# Could what you don't know hurt you?
# Information Asymmetry in Land Markets in Late Antiquity

P.V. VISWANATH
Lubin School of Business
Pace University
1, Pace Plaza
New York, NY 10038
Tel: (212) 618-6518
Fax: (212) 618-6410
E-mail: pviswanath@pace.edu
Web: http://webpage.pace.edu/pviswanath

and

MICHAEL SZENBERG
Lubin School of Business
Pace University
1, Pace Plaza
New York, NY 10038

**Keywords:** Information Asymmetry, Land Markets in Antiquity, Asset Pricing

**March 8, 2009**

We thank Niso Abuaf, Ephraim Kleiman, Daniel Schiffman and Mark Zitter for helpful comments.

**Abstract**

Markets in antiquity can provide valuable information about the importance of different factors in market pricing of assets. In this paper, we discuss a text from the Babylonian Talmud that deals with seasonal price and trading volume fluctuations in land markets in Roman Palestine. We argue that these fluctuations are probably due to information asymmetry and uncertainty regarding the value of land and the crops growing on that land.

# Could what you don't know hurt you?
# Information Asymmetry in Land Markets in Late Antiquity

## I. Introduction

It is well known that, in the first millennium of the Common Era, the economy of most lands in the Middle East was primarily agricultural. The most important markets in those economies were markets for agricultural commodities. There was a not unimportant export trade in these commodities and river and ocean transport was sufficiently well-developed to make such trade economically feasible. However, given the cost of transportation, these were primarily local markets with not insubstantial transactions costs.[1] Examination of evidence regarding these markets could throw light on the impact of transactions costs on trading volume and on pricing in modern markets as well. A much more important friction in modern markets is information asymmetry, and the recent collapse of mortgage derivatives markets certainly has something to do with information asymmetry. While agricultural commodity markets were probably not characterized by information asymmetry, another market, which is important in an agricultural economy viz. the market for land, probably was. A study of land markets in antiquity could help throw light on modern markets for financial products such as IPOs which are characterized by information asymmetry; a consideration of economic concepts such as information asymmetry could, on the other hand, throw light on historical issues having to do with markets.

## II. Description of the Problem and Rashi's Resolution

Jewish legal texts are important sources of information on the economies of Middle Eastern lands in the early centuries of the Common Era. In this article, we will look at one particular question regarding the seasonality of land prices that is dealt with in an important Jewish text, the Babylonian Talmud in the tractate *Bava Kamma*. Although the text itself was

[1] See Rosenfeld and Menirav (2005) for a thorough study of markets in Roman Palestine.

redacted in Babylonia, much of it is a commentary on a prior text, the *Mishna*, which was redacted in Roman Palestine towards the end of the second century C.E. [2] From the particulars of the situation and the language, it would seem that the land in question is located in Palestine, rather than in Babylonia.[3]

The issue of interest for us is to be found in the tractate *Bava Kamma* on folio 7a-7b. In the course of a discussion, one of the *amoraim*[4] says: "In the days of (the month of) *Nisan*, land is dear and in the days of (the month of) *Tishrei*, land is cheap and everybody waits until *Nisan*

---

[2] The *Mishna* is a quasi-legal text, based on oral tradition, whose redaction was completed in the 2nd century C.E. probably by R. Judah the Prince. It consists of six series of tractates dealing with different subjects. The tractate of relevance to us, *Bava Kamma*, is located in the series called *Nezikin* or 'Damages,' and deals with various kinds of civil matters, such as agricultural contracts, labor contracts, loan contracts, etc. *Bava Kamma* consists of 10 chapters or *perakim* (sing. *perek*). It deals with damage caused to property and persons and compensation for theft, robbery and violence. Each chapter of the *Mishna* consists of several units, each unit also being called a *mishna* (lower case, pl. *mishnayos*). A *mishna* usually presents a legal ruling that applies to a given situation or a set of related situations.

Jewish law from around the 9th century onwards until today, is based on two collections of discussions of the *Mishna*. Of these, one originates in Babylon, and is called the *Talmud Bavli* (Babylonian Talmud); another, originating in Palestine, is called the *Talmud Yerushalmi* (Jerusalem Talmud). Both of these were edited and put in their present form around the 6th century C.E. See Elon (1994), v. 3, pp. 1049 ff. for more details.

