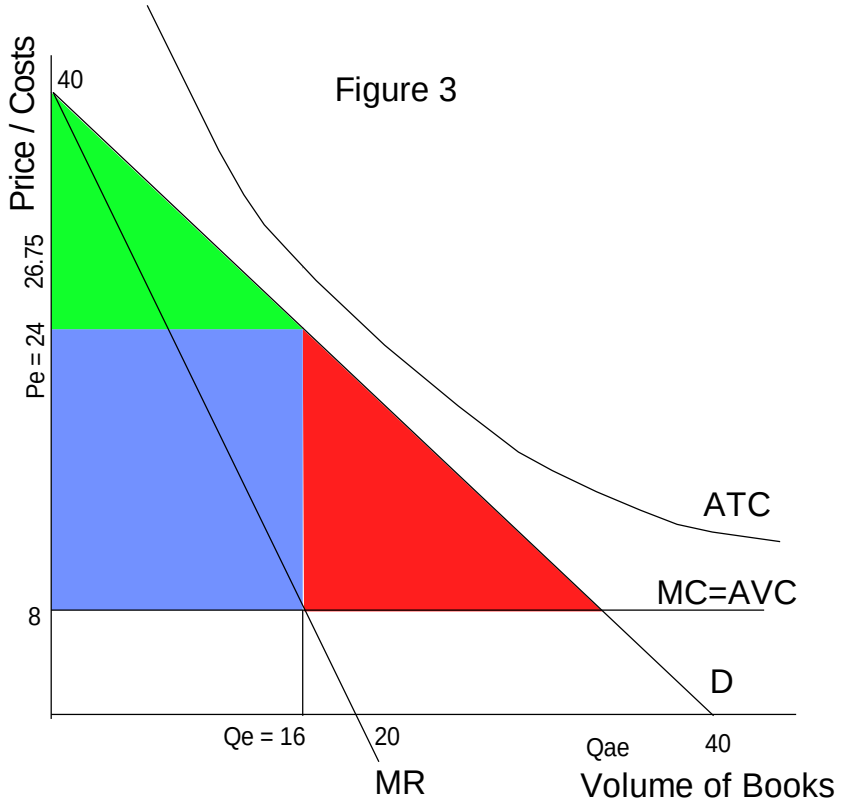
known as consumer surplus. However, with dynamic pricing, a firm can capture some of this surplus and increase their revenues.

The problem with dynamic pricing is that it is extremely hard to engage in. Perfect price discrimination is basically impossible because a firm can never know exactly what their customers are willing to pay. But in this case, Amazon would even have a difficult time capturing a small amount of the consumer surplus because of the feasibility of this type of system. Internet commerce is relatively new and though it would not be hard to keep track of previous purchases by a certain customer at Amazon.com, there really is no way of knowing if the customer had made purchases at a competitors site or store.

It is not likely that Amazon could have continued this pricing practice indefinitely. If executed correctly, Amazon would be making huge profits (or at least revenues) and this would cause others to enter the industry or those that are already in the industry to also introduce dynamic pricing. Arbitrage is also a likely result of this type of price discrimination with people buying from Amazon and then selling at a slightly higher price elsewhere thus eliminating some of Amazon's higher paying customers. Customers are not ignorant to these types of pricing strategies either. There are also enough consumer watchdog programs in the US that even if this was done secretively, the consumer would most likely catch on and return to a competitive substitute for online book sales, the local bookstore.

C

The following is a graph of the George and Al's demand curve along with revenue and cost curves for Amazon.com.



To find Amazon's profit maximizing sales volume and price, we first need to determine a few other curves.

Total Cost = 300 + 8Q
Average Total Cost = TC / Q = 300/Q + 8
Marginal Cost = TC '(Q) = 8
Demand: P = 40 – Q
Total Revenue = P * Q = (40 – Q) Q = 40Q – Q^2
Marginal Revenue = TR '(Q) = 40 - 2Q

To determine the profit maximizing quantity, set marginal revenue equal to marginal cost.

MR = MC.
40 – 2Q = 8.
Q_e = 16.

Plugging Q_e back in to the demand equation, we find the equilibrium price,

P = 40 – Q.
P = 40 – 16.
P_e = 24.

Thus, total revenues equal price times quantity, which is 16 * 24 = 384. Total cost is found by plugging in Q_e into ATC. Thus total cost = 300 + 8*16 = 428. Subtracting, we find that Amazon is making economic loses of $44.

Consumer surplus is the area to the left of Q_e, above P_e, and below the demand curve. It is shaded Green in figure 3. Producer surplus is the area to the left of Q_e, above the marginal cost curve and below P_e. It is shaded blue in figure 3. Numerically,

$$\text{Consumer Surplus} = 16 * 16 * 0.5 = 128.$$
$$\text{Producer Surplus} = 16 * 16 = 256.$$

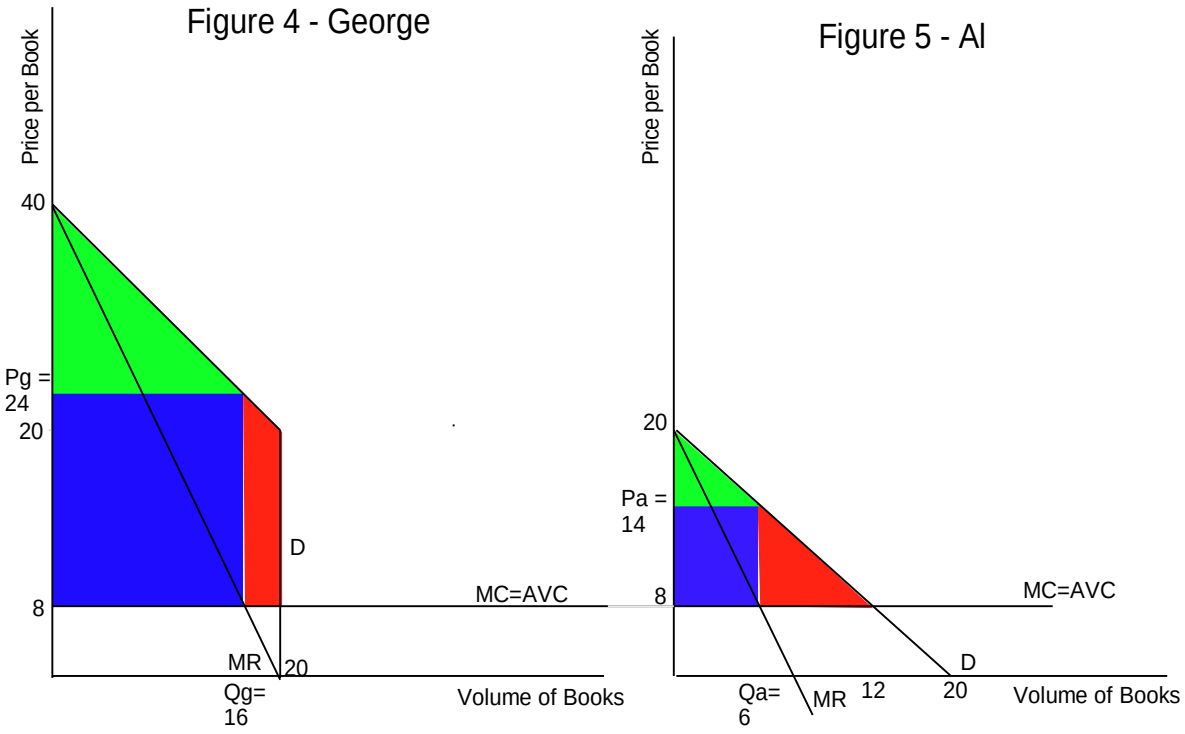
The allocatively efficient quantity occurs where marginal cost equals the demand curve. This makes sense because as far as society is concerned, if the willingness to pay for a good is any greater than the marginal cost of producing that good, the price should be lowered. Thus,

$$40 - Q = 8.$$
$$Q_{ae} = 32.$$

The term deadweight loss can be interpreted as the cost of monopoly power. Since Amazon can set whatever price it wishes and does so to maximize profits, there is a social cost called a deadweight loss. Graphically it is the area under the demand curve, above the marginal cost and between the equilibrium quantity (Q_e) and the allocatively efficient quantity (Q_{ae}). It is shaded red in figure 3. Numerically,

$$\text{Deadweight Loss} = (32 - 16) * (24 - 8) * 0.5 = 128.$$

D.



