

1 2009 Paper 3 Question 5

In what ways should the information goods and services sector be less or more severely affected by the credit crunch than the rest of the economy?

The Essay

Introduction

The global financial crisis plunged most of the world's developed economies into a deep recession, the effects of which we are still experiencing today. Over-optimism in economic outlook led bankers to lend excessively with minimal capital underpinning the loans. This meant that banks had the potential to make a lot of money but were particularly vulnerable to market volatility. Many of the loans made were subprime – to people who had poor histories and low likelihoods of full repayment. Due to the lessons learnt and the instability of the financial institutions, loans became far sparser causing a “credit crunch”.

The information goods and services sector initially appears likely to become a victim of the crisis; investments in information goods and services are characterised as high-risk-high-reward due to the strong networking effects observed in the industry. However, many companies offering information goods and services have high lock-in; which means the easiest way for clients to save money (which is what they will want to do during a recession) is to stay with the company.

More affected

Loan availability for companies in the information goods and services sector will decrease dramatically – especially for smaller companies without a proven track record. Due to the dot-com bubble bursting (the economic crisis before the global financial crisis), investments in web companies (which make up an ever-increasing portion of the information goods and services sector) have been perceived as risky. Established websites may find funding, however it's likely that many small online businesses will be unable to find the necessary funding. This is likely to lead to a decrease in the growth of the internet.

The customers of information goods and services align with the demographic who are most severely affected by the credit crunch. Many information goods are targeted at affluent customers: office workers, people who can afford an internet connection and people who have good TVs. This demographic is also the demographic who were most severely affected by the credit crunch – taking out loans to buy new properties. Studies in the US indicated that people who had money were affected the most by the credit crunch – people who didn't have money didn't have the money to lose. Although the numerical decrease in assets was comparatively low, in recessions people prefer to have a higher amount of liquid assets. This means people spend less money as they try to accumulate enough money for them to feel safe in the new economic climate. Many people who have money to spend (people who use information goods and services) are therefore likely to try to save money, leaving companies in the information goods and services sector with less revenue.

Furthermore, a higher proportion of companies in the information goods and services sector follow the “startup” model – where a business with no record gets a large investment and turns losses for several years before establishing itself and turning a profit several years after it begins trading. This business model requires loans and hence lenders who are happy to take a risk. However, lenders are unlikely to be as willing to loan money in the future and therefore this business model will become inviable. Since information goods and services have a higher proportion of companies following this model.

Due to strong network effects, the information goods and services sector is particularly prone to monopolisation. This will be exacerbated by the credit crunch. To break monopolies,



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new businesses need to form and grow. However, with a lack of availability of loans this will not be possible to the extent required to break monopolies. Therefore, monopolies in the information goods and services sector (such as Facebook, Google and Amazon) will remain largely unchallenged for years. This will result in an even more monopolised industry. The result of this is that the market could be manipulated, making the monopolies significant amounts of money but damaging the sector as a whole.

The information goods and services sector thrives off two types of product: new products and optimisations. New products are often high-risk investments with possible high yields – in a recession investors will try to invest where they are likely to have guaranteed gains rather than risky investments. Therefore this side of the information goods and services sector is likely to be neglected. The other type of product which companies in the information goods and services sector sell are optimisations – outside of a recession, companies are looking for optimisations to increase efficiency, in the long-run. However, during a credit crunch many companies will not have sufficient funding to afford these optimisations. Although cost-saving optimisations are exactly what the information goods and services sector can offer, almost no company will be willing to spend the money required to save money. Therefore demand for all types of product offered by the information goods and services sector will decrease. This will cause the industry to experience slow growth. Historically, technology companies have experienced very high growth – this has encouraged investors. Flatlining growth in a risky sector is likely to discourage investors in the future – who may view even safe companies in the sector as subprime, preventing new companies challenging monopolies for many years.

Regrettably, many information goods can be pirated. While most people will not pirate material, if economic pressure becomes severe enough it is likely to increase the number of people who pirate content. Currently, almost 20% of all information material consumed is pirated. It's becoming increasingly harder to manage pirated material due to the size of the internet and popularity of peer-to-peer networks. A dramatic rise in piracy rates due to economic pressure may cripple the information goods and services sector.