[3] Although the comment regarding the seasonality of land prices is made by an interlocutor in the Babylonian Talmud, it is meant to clarify a *baraisa* (pl. *baraisos*). *Baraisos* are similar in form and purpose to *mishnayos*, but were not included in the edited collection of *mishnayos*. *Baraisos*, which were written in Hebrew (the literary language of Palestine in those days, as opposed to Aramaic, the spoken and literary language of Babylonia), stem from the first and second century Palestine. Hebrew may also have been spoken in Palestine in the second century, but this is the subject of an ongoing debate (see Bivin, 2008 and Safrai, 2005).

[4] Interlocutors in the Talmud are called *amoraim*, pl.; *amora*, sg. meaning "speaker" in Aramaic. According to Rashi, this is Rabbah is Rabbah bar Nachmani (fl. ca. 270-330 CE), who was head of the academy of Pumbedita in Babylonia.

(to sell)."[5] From this we see that land prices were higher in *Nisan*, compared to *Tishrei*, and furthermore, that the volume of trade in land was also higher in *Nisan*.[6]

A commentator, **Ra**bbi **Sh**elomo **Y**itzhaki (commonly known the acronym Rashi)[7] has the following explanation as to why prices are higher in the month of *Nisan*: "Because a purchaser of a field (for cultivation) plows it in the summertime and seeds it in the months of *Tishrei* and *Marheshvan* (the second month of the Jewish year) …" Presumably what Rashi means is that land prices are high in *Nisan* because the fields are ready to be plowed. He goes on: "… and fields are cheaper in the month of *Tishrei* because there is not enough time at that point to seed them for the coming year." The contemporary Artscroll commentary explains that this is because it has not been plowed previously; this seems to pick up on Rashi's focus on convenience as being the primary determinant of the price.

**A Convenience Explanation of Rashi's Resolution**:

Rashi's resolution (as clarified by Artscroll) for the lower prices of *Tishrei* is difficult to understand. Why would the owner of a piece of land not plow it in the summer, whether or not

---

[5] The Jewish year consists of twelve months, starting in Tishrei (traditionally around September/October). Nisan is the seventh month and occurs in the springtime. More on this, below.

[6] While commodity markets, particularly those of perishable commodities, are often seasonal, asset markets are not usually seasonal. There may be other examples of seasonal asset markets, however. For example, initial public offering (IPO) markets are characterized by dramatic swings in price and volume. The literature (Ibbotson and Jaffe, 1975 and Ritter, 1984) talk of "hot and cold" IPO markets. Helwege and Liang (2004) describe their characteristics thus:

> Hot IPO markets have been described as having an unusually high volume of offerings, severe underpricing, frequent oversubscription of offerings, and (at times) concentrations in particular industries. In contrast, cold IPO markets have much lower issuance, less underpricing, and fewer instances of oversubscription.

In that case, as well, there is discussion as to whether the price swings are due to irrationality or due to fundamental factors.

[7] From 11th century France (Troyes in the Champagne region).

he wanted to sell it? If he wanted to hold on to it, he would, of course, plow it with the intention of seeding it later. If he wanted to sell it in *Tishrei*, he would want to plow it so that he could get a higher price and not lose out on an entire growing period! Now it is of course possible that some individuals might not have plowed their fields in the summertime and their fields would then be worth less in the marketplace in *Tishrei* – but this would not explain why field prices, in general, would be lower in *Tishrei*!

Furthermore, as we will see below, it would seem that the Talmud considers the lower prices in the months prior to *Nisan* to be incorrect in some sense. Any explanation of the land price seasonality would have to explain this, as well. In order to proceed further, we need to understand this question of a "correct" price better. Here is the context – the discussion ad loc. in the tractate *Bava Kamma* concerns when a person may be considered as deserving of being paid from the poor tithe, i.e. when is a person considered poor.[8] The wealth limit accepted in the Talmud is 200 *zuzim*[9] – a person with possessions worth 200 *zuzim* or more is not considered poor.[10] The *amora*, Abaye,[11] in the Talmud brings up the case of a person who apparently was considered to straddle the fence – while he was eligible to be paid from the poor tithe, a limit was put on the amount of money he could receive, in contradistinction to an ordinary indigent who did not have such a limit. "An owner of houses, fields and vineyards who cannot find a purchaser [is considered needy and] may be given the tithe for the poor up to half the value of his estate.[12]" The question is raised as to how such an intermediate case could exist – either the