George and Al's individual demand curves along with Amazon's cost curves are plotted above. You can clearly see that the horizontal summation of the two demand curves equals their combined demand curve, $P = 40 - Q$. We can also determine Amazon's MR curve for each customer. Setting MR = MC in each graph, we obtain the equilibrium quantity of books for George and Al, (Q_g and Q_a).

$$\text{George: } 40-2Q = 8$$
$$Q_g = 16$$
$$\text{Al: } 20 - 2Q = 8$$
$$Q_a = 6$$

Plugging these quantities into each demand curve to find the price charged to each customer (P_g and P_a),

$$\text{George: } P = 40 - Q$$
$$P_g = 40 - 16 = 24$$
$$\text{Al: } P = 20 - Q$$
$$P_a = 20 - 6 = 14$$

Total revenue is therefore, 16*24 + 6*14 = 468. Total cost of the 22 bestsellers (16+6) would be, TC = 300 + 8Q = 300 + 8(22) = 476. Thus the total economic loses of utilizing dynamic pricing on George and Al is $8. Much better than the $44 in loses that Amazon had when they used the combined demand curve.

Consumer and producer surpluses are calculated as before and shown graphically in figure 4 shaded green and blue respectively. Numerically,

$$CS = CS_{Al} + CS_{George} = 16*16*0.5 + 6*6*0.5 = 128 + 18 = 146$$
$$PS = PS_{Al} + PS_{George} = 16*16 + 6*6 = 256 + 36 = 292$$

Finally, the deadweight losses are shown in each of the graphs in red. Numerically,

$$DWL = DWL_{Al} = DWL_{George} = 56 + 18 = 74.$$

E.

The following table illustrates the difference when Amazon employs dynamic pricing to the market made up of George and Al.

	Combined Demand Curve	Dynamic Pricing
Total Revenue	384	468
Total Cost	428	476
Economic Profit	-44	-8
Consumer Surplus	128	146
Producer Surplus	256	292
Deadweight Loss	128	74

As shown in the table above, dynamic pricing increased revenues, profits, consumer and producer surpluses and reduces the deadweight loss associated with Amazon's pricing strategy. The gain in consumer surplus is a result of Al paying a slightly lower price due to his individual demand curve. (George continued to pay the price as in part C) Bases on these numbers, it does seem that dynamic pricing, though it is a type of price discrimination, is more economically efficient.

F.

Senator-elect Heart's view on regulating internet commerce might be different if she saw the results that were shown previously. If Amazon is truly able to employ dynamic pricing correctly, then the deadweight loss is reduced and the consumer and producer surplus is increased. So if done correctly, Heart's first claim that society is better off at a single price is inaccurate. The problem is again if Amazon can really employ dynamic pricing fully. As said earlier, there is no such thing as perfect price discrimination. There will always be some consumers who would have bought if the price was set a one particular level, but decide differently under dynamic pricing as Amazon misread the consumer's preferences. Therefore there will always be some deadweight loss associated with this type of pricing strategy. A perfectly competitive market is the only way to eliminate that deadweight loss.

Senator-elect heart's second point about the lack of ability of an unregulated market to curtail dynamic pricing is controversial. I would argue that there is not a need for government regulation and if Amazon is successful with dynamic pricing, it could not continue for long due to the reasons stated in part B. Especially as the internet becomes a more stable and prominent part of today's marketplace, the barriers to entry into internet commerce will fall and the market will become more competitive. Another condition for perfect (or close to perfect) competition is good information for the buyer and seller. This also will increase substantially over time as the internet grows and allows customers to gain information about all possible sellers and then can choose a competitive price. So I disagree with Ms. Heart's proposal and would allow the market to regulate the online book industry.

G.

The main different in priceline's pricing strategy is that the marginal revenue of selling an additional book is equal to the price level as determined by the demand curve. This is because the firm must lower the price to sell that additional unit, but it only lowers the price for that last unit and not all those that it would have already sold. Thus total revenue is increased. In priceline's situation, we can illustrate the situation with the following figures.

Figure 6 - George

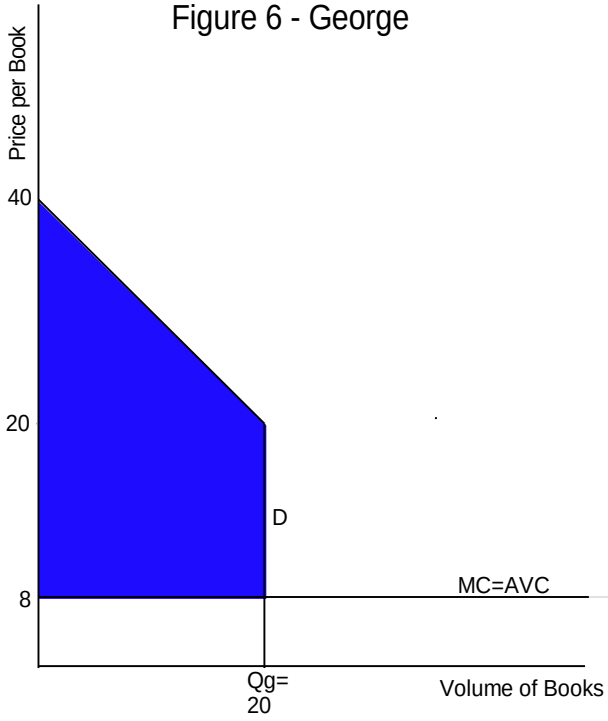
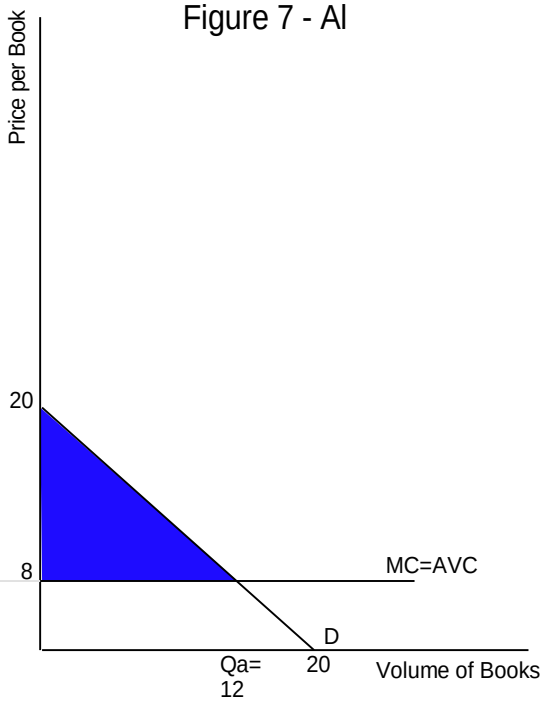


Figure 7 - Al



Setting marginal revenue, which is now the same as the demand curve, equal to marginal cost, we find that the equilibrium quantity of books to sell to George is 20 since his demand curve is kinked. For Al, setting MR = MC, we obtain $Q_{Al} = 12$. Thus total sales in this market equals 20 + 12 = 32 bestsellers. We do not signify an equilibrium price here since the price varies for every quantity. Thus,

$$\text{Total Revenue} = TR_{George} + TR_{Al} = 600 + 168 = 768.$$
$$\text{Total Cost} = 300 + 8Q = 300 + 8(32) = 556.$$

Subtracting we find that the aggregate economic profit for Priceline.com is $768 - 556 = \$209$. There is no consumer surplus in this type of pricing strategy since all buyers bid their maximum willingness to pay. Producer surplus is shaded blue above and numerically equals,

$$\text{Producer Surplus} = PSGeorge + PSAl = 440 + 72 = 512.$$

There is also no deadweight loss in this particular model. In both figures above, the Q_e is equal to the allocatively efficient quantity. Allowing people to set their own price causes the marginal revenue of the firm to be different and thus their pricing decision changes. They are more willing to set the lower price for consumers at quantities all the way up to Q_e because when they do so, they are not sacrificing the higher prices they can get from other consumers.

This type of pricing strategy is the most efficient we have looked at thus far. Consumer surplus is eliminated but everyone is still paying exactly what they are willing to and no one is cheated by the imperfections and complications associated with dynamic pricing. The deadweight loss it eliminated and

Priceline.com is actually making a positive economic profit. This will induce other firms to enter the market and increase the competitiveness. The key assumption that has been made that is not entirely realistic is that people state their maximum willingness to pay. Adding on to the chart started earlier,

	Combined Demand Curve	Dynamic Pricing	Demand Collection System
Total Revenue	384	468	768
Total Cost	428	476	556
Economic Profit	-44	-8	209
Consumer Surplus	128	146	0
Producer Surplus	256	292	512
Deadweight Loss	128	74	0

It seems evident that the demand collection system is really in the firm's favor since it increases their revenue, profit, and producer surplus. Total surplus, consumer plus producer, is also greatest in the third case. The consumer is not better off in terms of consumer surplus but as far as economic efficiency, the last model is superior to the other two.