Creating information goods or services: books, songs and software is expensive and time-consuming. Without sufficient investment from loans, companies and the industry may not be able to create new information. This could potentially result in a lull where there is no promising information being created and investors become underwhelmed.

Less Affected

Many information goods and services companies benefit from a very high lock-in. This means that it is often hard for companies and clients to switch to other companies (or stop using the product altogether). Therefore, companies who do not go bankrupt as a result of the credit crunch will find that the cheapest way for them to continue trading is to continue using their current service providers. This means that information service providers are unlikely to observe a significant decrease in income or observe significant moves away and therefore the income of established companies could be largely unaffected.

Many companies in the sector have very low marginal costs and low fixed costs. Most of the cost of running a company in the information goods and services sector comes from the cost of creating new products – consider Google, where the majority of its expenditure comes from the creation of new services rather than the maintenance of existing services. Therefore, many information companies expenses are “optional” – they can choose not to create new products for a short period of time if required. Therefore it is very hard to make an information company bankrupt – if they face financial concerns they can idle for several months or focus their efforts only on the most promising projects until the outlook looks better.

The information goods and services sector is one of the most exciting sectors – there are consistently new services and inventions and “must-see” material. This excitement may make it somewhat resilient to the crisis – investors could expect the sector to perform well



in the long-run or may simply like the companies and the products too much. This could counteract the effect of the credit crunch and result in good funding and challengers to the monopolists.

Conclusion

The credit crunch is the most significant financial event since the great depression and the effects of it will reverberate through the economy for years. The information goods and services sector is likely to be highly affected: it will be reshaped and monopolised, face slow growth and be undervalued for years to come – but is unlikely to face widespread bankruptcy.

2 2020 Paper 7 Question 3

(a) Define the following terms, providing examples to illustrate their meaning.

(i) Pareto improvement

A pareto improvement is a change which leaves one party better off but does not leave any other party worse-off.

Consider two allocations: player 1 gets 0 and player 2 gets 0; or player 1 gets 0 and player 2 gets 1. The second allocation is a pareto improvement on the first allocation as player 2 benefits at no cost to player 1.

(ii) Pareto efficient allocation

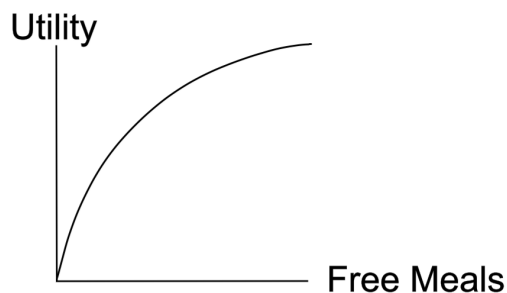
A pareto efficient allocation is an allocation such that there is no pareto improvement.

An example of this would be an allocation of funds where one player gets everything. No other player can get anything without it coming from the first player and therefore the allocation is pareto efficient.

(iii) Utility

Utility is the value that a consumer places on a good.

Utility is usually non-linear in number of goods. For example here is a graph of utility against number of free meals per day. The utility for a small number of free meals per day is high, but tapers off quickly.



(b) Explain the theorems of welfare economics, comparing and contrasting classical utilitarian welfare and Rawlsian welfare.

- The first theorem of welfare economics states that market equilibrium is a pareto efficient allocation.



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If a market is in equilibrium then the allocation is not pareto efficient – else some company will change the structure such that they benefit without damaging any other company. Essentially, if we view the market as a n -dimensional graph then the equilibrium is a local maxima.

- The second theorem of welfare economics states that any pareto efficient allocation can be reached by market forces if preferences are convex.

There is some initial set of endowments such that locally optimal decisions by companies will lead to any pareto efficient allocation. Essentially, if we view the market as an n -dimensional function then there is some point such that gradient descent will reach any local minima.

- Classical utilitarian welfare views welfare as the total utility across the whole population. This is the approach taken by most countries – to maximise GDP .
- Rawlsian welfare maximises the minimum utility – the welfare of the state is the utility of the poorest person. This approach is that of a compassionate society and is taken by only the most liberal countries.

- (c) Do you expect the free market to solve the privacy problem?

Many technology companies are encouraged to gather as much data on customers as possible to maximise their revenue. Whether this is Google gathering data to help place advert slots from ad auctions or Amazon gathering data to assess which products to recommend to us or Spotify collecting data to recommend new songs; almost all major companies are heavily incentivised to collect as much data as possible. Gathering as much data as is legal is pareto optimal – the more data companies gather, the more data they can use and the better personalisation they can offer.