---

**8** See Deuteronomy 14: 28-29.

**9** A *zuz* was equivalent to a Roman coin, the silver denarium; pl. *zuzim*.

**10** We know this from the *mishna* in Tractate Peah: מי שיש לו מאתיים זוז, לא ייטול לקט שכחה ופיאה ומעשר עני. One who has two hundred *zuzim* may not take from *shikhah*, *leket*, *peah* or the poor tithe. *Shikhah*, *leket*, and *peah* are three different situations where grain in a field could be taken by poor people for their own sustenance.

**11** Abaye was a Babylonian *amora*, who was born towards the end of the 3rd century CE and taught at Pumbedita. He was a student of his uncle, Rabbah bar Nahmani.

**12** Translation from the Soncino edition (http://www.come-and-hear.com/babakamma/babakamma_7.html, viewed March 5, 2009).

person would be an indigent (he has wealth below 200 *zuzim*) or he would not! The clarification of another teacher, Rabbah,[13] is that the person in question had land that would be worth 200 zuzim in *Nisan*. However, right now (prior to *Nisan*), the land is worth less and therefore, he might be considered to be poor. This uncertainty regarding his wealth is sufficient to give him this intermediate status. In other words, the current price is somehow not a "correct" price to use in valuing the field.

Rashi's "convenience" explanation as to why the price in *Nisan* is higher doesn't allow us to treat the pre-*Nisan* price as an incorrect price. As far as Rashi's comment regarding the summertime being the season when fields are plowed, it's difficult to see how that would explain the general price level for land in *Tishrei*, even with Artscroll's augmentation, for the reasons explained earlier.

**A "dividend" explanation of Rashi's resolution:**

Perhaps what Rashi means is simply that since the harvest will not be available until the months of *Nisan* or *Iyar*,[14] we could think of the price of a field pre-*Nisan* as being its "cum-dividend" price, while the post-harvest price would be its ex-dividend price (in analogy with the price of a share of stock). Clearly, the "ex-dividend" price would be lower than the "cum-dividend" price and the price of the field would, on average, increase over time until the harvest.

While this would explain why the price of a field would peak around *Nisan*, why would it be lowest in *Tishrei*? One possibility is that while the barley harvest occurs in the beginning of *Nisan* and the wheat harvest occurs towards the end of *Iyar*, agricultural land could still be used

---

**13** According to Rashi. This assumption is reasonable, since Rabbah was the teacher of Abaye, who introduces the initial case of the indigent landowner. The text, itself, does not name the interlocutor, referring to him simply as *mar* which means something akin to "sir."

**14** Michael Morrison in "Harvest Seasons of Ancient Israel" at http://www.wcg.org/lit/law/festivals/harvest.htm, viewed December 12, 2008. He uses information from Oded Borowski, *Agriculture in Iron Age Israel*, 1987, page 37.

for other crops such as sesame, flax and millet, and fruits such as grapes, pomegranates, figs and olives, which were not harvested until the beginning of *Tishrei* (see Table below from Borowski, 1987).[15] While not all land could be, or was, used for grains as well as fruit, we do have evidence that there were at least some fields that were cultivated for grains that had fruit trees planted in them as well.[16] In any case, Rabbah might have been talking about the overall price for land and since some harvests would still not be completed until the beginning of *Tishrei*, the price of agricultural land, in general, would not reach its nadir until then.