H.

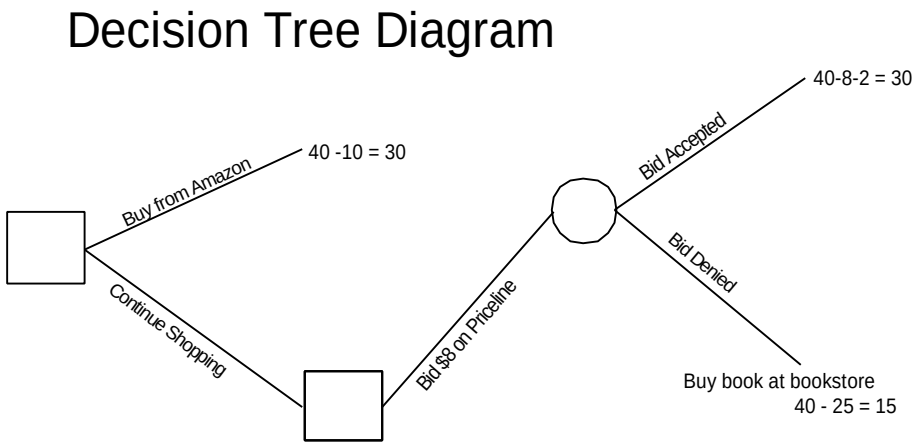
The key assumption being made in this problem is that the priceline order is going to arrive after either the Amazon order is sent out or the customer buys the bestseller at the bookstore. The following is my reasoning for what the customer should bid on Priceline and what Amazon must do to guarantee they get the sale. First I considered the maximum that the Amazon could set the price and the most she would bid on priceline given the bookstore price of $25.

If Amazon sets a price of $25, she would not buy from them and instead make a bid on priceline. Though her bid might be denied, she can still go to the bookstore the next day and buy the book at $25 and she gets the book at the same time she would have received it from Amazon. Waiting, and bidding on Priceline, provides her with the chance of attaining the book at a lower price with the security of knowing she can buy it tomorrow at the store. So Amazon clearly would not set a price any higher than $25 because that would definitely make her go to priceline or the bookstore. Now when she does go to priceline, she is faced with a $5 waiting fee. So her highest possible bid would be $20, but why bid away all her consumer surplus? She would surely bid at a price below $20 and hopefully have it accepted. If not, she is still assured of buying the book the following day at the bookstore for $25.

So what should Amazon do then to assure she buys it from them initially and does not make a bid with priceline? At a price just below $25, (25-X), from Amazon, she is faced with a dilemma. If her bid to priceline is rejected, she is forced to buy the book at the bookstore for $25 and she is losing $X. But by looking at the cost curves of priceline, she would know if her bid would be accepted or not. Now that I have established maximum prices and bids, I will look at cost curves to determine how low each firm would be willing to sell at.

Since both Amazon and priceline have the same cost curves, the lowest price that each would sell at is $8. The AVC of Amazon is $8, so they would be willing to sell at $8 or more, as this would increase their producer surplus. So if Amazon sets a price of $8, the lowest they could possibly offer, she would accept this price and buy from Amazon. But Amazon could charge up to $13 because she would incur a $5 waiting fee if she made the bid on priceline. So Amazon should charge $13, and if accepted, and it will be accepted, Amazon has a producer surplus of $5 on the book. If for some reason, Amazon set the price above $13, she would not buy from Amazon and instead go to priceline and bid $8, or the minimum that they would be willing to accept. At a price greater than $8, priceline's producer surplus is increased and thus would engage in the transaction.

If the waiting cost is lowered to only $2, then Amazon must charge no more than $10 to guarantee she buy from them. The decision tree that the customer faces is shown here.



This is all assuming perfect information, which is usually difficult to come by, though it is much easier now with the capabilities of the internet. A person can easily check the prices at many different stores and determine the lowest. All it took was two sellers to drive down the price and if there were no costs of using priceline's service, we would reach the allocatively efficient level of sales. The price charged to this customer given the option between Amazon and Priceline is lower than that charged to George in parts C and D.

Costs though are still high and hence the negative profits. The bookstore is eliminated from the market as long as the AVC of one of the online firms is less than the price charged at the bookstore. So one might argue that brick and mortar stores will be hurt by the influx of online sales. But if cost curves were slightly different, the bookstore might still win out. Also, there is a huge disadvantage to online sales in that customers like to see what they are buying. Customers still want to see and hold their purchases before committing to buying. Unless customers know exactly what they want and are merely looking for the best price, the bookstore down the street still has a key advantage.

II. Oil Price Shocks

A.

The following figures illustrate several economic variables over the past 40 years. As we look into the economic conditions surrounding this most recent oil price increase, it is interesting to look at past increases and see how the economy reacted.

Figure 1
Real Domestic Crude Oil Prices

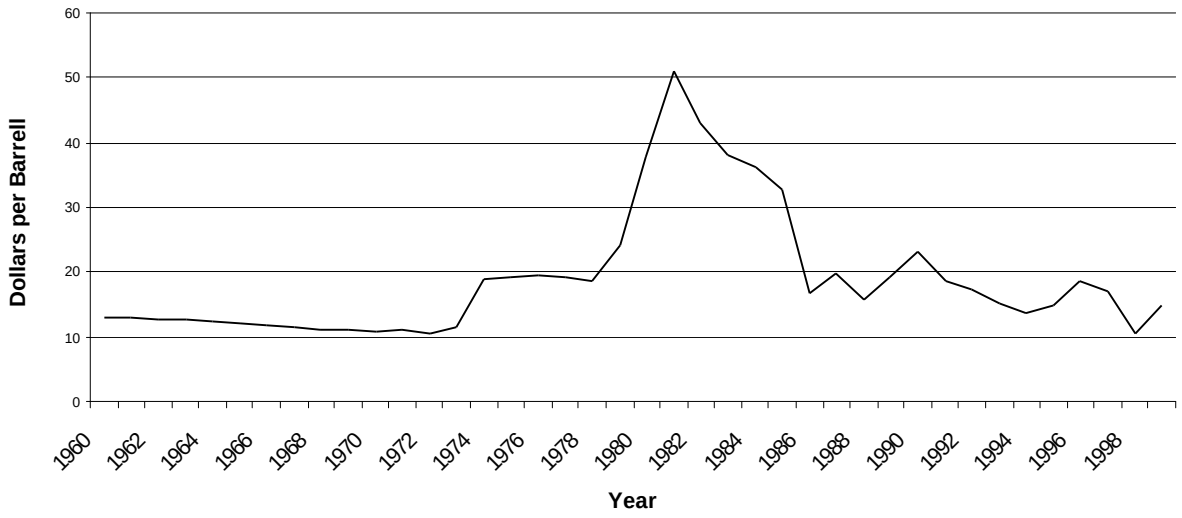
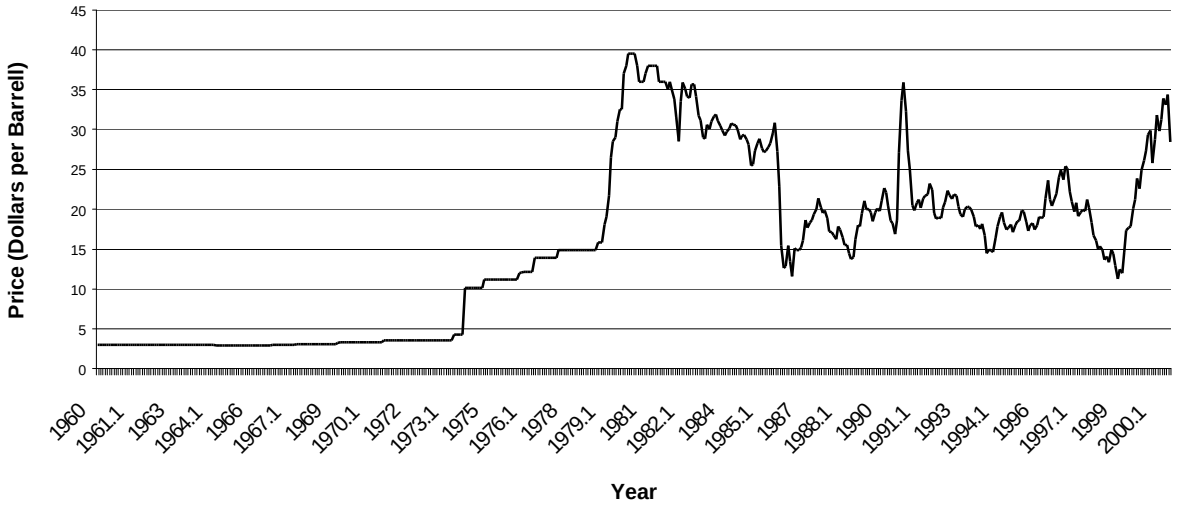


Figure 2
West Texas Intermediate Oil Prices



Figures 1 and 2 show the oil price history first with a general price index of crude oil and then for a specific region –west Texas. This most recent oil price increase is different from those in past years due to the fact that usage of alternate types of energy is growing and the country is now utilizing its resources more efficiently. Efficiency has improved 42% between 1960 and 1999, as the amount of energy required to generate a dollar of output fell from almost 19,000 Btu (British thermal units) in 1960 to under 11,000 Btu in 1999. (see figure 3) Natural gas production (up 53% in the past 40 years) and coal energy production (up 153%) seem to show the greatest increases (Annual Energy Review 1999).