Most consumers follow defaults – there is simply not enough publicity about the data that companies collect and users don't care enough. Users will accept cookies or terms of service which release their private data without reading them. Companies do offer services without “personalisation” – you can disable tailored adverts on almost any platform and remove access for data; most companies benefit more from a user with data collection settings disabled than no user and therefore offer such settings. Most users simply don't bother enabling these settings.

As mentioned earlier, gathering as much data as is legal is pareto efficient . For the free-market to solve the privacy problem, this would have to change. This can happen by either decreasing the amount of data which is legal to gather or by a societal shift. Changing the law is not performed by free market forces, however a societal shift could be. If a large company were to have a data scandal then other large companies could come under public scrutiny. It may then become societally unacceptable to have invasive privacy policies. If having such a privacy policy were to cause people to leave services then it would be a pareto improvement for large companies to have a more respectful privacy policy. However, this is unlikely to apply to smaller companies and websites – who do not have reputations to protect.

I think it is unlikely for free-market forces to solve the privacy problem – it's not currently pareto optimal and for it to become pareto optimal would require a full societal shift, which seems unlikely.

3 2010 Paper 4 Question 8

- (a) In a hawk-dove game, doves share food, hawks take food from doves and hawks fight each other (with a certain risk of death).
- (i) Write out this game in strategic form.



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Encounters happen when two birds find food of value v . If two doves find food then they will share it, so they both get $\frac{v}{2}$. If a dove and a hawk finds food then the hawk steals from the dove – the hawk gets v and the dove gets 0. If two hawks find food then they will fight for it; fighting has total cost c and therefore the gain to each hawk is $\frac{v-c}{2}$ which can be negative.

	Hawk	Dove
Hawk	$(\frac{v-c}{2}, \frac{v-c}{2})$	$(v, 0)$
Dove	$(0, v)$	$(\frac{v}{2}, \frac{v}{2})$

- (ii) Under what circumstances will there be an equilibrium with non-zero numbers of hawks and doves?

There is an equilibrium with a non-zero number of doves and hawks when $c > v$.

If $c < v$ then the nash equilibrium is that all birds are hawks – if the other bird is a dove then it is beneficial to be a hawk; and if the other bird is a hawk then it is beneficial to be a hawk (as $\frac{v-c}{2} > 0$ so in an encounter with a hawk you get more if you're a hawk).

If $c = v$ then all birds are hawks and they all starve as the same logic as above holds.

- (iii) What will this equilibrium be? Justify your answer.

With p as the proportion of birds which are hawks; the equilibrium is:

$$p = \frac{v}{c}$$

If the expected return from being a hawk was greater than the expected return from being a dove, then the game is not in equilibrium – as the number of hawks will be increasing. An analogous argument holds for doves. Therefore, we can conclude that the equilibrium occurs when the expected return from being a hawk is equal to the expected return from being a dove.

We can form an equation from this and solve:

$$\begin{aligned}\mathbb{E}(d) &= \mathbb{E}(h) \\ p \cdot 0 + (1-p) \cdot \frac{v}{2} &= p \cdot \left(\frac{v-c}{2}\right) + (1-p) \cdot v \\ p \cdot c &= p \cdot v - v + p \cdot v + 2 \cdot v - 2 \cdot p \cdot v \\ p \cdot c &= v \\ p &= \frac{v}{c}\end{aligned}$$

As required, therefore the proportion of birds which are hawks in a dove-hawk game p where $c > v$ will be $\frac{v}{c}$.

- (b) Why might people be more aggressive online than they are in face-to-face encounters?

The cost of encountering another aggressive person online is significantly less than the cost of encountering another aggressive person in a face-to-face encounter and therefore the equilibrium has a higher proportion for aggressive people.

We can model human interactions as a dove-hawk game.

In-person encounters have a high cost – if an aggressive person encounters another aggressive person then they get in a fight and get injured or go to jail. This is substantially more than the benefit from being nasty to someone who is nice – the £100 they have in their wallet.



The cost of encountering another aggressive person online is substantially less. The worst that happens is an argument and blocking the other person. In many cases this is almost zero cost and therefore under the dove-hawk logic, there is no incentive to be nice.