Table 3. Harvesting and ingathering, based on modern agricultural practices in Israel

| | March | Apr | May | June | July | Aug | Sep | Oct | Nov |
|---|---|---|---|---|---|---|---|---|---|
| Wheat | | | x | | | | | | |
| Barley | | x | | | | | | | |
| Oats | | | x | | | | | | |
| Peas | | x | x | | | | | | |
| Chickpeas | | | | x | | | | | |
| Lentils | | x | x | | | | | | |
| Vetch | | x | x | | | | | | |
| Sesame | | | | | x | | | | |
| Flax | | | | | x | | | | |
| Millet | | | | | x | x | | | |
| Grapes | | | | x | x | x | x | | |
| Figs | | | | | | x | x | | |
| Pomegranates | | | | | | x | x | | |
| Olives | | | | | | | x | x | x |

**Table taken from Oded Borowski (1987), page 37**

Of course, this is not exactly Rashi's answer, but it is at least consistent with Rabbah's statement and does draw on some elements of Rashi's answer. However, this approach doesn't resolve the issue in an entirely satisfactory manner. The reason is that according to this

---

**15** See Chapter 4 in Borowski (1987).

**16** This is evident from the existence of an entire tractate (*Kilayim*) dealing with prohibited and permitted cases of raising different kinds of grains and fruit side by side. For example, mishna 9 in chapter 4 of the tractate *Kilayim* begins: "If one plants two rows (of vines) and there is not between them (at least) eight *amos*, he may not introduce seed there." And again in mishna 4 of chapter 6 of the same tractate: "One who suspends vines above part of a fruit tree, he is permitted to introduce seed under the other (parts of the tree)." (See http://kodesh.snunit.k12.il/b/h/h14.htm for Hebrew text.)

approach, the lower price prior to *Nisan* is an entirely reasonable price and correct price. The price of a field is the price of the land plus the crops on it, and clearly ripened crops ready for harvest are more valuable than crops that are not yet ready for harvest! And it's entirely reasonable that land with crops should sell for more than land without crops! If this is the case, why should the *Nisan* price be considered more "correct?" Furthermore, why should the volume of trade be higher in *Nisan*?

## III. Information Asymmetry as an Explanation

We would suggest that the answer has to do with information asymmetry regarding the value of agricultural land. [17,18] The quality of unsown land is doubtful. The owner might well have information about its yield in past harvests. The intending purchaser, however, has much less information. At harvest time, on the other hand, the information regarding the productivity of the field is readily available and visible, and can also be compared to the productivity of other fields in the area. Hence a better public estimate of the "true" value of the field is available in *Nisan* than before. Prior to *Nisan*, market prices would be depressed because they would have to factor in the uncertainty; and, for the same reason, trading would be inhibited as well.[19] Furthermore, given the fact that the uncertainty is endogenous, and not exogenous, land market

---

[17] Bond (2002) briefly discuss the impact of uncertainty on land valuation. Lin and Roach (2008) consider information asymmetry between land owners and the government in the valuation of government-expropriated land.

[18] A medieval commentary known as Tosafos comments ad loc that the prices of houses also exhibited the same seasonality in prices as fields. The answer it gives is that demand for rental houses peaked in Nisan and hence house prices also peaked in Nisan. Tosafos notes that this explanation is not consistent with Rashi's explanation for the seasonality of field prices. However, in an agrarian economy, prices of many consumption goods were probably correlated with prices of agricultural commodities and land, and hence house rental demands may also have peaked in Nisan along with land prices.

Whether, in fact, house prices exhibited seasonality or not is not known; how Tosafos came by this information is not clear.

[19] See Brown and Tinic (1980) for evidence that prices are depressed during periods of heightened uncertainty.

liquidity would be further affected. Prices, therefore, could be characterized as being "abnormally" low before *Nisan*. It thus makes sense to refer to the higher *Nisan* price as the "true" price.[20] This is the core of our explanation as to why land prices are higher in *Nisan*. However, we still have to explain why land prices would be lower in *Tishrei*. Furthermore, what evidence do we have that the harvests occurred in the month of *Nisan*? Let us look at the evidence a bit more closely.

In Nissan, as we will see, the barley harvest was undertaken and the *omer* sacrifice brought on the second day of Passover. In Leviticus 23:5, we read, "The afternoon of the 14th day of the first month is [the time that you must sacrifice] God's Passover offering." It goes on to say in verse 23:10, "speak to the Israelites and say to them: When you come to the land that I am going to give you, and you reap its harvest, you must bring an omer of your first reaping to the priest." We know this also from Josephus, who describes it thus and also specifies that it is a barley offering:[21]

> On the second day of unleavened bread, that is to say the sixteenth, our people partake of the crops which they have reaped and which have not been touched till then, and esteeming it right first to do homage to God, to whom they owe the abundance of these gifts, they offer to him the first-fruits of the barley in the following way. After parching and crushing the little sheaf of ears and purifying the barley for grinding, they bring to the altar an *assaron* for God, and, having flung a handful thereof on the altar, they leave the rest for the use of the priests. Thereafter all are permitted, publicly or individually, to begin harvest.