Figure 3
Energy Consumption per Dollar of GDP

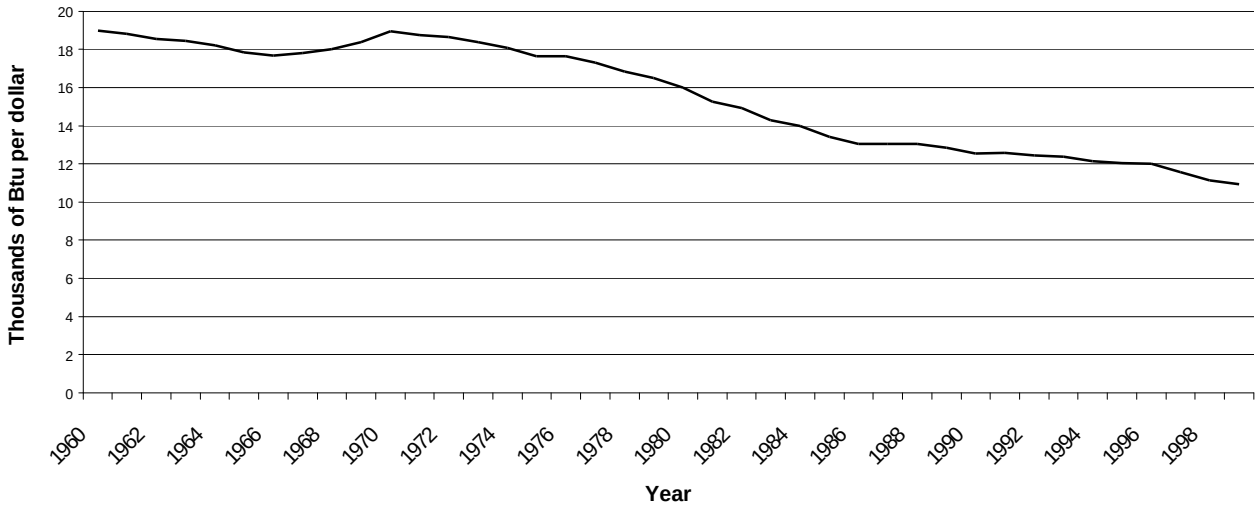
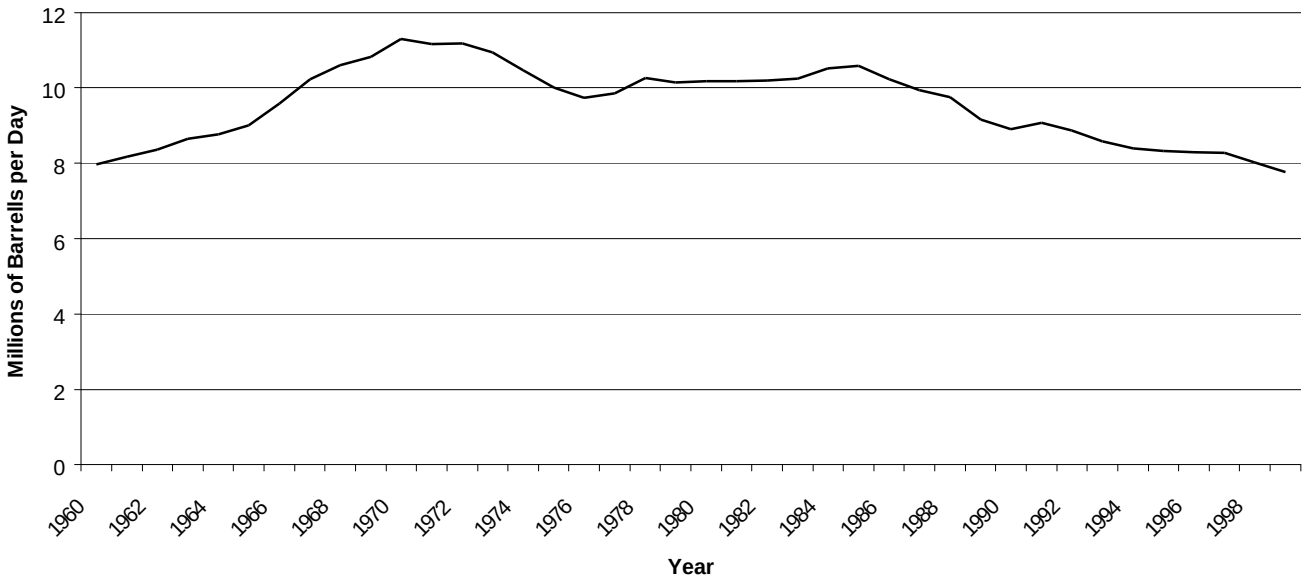


Figure 4
Total Petroleum Production



In figure 4, one can see that total petroleum production fell over the past 15 years even when oil prices have gone through a volatile period. Since oil consumption continues to rise (figure 5), oil imports must be rising as is verified by figure 6. Between 1985 and today, imports of oil has more than doubled. Imports now account for a larger percentage of the oil used in this country then our domestic production.

Figure 5
Energy Consumption

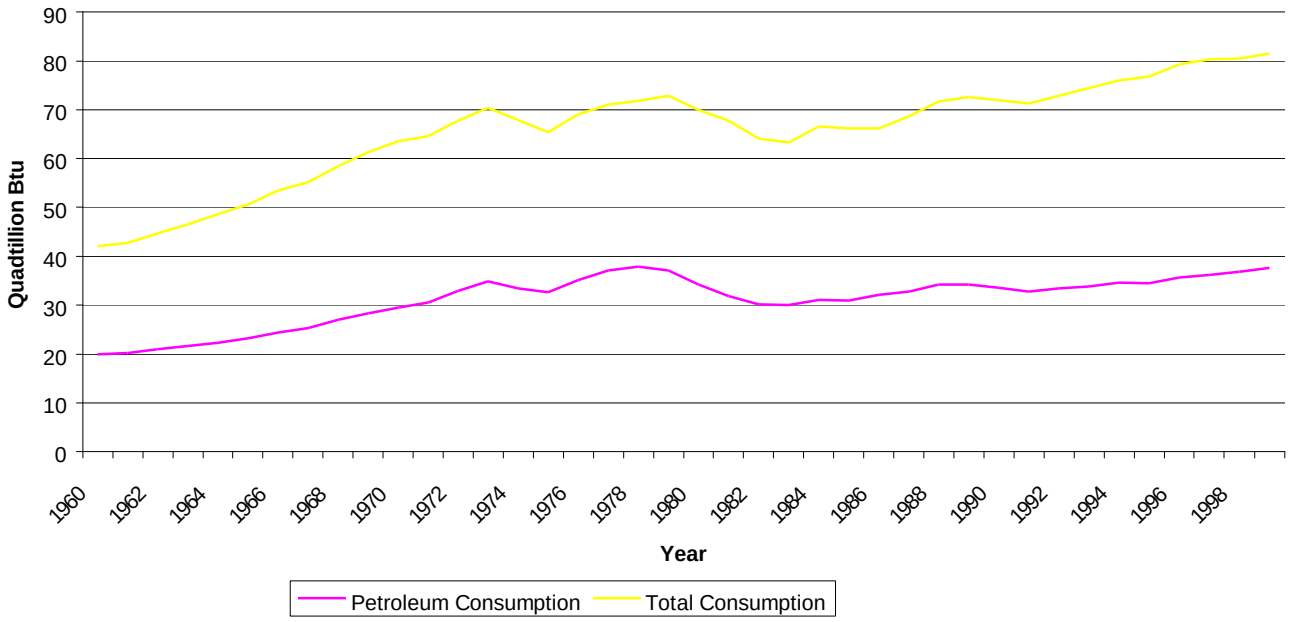
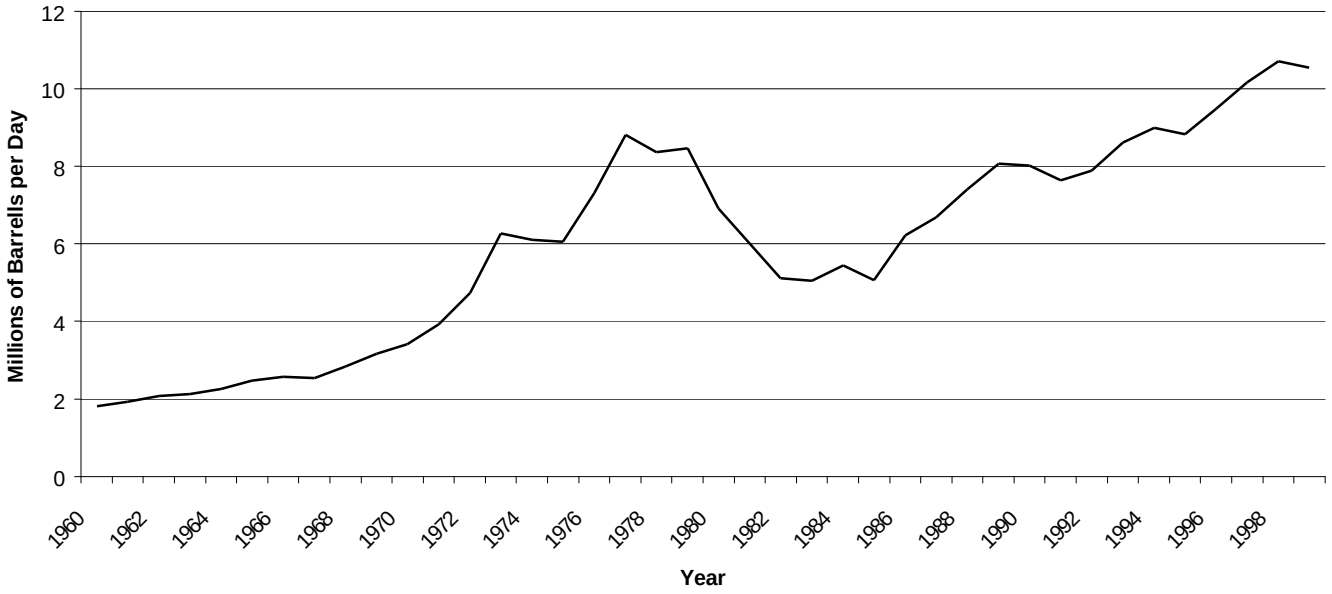