At this point, the grain is already standing in the fields, as the verses say: "For six [additional] days you shall then eat matzah, with the seventh day as a retreat dedicated to God

---

[20] Of course this does not mean that prices would always be higher in *Nisan*. If the harvest turned out to be bad, the price of land would probably be lower if only because the value of the crop on the land would be low. However, to the extent that the bad harvest implied future bad harvests, the asset value of the land (i.e. the present value of future crops) would be low, as well.

[21] Josephus, Antiquities 3.250-251, in Josephus IV Jewish Antiquities Books I-IV, Loeb Classical Library, Harvard University Press, Cambridge, 1930, pp. 437-439.

your Lord, when you may not do any work. Then count seven weeks for yourself. From the time that you first put the sickle to the standing grain, you must count seven weeks."[22] Clearly, at the time of the *omer* offering on the 16th of *Nisan*, the barley grain is standing and visible – there is very little information asymmetry or uncertainty, at this point. However, the wheat harvest does not happen until a month later. Since wheat is probably the more important crop, compared to barley,[23] we would expect uncertainty to be lowest at the time of the wheat harvest, towards *Iyar* and not *Nisan*. Perhaps Rabbah uses *Nisan* and *Tishrei* to describe the high and low points because they correspond with two important months in the Jewish calendar – *Nisan* being the time of Passover and *Tishrei* being the time of *Rosh haShanah*, the Jewish New Year.[24] Furthermore, prices probably start to peak in Nisan, when complete information about the barley crop and fairly complete information about the wheat crop is available.

We also have information about the agricultural calendar from the Gezer calendar, an inscribed limestone palette, discovered at the of the Biblical city of Gezer, 30 miles northwest of Jerusalem, by R.A.S. Macalister in his excavations between 1902 and 1907. This calendar consists of seven lines, outlining eight agricultural chores, in a Northern Israelite dialect. While there is some dispute as to the meaning of the lines, Borowski (1987, 2005) gives the translation thus:

1 two months of ingathering (olives)/ two months
2 of sowing (cereals)/ two months of late sowing (legumes and vegetables)
3 a month of hoeing weeds (for hay)
4 a month of harvesting barley
5 a month of harvesting (wheat) and measuring (grain)
6 two months of grape harvesting
7 a month of ingathering summer fruit

---

[22] Deuteronomy 16:9,10 (Translation from http://bible.ort.org)

[23] Wheat is mentioned first before barley in the list of Israeli produce in Deuteronomy 8:8.

[24] *Nisan* and *Tishrei* are also the two candidate months accepted in Jewish tradition for the date of Creation. This is first mentioned in the Seder Olam Rabbah, which was written in Palestine towards the end of the second century C.E.

According to him, this corresponds to the following activities:

| **Time Period** | **Activity** |
|---|---|
| Late October to late December | Sowing of cereals (presumably primarily wheat and barley) |
| Late December to late February | Sowing of legumes |
| March | Weeding |
| Passover | Beginning of the harvesting of barley |
| Spring Equinox to late April | Barley Harvesting |
| Late April to Late May | Harvesting of Wheat |
| June and July | Harvesting of Grapes |
| Late July to late August | Harvesting of other summer fruit |
| Late August to Late October | Harvesting of Olives |
| Feast of Tabernacles (Sukkot) | End of the harvesting season |

According to this, there were different harvests from Passover until the Feast of Tabernacles; from the Feast of Tabernacles until Passover, there were no harvests. Thus, late October would be the farthest from the next harvest and hence the point in time when uncertainty regarding the value of the land would be highest. Although there were fruit harvests after Nisan and continuing all the way to late August, these fruit harvests do not seem to have been as important as the grain harvests of the spring and early summer.**25**

Now, if we assume that *Tishrei* corresponded to this point in time when the farmer had ended the season of ingathering and was about to start sowing, we have an explanation for prices being lowest at that time. However, going by the Jewish calendar that was current in Roman Palestine and Babylonia of late antiquity, late October would probably correspond to a late *Tishrei* and maybe even early *Marheshvan*.**26** Of course, the Gezer calendar refers to early 10th century BCE**27** and to a location which Borowski (1987) identifies as essentially Lod-Ramla, so

---

**25** In terms of dietary calories, the spring grain harvest was most important. Borowski (1987, p. 57) calls barley and wheat "the main food staple of the ancient Israelite." According to E.P. Sanders (1992), "Grain constituted over fifty percent of the average person's total caloric intake, followed by legumes (e.g. lentils), olive oil, and fruit, especially dried figs."

**26** This is also consistent with the testimony of Rashi (see above).

**27** According to Borowski (1987), the date of the inscription has been established from paleographic and orthographic evidence as ca. 925 B.C.E.

a difference of a month may not be crucial. On the other hand, olive harvesting in current times does take place in Lod-Ramleh between mid-September and mid-October,[28] which coincides with the timing given by Borowski. Once again, we might use the same explanation given above as to why Rabbah used the months of *Nisan* and *Tishrei* in his explanation, when *Iyar* and *Marheshvan* would have been more appropriate. All in all, though, the match between the seasons and the pattern of land prices, according to the information asymmetry explanation, is pretty good.

This interpretation also explains why the volume of trade in land would be lower, pre-*Nisan*, and higher in *Nisan* and subsequently. Resolution of the uncertainty and reduction of the information asymmetry would clearly increase incentives to trade.

Although the discussion above has assumed that the information asymmetry is about the value of the land, it may also be about the current crop. As mentioned before, the field could be thought of as a portfolio consisting of the land and the crop that is growing on it. As the stalks grow and the kernels ripen, the quality of the resulting grain becomes more evident. Furthermore, there may be information that the farmer may have regarding the quality of the grain to be harvested that is not immediately visible by looking at the stalks long before harvest.

Another possibility is that prices of all goods and assets in an economy move together. More money is available at harvest time because produce can be sold at that time.[29] Hence demand for all goods and assets are greater at that time. Consequently, prices of assets such as fields and houses are also higher at that time. While this is a simple explanation that would explain both seasonality in prices and volume, it is not an entirely satisfactory explanation of why a lower pre-*Nisan* price should not be used to estimate a person's wealth. It is possible, though, that the reason for land price and volume seasonality is a combination of all the theories

---

**28** On information provided in Talmon (1958, page 56)

**29** This explanation was suggested by Niso Abuaf in a private conversation.

– the funds-availability theory, the convenience and dividend explanations of Rashi and the uncertainty/information asymmetry hypothesis.

**How reasonable is the supposition of information asymmetry?**

It may be argued that information asymmetry might well be a reasonable assumption in the case of an asset such as a firm, where the activities of the managers are not easily observable; it might even be reasonable in the case of land with multiple uses. However – such an argument might proceed – information asymmetry is unlikely in a situation such as probably obtained in Roman Palestine, where the land clearly had a single use, agriculture. Furthermore, the land was probably unfenced land where work went on in the open. How could there be any element of information asymmetry in such an environment? It is certainly true that most of the activities involved in the cultivation of a field are observable. I argued, as much, in Viswanath (2000), bringing evidence from mishnayos 1, 4, 5 and 8 in Tractate Bava Metsia, Chapter 9. The mishnayos there describe conditions on the rental contract of a field; here is the law as described in those sources:

> *Mishna* 1:
>
> In the case of one who rents a field from his fellow man (he is bound by the following conditions). In places where it is the custom to harvest with a scythe, he must so harvest. In places where it is the custom to pull up the roots while harvesting, he must so harvest. In places where it is the custom to plough the field after the harvest, he must do so. Everything follows the custom of the land.[30]
>
> *Mishna* 4:
>
> In the case of one who rents a field from his fellow man in return for a fixed amount of grain, and does not want to weed. If he says (to the owner): "What does it matter to you, since I have agreed to pay you a fixed amount?" we do not listen to him (the tenant), since he (the owner) can say: "Tomorrow, you will leave this field and it will be covered with weeds!"

---

**30** *Mishna* 1 continues with a discussion of other situations where custom affects the conditions of rental, but they are not relevant for our purposes.