Figure 6
Total Petroleum Imports

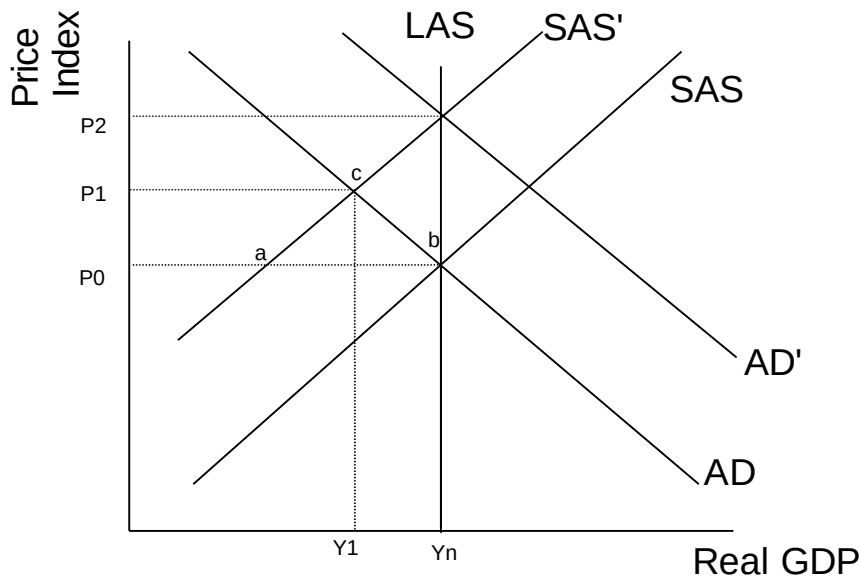


The price fluctuations can be seen clearly in the energy and crude oil prices in figures 1 and 2. They both indicate the oil shock of the early 1970's, the recession of the early 1980's, incredibly low oil prices in 1986 as OPEC fell apart, and the dramatic increase in the price of oil around the time of the Persian Gulf war. More specifically, the price of oil produced in west Texas amplifies these shocks due to limiting the data to a particular region. I have included it specifically because these major events are much more evident.

B.

As the price of oil increases we will first look to the aggregate demand / aggregate supply model to see its effects (figure 7). We will start out in equilibrium at a real GDP level of Y_n (the natural rate) and a price level of P_0.

Figure 7

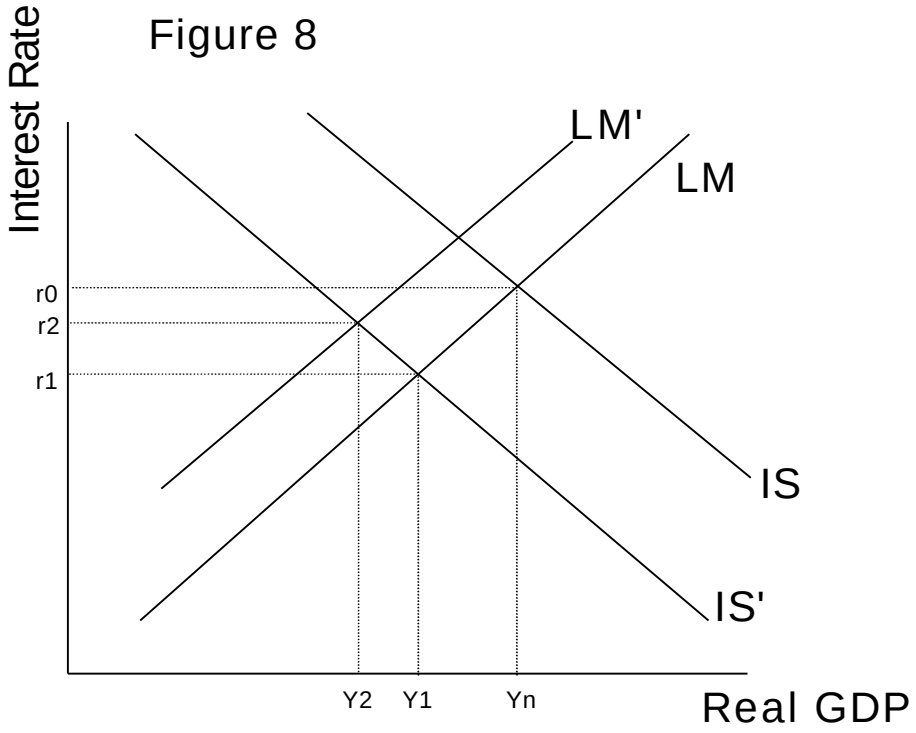


The immediate result of an increase in oil prices is to cause short run aggregate supply (SAS) to shift back to SAS'. This occurs because oil is a huge input into many industries and when production costs increase, for any given price level, firms now want to supply a lesser quantity of output. At the current price level, P_0, there is a shortage represented by the distance from *a* to *b*. This puts pressure on price to rise. Firms will begin to increase quantity supplied and move from point *a* up towards *c*. Consumers will react to the high prices and decrease quantity demanded and move along the demand curve from *b* up to *c*. This movement is called stagflation since we have a higher price level (P_1) and a lower level or income or output (Y_1). Long run aggregate supply (LAS) remains where it was. All of this occurs in the short run and in the long run, two things could happen. First, SAS' could shift back to SAS as worker's wages fall in the recession thus lowering production costs for firms and allowing them to increase supply. It is also likely that domestic oil exploration will increase after a price shock thus causing supply to shift to the right. In the long run we might return to (Y_n, P_0) though Keynes would not agree with this scenario because of the "stickiness" of wages. The other possibility is that the government could step in and increase aggregate demand (AD) so prices rise some more, but output / income is back at the natural rate. This scenario is shown on the graph with the addition of AD' and the new equilibrium at (Y_n, P_2).

Clearly, this type of price movement, an increase in the price of a major input into production, is a likely cause of recession. The shift back to full employment is not rapid even with government intervention and recession or at the very least, an economic downturn, could result.

C.

In the IS/LM model there is a similar reaction to an increase in oil prices but this model allows us to determine the effect on the interest rate (figure 8). We will again start out at equilibrium at Y_n, r_0.

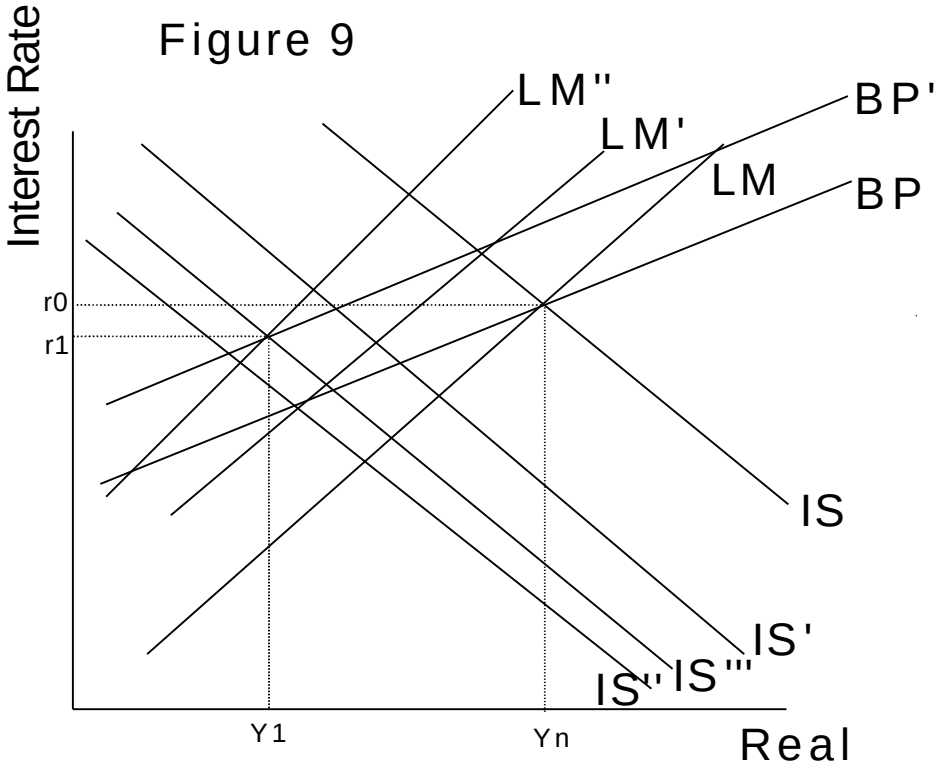


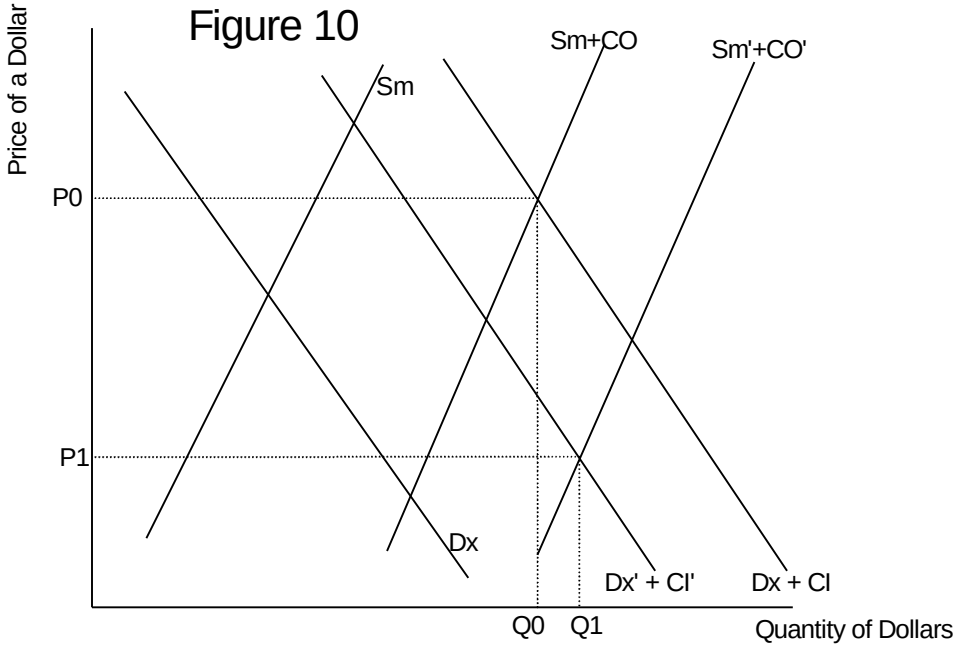
As oil prices rise, firms will be forced to reduce their intended investment, causing IS to shift back to IS'. At the current interest rate, r_0, there is an excess of money in the economy and people will start buying bonds thereby bidding up the price of bonds and driving down the interest rate. In figure 8, this is shown as the movement along LM until we reach equilibrium at Y_1, r_1.

Now, as we have just shown in the AD/AS model, this price increase of oil will, in the short run, drive up the general price level on the economy. The LM curve is determined by the real money supply so M_s/p will shift in and cause LM to shift in to LM'. There is a similar movement as described above and we move along the IS 'curve up to its intersection with LM'. Hence, overall we reach a lower level of income at Y_2 and a lower interest rate, r_2.

D.

Finally we can extend our analysis of IS/LM to include the balance of payments curve, (BP). As before, we model the initial movements in IS and LM and redraw them in figure 9.





To extend the analysis to include BP, we must turn to the exchange market. Figure 10 models the market for the US dollar that includes the supply of dollars to buy imports coming into the US as well as capital outflows, and it is plotted with the demand for US dollars by foreigners to buy our exports as well as capital inflows. When the price of oil increases it again causes the general price level of the economy to rise thereby

driving up the price of our exports. We also just showed that the interest rates would fall. This will result in Sm+CO shifting out to Sm'+ CO 'and Dx + CI shifting in to Dx 'to CI'. Thus the dollar falls in value from P_0 to P_1 as people reduce their supply of dollars and look to hold other currencies. The decrease in net exports shifts the IS 'curve in to IS "and the fall in the money supply shifts the LM 'curve in to LM ". This same decrease in net exports moves the economy towards a balance of payments deficit and thus causes the BP curve to shift up to BP'. Finally, as the dollar devalues over time to P_1, the demand for exports begins to rise and the supply of the dollar falls. This shifts the IS curve back out a little to IS "'. Thus we reach a new equilibrium at a lower level of income, Y_1, and a lower interest rate, r_1.

The US trade deficit has worsened lately and it is logical to wonder if this oil price increase is the cause. Clearly we have shown that it does cause an increase in imports and capital outflows and a decrease in exports and capital inflows, which all contributes to a trade deficit, but the extent of the contribution is not clear. Oil is not a major export of this country (it is one of its major imports). It is possible that as the price of oil has increased, the US has been forced to utilize more of its resources or possibly alternate forms of energy such as natural gas. If this occurs, IS will not shift back as much and either will SAS. Thus the general prices level will not increase as dramatically and the effect on the exchange market will be lessened. So the oil price increase definitely contributes to the recent growth of the trade deficit, but it may not play a major role in it.

E.

Based on the predictions of the model that was developed in the previous 3 sections, several things occur in the economy following an oil price increase.

- The price level in the economy rises
- There is a fall in real GDP
- Interest rates decline
- The trade deficit worsens
- The money supply is decreased
- The dollar falls in value relative to other currencies

We will now turn to an actual oil price shock in history and determine if the reaction of the economy is consistent with the predictions from the models.