*Mishna* 5:

> One who rents a field from his fellow man, and the field does not yield much of a harvest; if there is enough of the crop to gather a sheaf's worth, he is obliged to attend to it. R. Yehuda says: Why set the limit at a sheaf's worth? Rather, if there is as much grain as the amount of seed that he sowed.

*Mishna* 8:

> One who rents a field from his fellow man in order to plant it with barley, he may not plant it with wheat; in order to plant it with wheat, he may plant it with barley. R. Shimon ben Gamliel prohibits it. (If he rented it to plant it with) grain, he may not plant it with beans; (in order to plant it with) beans, he may plant it with grain. R. Shimon ben Gamliel prohibits it.

We see here that cultivation involves several activities that are likely to affect the value of the land, which is why they are considered relevant conditions in a rental contract. This includes the method of harvesting, the method of weeding, the crops that were grown there in the past, the extent to which the land lay fallow etc. Now, the owner of a field who has a contractual relationship with a renter would certainly watch the latter to make sure that the conditions are complied with. However, when we are talking about the value of a plot of land in the marketplace, the price of that land is determined by the price that potential buyers of that plot of land are willing to pay. Now some of those buyers might have kept a close watch on the seller to gather information on the farming practices of the seller and their impact on the value of the land. However, there is no reason to assume that all buyers were sufficiently farsighted to collect such information. There probably was also no field-rating service, akin to Moody's or Standard and Poor's. While a neighbor would probably have much of this information, it may not be available to all potential buyers. Furthermore, a close observation of the field probably yielded better information to the tiller of that field regarding the future harvest than could be obtained even by the neighbor.

Furthermore, while the potential market for land was not far-flung, it probably was also not so circumscribed as to allow us to assume that potential buyers were all well-informed about the land. One proof of this is from the requirement for the guardian (*apotropos*) of an orphan's land to advertise for at least thirty days prior to the sale to ensure that the orphans got the highest

price possible. This is given in *Mishna* 6:1 in the Tractate *Arakhin*: "Appraisement of orphans' lands is thirty days; that of consecrated things is sixty days, and they cry it out every morning and evening."[31] R. Obadiah Bertinoro, a 15th century rabbi in Bertinoro, Italy, comments on this *mishna*:

> "The judges that go down to the estate of the orphans to sell it for debt appraise it, and cry out for buyers on thirty continuous days, day after day: in the morning when workmen go out to the fields—that any prospective buyer may direct his employees to look at the field and report; and in the evening when the workmen come back, so that he who hears the announcement may be reminded of the business in view and obtain the necessary information."[32]

This suggest that the geographical spread of the market was wide enough to benefit from an announcement period as long as an entire month. Furthermore, we see from another Mishna in Tractate Ketubos (11:5) that there was considerable uncertainty as to the correct price of land:

"On an appraisement by the judges, when they have gone too low by a sixth, or too high by a sixth, the sale is void [rather, voidable]. Rabban Simeon, son of Gamaliel, says the sale stands; otherwise, wherein lies the power of a court of justice? But if they have made a letter of examination[33] between them—even should they have sold what is worth a maneh [100 zuz = $15] for two hundred, or what is worth two hundred for a maneh—the sale stands."

---

[31] Translation from the Jewish Encyclopedia (http://www.jewishencyclopedia.com/view.jsp?letter=A&artid=1668; viewed March 5, 2009)

[32] Translation from the Jewish Encyclopeida (http://www.jewishencyclopedia.com/view.jsp?letter=A&artid=1668#4936; viewed March 6, 2010).

[33] The letter of examination or *iggeres bikkores* is a written public notice, synonymous with *hakrazah* or advertisement. (Explanation from the Jewish Encyclopedia, op. cit.)

This implies that there was considerable uncertainty as to the correct valuation of the piece of land, as much as 16% or 20% of the true price.[34] Of course, we have no evidence as to the actual size of errors; simply that the law provided for cases of errors of up to 20%.

## III. Conclusion

In this paper, we discuss a text from the Babylonian Talmud dealing with seasonal price and trading volume fluctuations in land markets in Roman Palestine. We present an explanation given by Rashi, a 11th century commentator and discuss two different interpretations of this explanation. Ultimately, we argue that neither explanation is tenable and present a new resolution. We argue that the land price fluctuations are probably due to information asymmetry and uncertainty regarding the value of land and the crops growing on that land.