Figure 11
CPI - Energy

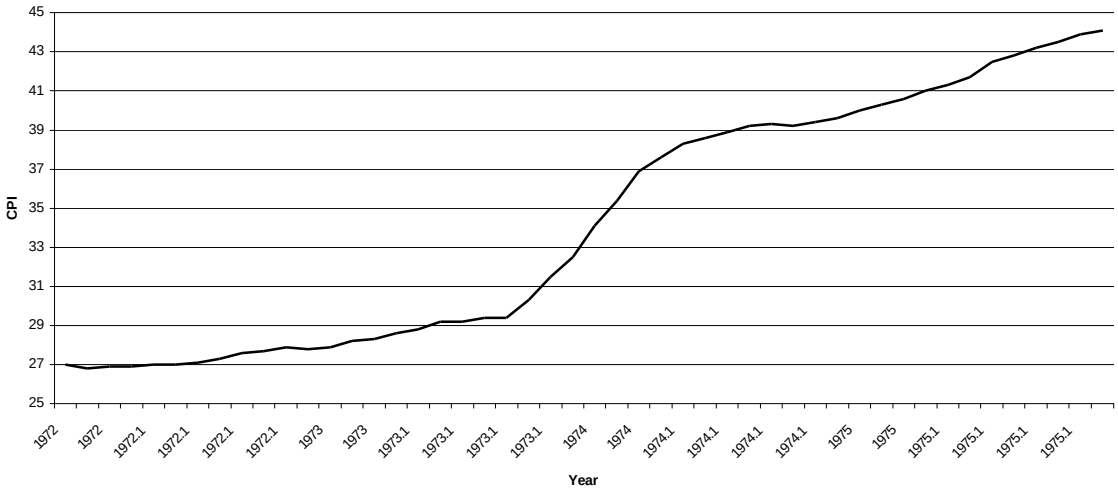
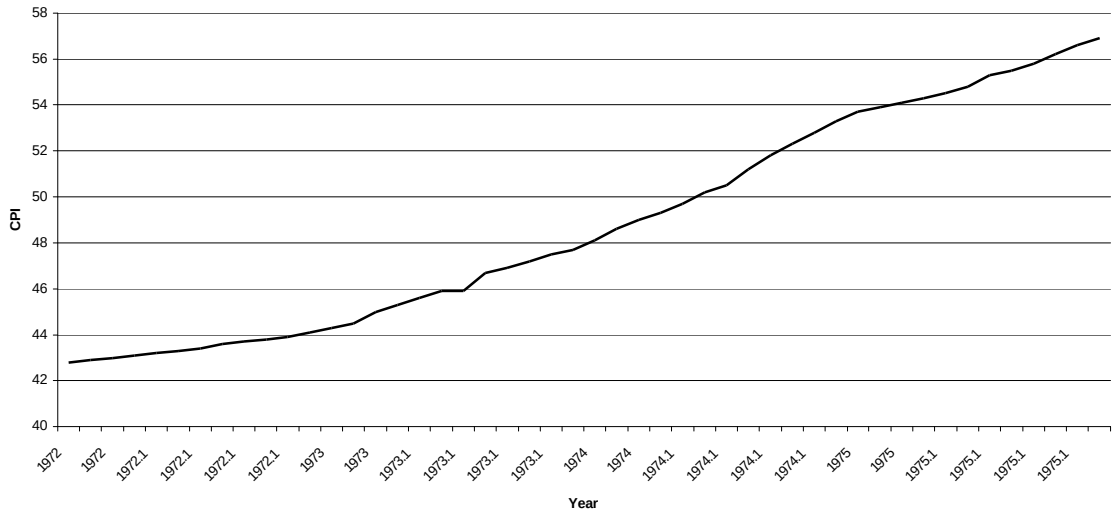


Figure 12
CPI less energy

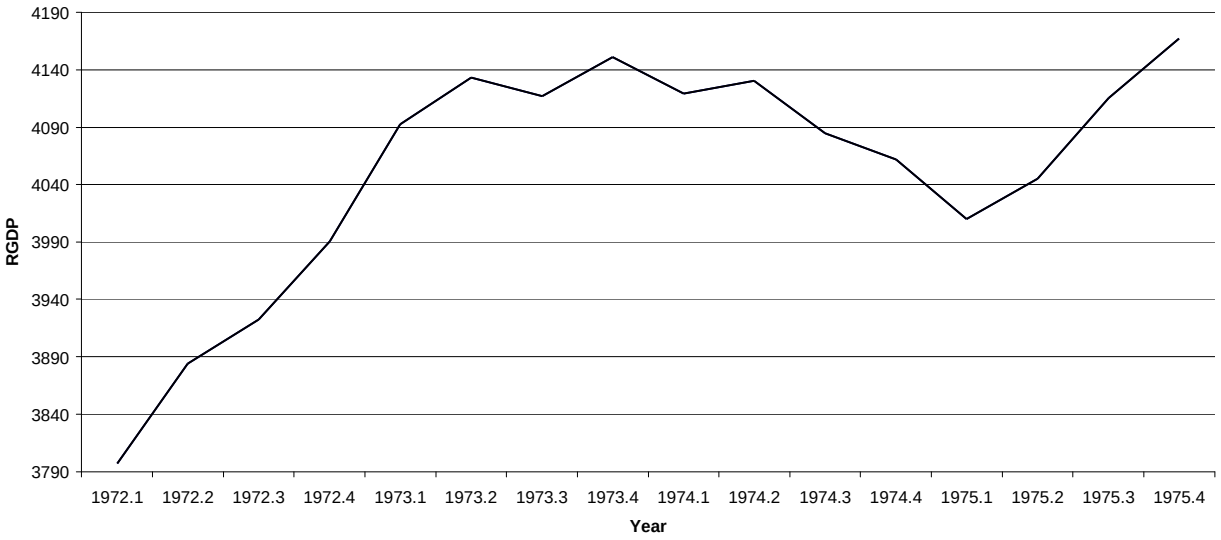


First in figure 11 and 12, we will examine the price indices. In figure 11, I choose to include this graph to illustrate the dramatic effect of OPEC's October 1973 decision on the consumer price index of energy. Then, in figure 12, since the models have predicted that the general price level of the economy should rise following the oil shock, I choose to plot the CPI without the energy indices accounted for. While not entirely evident from figure 12, from January of 1972 to September of 1973, the consumer price index less energy increased 9.5%, while from October of 1973 until October of 1974, the year following the price shock,

prices climbed an additional 10.8%. The price increase is not as dramatic as it might have been, possibly due to the reasons referred to in the last section of part D.

The effects on real GDP are plotted in figure 13.

Figure 13
Real GDP in Chained 1996 Dollars



The fall off in real GDP growth is clearly shown in this graph. RGDP grew by 8% from the first quarter of 1972 to the third quarter of 1973. Then it fell by almost 3.4% from the fourth quarter of 1973 until the first quarter of 1975. This slow down in output was predicted by our model and barring any other variables that might have slowed down RGDP growth, an oil price increase definitely effects output adversely.

The money supply in the economy is a slight inconsistency that I found. See figure 14 and 15.

Figure 14
M1 Money Stock

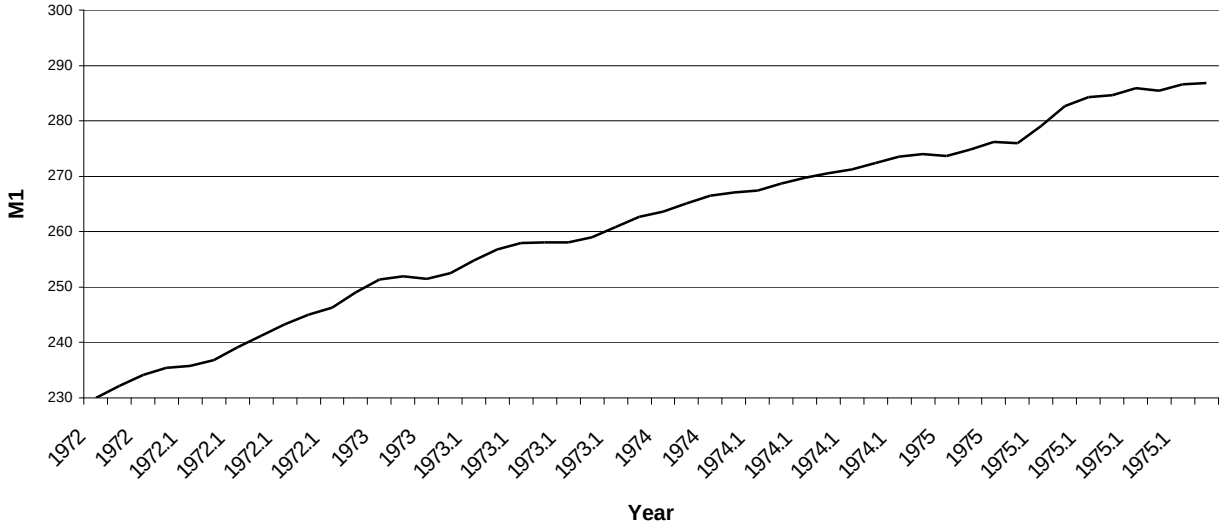
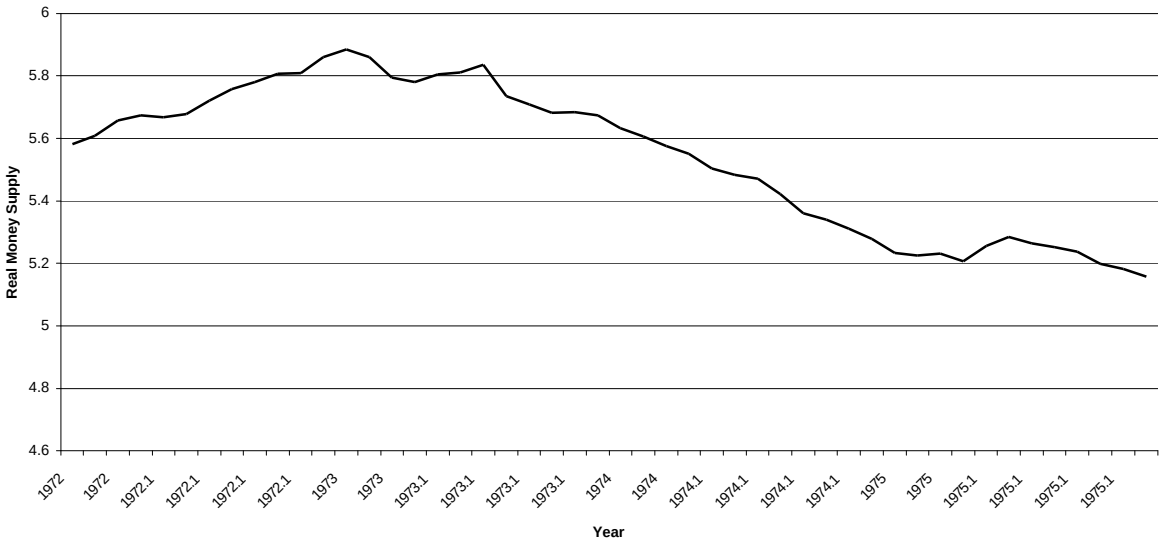


Figure 15
The Real Money Supply
M1 / CPI



The model predicted the real money supply would decline due to inflation in the economy but it also predicted a decline in the money supply resulting from the lower interest rates and consumer's desires to hold other stronger currencies. This slow down is not evident in figure 14. Though figure 15 is more interesting. For this plot, I took the M1 money supply and divided it by the CPI for all urban consumers to come up with a measure of the real money supply. This figure does show the fall off in the real money supply following OPEC's decision that is clearly due to the increase in the price index as examined earlier.

Finally, in figures 16, 17, and 18, we look at three more variables, the interest rate, the current account balance, and the exchange rate.

Figure 16
Federal Funds Rate

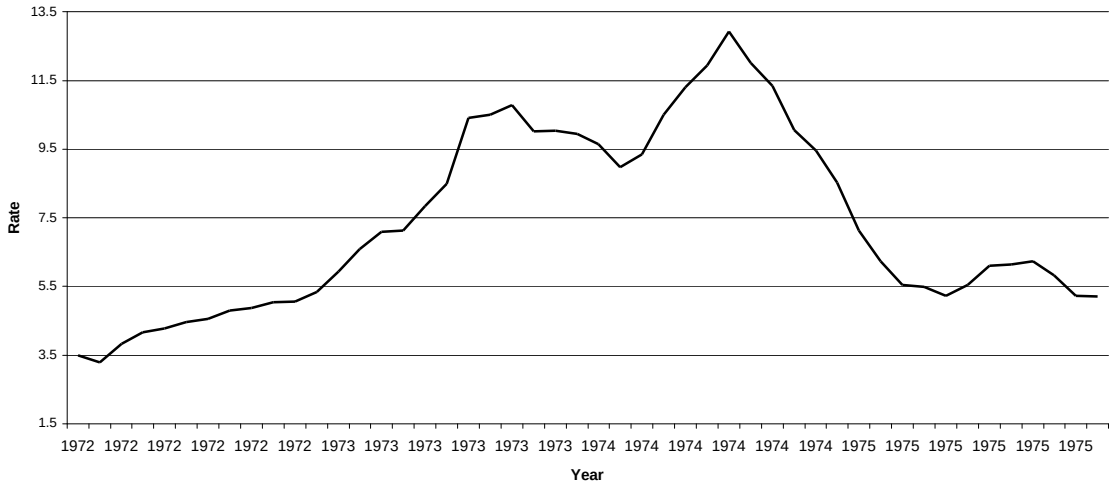


Figure 17
Balance on the Current Account

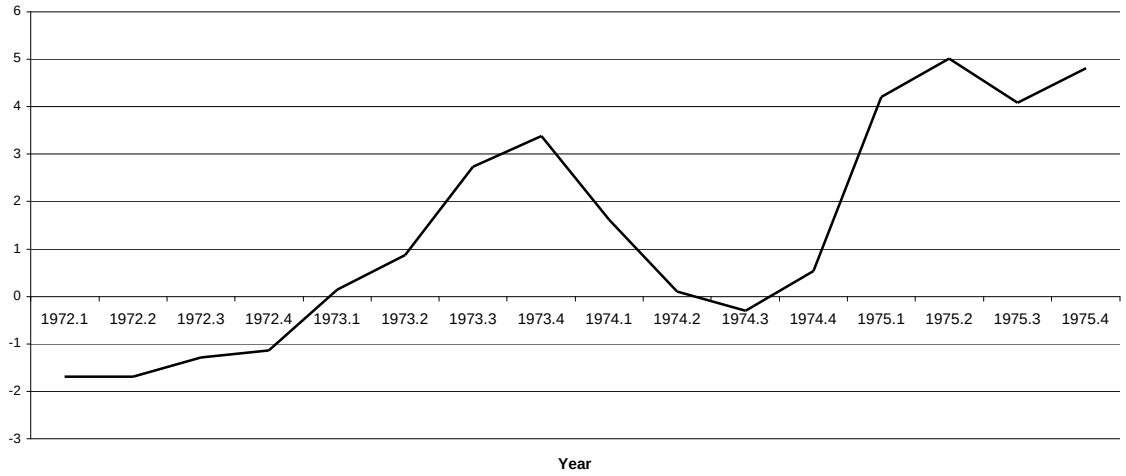
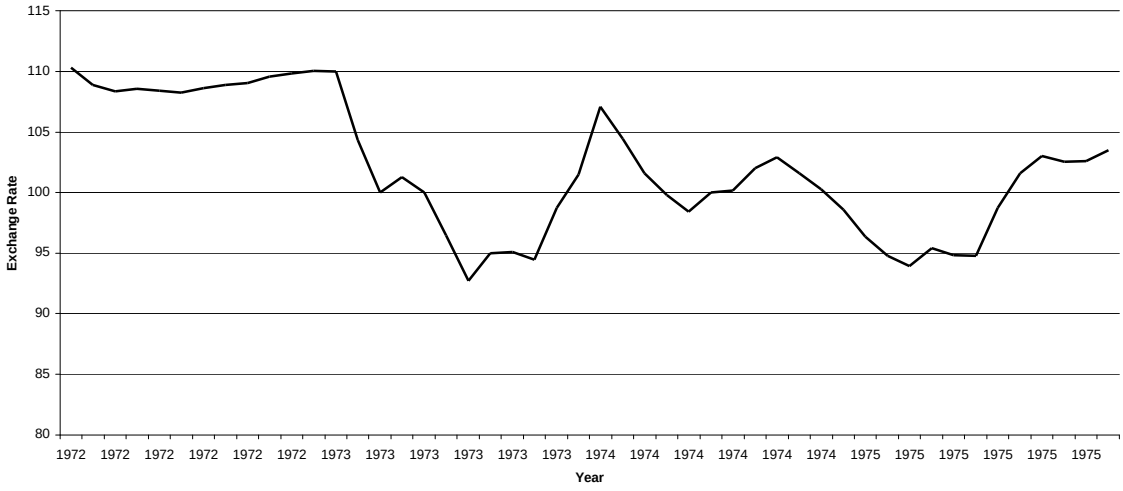


Figure 18
Trade Weighted Exchange Index



In figure 16, I choose to plot the federal funds rate to determine the interest rate situation in the economy following the oil shock. From October of 1973 until February of 1974, the interest rate fell over 10%. However, this was quickly reversed by mid 1974 as the federal funds rate rebounded to a rate 30% higher than at the time of the oil price increase. Afterwards though, the rate plummeted as was predicted in the model, falling 60% from July of 1974 until May of 1975. This is consistent with our predicted leftward shift of the IS curve.

Figure 17 plots the balance on the current account. This mostly captures the changes in exports and imports in the economy following the inflation rate changes and the devaluation of the dollar. From the fourth quarter of 1973, we see a decline in the balance of on the current account as predicted following the price increase and interest rate decrease. Then after a bottom in the third quarter of 1974, the current account rebounds as predicted when the dollar depreciates.

Finally in figure 18, we can see the dramatic fall off of the exchange rate, but this occurs prior to the oil price shock in October. The fall off actually starts in February of 1973 and the dollar actually appreciates following the oil price shock. It is possible that the exchange market is slower to react to shocks like this one and that the decline in the rate starting the following year is what was predicted by our model. It is also possible that there are other variables that influenced the price of the dollar and caused it to behave in a way that is inconsistent with the theoretical model.