If our hypothesis is correct, and we suggest that the evidence points in that direction, we see that information asymmetry could cause the price of assets to be depressed considerably and to affect the liquidity of markets. Consequently, it might be valuable for regulatory authorities, even in today's markets, to work to reduce such information asymmetry. Future work could profitably consider other examples of information asymmetry in the agricultural economies discussed in the Babylonian and Palestinian Talmuds.

[34] If the estimated price were 100 zuzim and the allowable error was 16.66% of that, then the error would be 20% (overestimate) of the true price or 14.29% (underestimate). In point of fact, the Talmud records a disagreement as to whether the allowable error is one-sixth of the estimated price or of the true price. In any case, the error is economically significant.

## An illustration of the Gezer Calendar

From Hypertext Bible Commentary - Amos (http://www.bible.gen.nz/amos/pics/gezcalsm.jpg )

# Bibliography


Bivin, David. (2008). "Hebrew as a Spoken Language in First-century Israel," at http://blog.jerusalemperspective.com/archives/000126.html, viewed December 19, 2008.

Bond, Sandy. (2002). "Do Market Perceptions Affect Market Prices? A Case Study of a Remediated Contaminated Site" in Ko Wang and Marvin L. Wolverton (eds.) *Real Estate Valuation Theory*, Springer, 2002.

Borowski, Oded. (1987). *Agriculture in Iron Age Israel*.

Borowski, Oded. (2003). *Daily Life in Biblical Times*, Brill: Leiden.

Brown, Keith and Seha Tinic. (1980). "Risk Aversion, Uncertain Information, and Market Efficiency," *Journal of Financial Economics*, v. 22, pp. 355-385.

Elon, Menachem (1994). *Jewish Law: History, Sources, Principles*, 4 vols. The Jewish Publication Society, Philadelphia, Pa.

Helwege, Jean and Nellie Liang. (2004). "Initial Public Offerings in Hot and Cold Markets," *Journal of Financial and Quantitative Analysis,"* v. 39, no. 3, pp. 541-569.

Ibbotson, R.. and J. Jaffe. (1975) "Hot Issue Markets." *Journal of Finance*, 30, 1027-1042.

Lin, Tzu-Chin and Stephen D. Roach. (2008). "The Materialization of Protection of Property Rights through Just Compensation - Experiences from Taiwan and California," Working Paper presented at the Pan Pacific Congress of Real Estate Appraisers, Valuers and Counselors; viewed at http://www.property.org.nz/AM/pdfs/Pan%20Pacific%20Conference%202008/The%20Materialisation%20of%20Protection%20of%20Property%20Rights%20through%20Just%20Compensation%20-%20Tzu-Chin%20Lin,%20Stephen%20D.%20Roach.pdf on March 4, 2009.

Morrison, Michael. (2008). "Harvest Seasons of Ancient Israel" at http://www.wcg.org/lit/law/festivals/harvest.htm, viewed December 12, 2008.

Ritter. J. (1984). "The "Hot Issue" Market of 1980, *Journal of Business*, 57, pp. 215-240.

Rosenfeld, Ben-Zion and Joseph Menirav. (2005). "*Markets and Marketing in Roman Palestine*," Leiden: Brill

Safrai, Shmuel. (2005). "Spoken and Literary Languages in the Time of Jesus," in *Jesus' Last Week: Jerusalem Studies in the Synoptic Gospels, Vol. 1*, ed. R. S. Notley, M. Turnage and B. Becker; Leiden: E. J. Brill.

Sanders, E.P. (1992). *Judaism: Practice and Belief, 63 BCE-66 CE*, London: SCM; Philadelphia: Trinity Press International.

Talmon, S. (1958). Divergences in calendar-reckoning in Ephraim and Judah," *Vetus Testamentum*, vol. 8, pp. 48-74.

Viswanath, P.V. (2000). "Risk Sharing, Diversification and Moral Hazard in Roman Palestine: Evidence from Agricultural Contract Law," The International Review of Law and Economics, November 2000, vol. 20, pp. 353-369.