

## **RISK SHARING IN THE MISHNA**

### **An Economic Explanation of a Mishnaic Law Pertaining to Agricultural Rental Contracts**

P.V. VISWANATH  
Lubin School of Business  
Pace University  
1 Pace Plaza  
New York, NY 10038  
Tel: (212) 346-1817  
Fax: (212) 346-1573  
E-mail: [pviswanath@pace.edu](mailto:pviswanath@pace.edu)  
Web: <http://webpage.pace.edu/pviswanath>

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#### **I. The Rental Contract in the Mishna**

*Perek HaMekabel* in Tractate *Bava Metsia* of the *Mishna* has the following law governing the payment of rent by a person who rents a field from its owner for the purpose of cultivating it. In normal circumstances, the renter pays a fixed sum either in money (*sokher*) or in kind (*khoker*) and keeps the excess, if any, for himself. This division holds, even if the yield on the field is disastrous. However, there is one circumstance in which the renter gets a break. That is the case of a *makas medina*, i.e. if the disaster is widespread.<sup>1</sup> The prototypical case that the *mishna* gives is that of a field that is overrun by locusts or devastated by disease, where the same calamity befalls all the fields in the area.<sup>2</sup>

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<sup>1</sup> *Mishna* 6 reads as follows (my own loose translation):

Regarding the case of one who rents a field from his neighbor, and the crops were eaten by locusts or they were devastated by disease; if the situation is that of a *makas medina*, the renter can deduct his losses from the rent due. If it is not a *makas medina*, he may not deduct his losses from the rent. R. Yehuda says: "If the rent is payable in money, he may not deduct his losses, in either case."

<sup>2</sup> Commentators disagree regarding the precise extent of the area affected by a *makas medina*, but all agree that it goes beyond the borders of the one field. It should be kept in mind, however, that traditional commentators use rules of interpretation that are not always consistent with an historical approach. For this purpose, where possible, it is preferable to keep to the literal meaning of the text. In this case, *makas medina* would literally mean a 'plague on the land.'

In this case, the renter is permitted to reduce the amount of his rental. Why should there be such a distinction? A renter, by the terms of his contract chooses to bear the risk of fluctuations in yield. Why should the *mishna* set out a different risk-sharing arrangement, and why just in cases of *makas medina* alone? And, furthermore, if the renter wished such an arrangement, why would he not write it into the contract itself?

The gist of the answer that we propose is twofold. Taking the second question first, we propose that mishnaic law sets out to define a default contract. Civil law, unlike religious law, can be modified by the parties by mutual consent.<sup>3</sup> However, to the extent that a set of contracts is optimal for a large set of people, it is efficient to encode it as the ‘default’ set of contracts.<sup>4</sup> This reduces contracting costs.<sup>5</sup> Furthermore, in our case, some of the quantities on which the optimal contract is based (e.g. when a *makas medina* is deemed to have occurred), are not easily observable. Consequently, it may be worthwhile to involve a third party, viz. the *bes din* (court), to determine what shall be accepted as a *makas medina*, and what shall not. An answer to this question, once it is

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<sup>3</sup> See discussion, p. 123-127 in Elon (1994), v. 1. The general consensus of the *tannaim* is that it is possible to contract out of laws pertaining to monetary matters, but not out of laws pertaining to non-monetary matters. (Tosefta, Kiddushin 3:7-8)

<sup>4</sup> This can be seen very clearly in the first mishna in our chapter, Bava Metsia 9:1, where it is stated: "In all things, the local practice governs." There are numerous other examples of local custom defining the default contract. See Bava Basra 1:1-2 for an example in the area of joint ownership of property, and Bava Metsia 7:1 for an example in the area of employer-employee relations. See also discussion in Elon (1994), pp. 931-932.

<sup>5</sup> This is, essentially, the law-and-economics approach. Schwartz (1992, p. 277) states this lucidly: "... the solutions to some problems are public goods. The costs that any set of parties will incur to devise a term that resolves a possible dispute may exceed the parties' gain. If many sets of parties can have the dispute, the social cost of drafting a term that resolves it may be less than the social gain. Thus, the state can increase welfare by supplying efficient solutions--that is, legal rules--to recurrent contracting problems."

determined by the courts in one case, can be used in other cases as well, through the power of precedent. In other words, there is a public good aspect here which makes it optimal for the system to enshrine this default contract as general law, rather than have each set of parties engage in an explicit contract.

In seeking to answer the first question of who would prefer such a contract as set out in the *mishna*, we lay out a plausible set of circumstances. We show that, under these circumstances, even for clearly more risk-preferring agents like the renter, it would be optimal to engage in greater risk sharing in times of *makas medina*. The next section of the paper is devoted to explaining this answer in greater detail. Section III provides empirical evidence and the final section concludes.

## **II. An Economic Risk-Sharing Explanation for the Mishna**

The essence of the explanation is that renters are able to diversify away uncertainty specific to the field because they have other income sources. Hence they are not interested in insuring them. On the other hand, they are interested in insuring *makas medina* risk, which is economy-wide and non-diversifiable. Landlords, being wealthier, and hence less risk-averse are willing to sell the renters the insurance that they seek. We now explore the situation in greater detail, and show how the contract specified in the *mishna* can be optimal for the parties involved.

### **The context of the mishnaic contract:**

Let us discuss the particulars of the situation in which the landlord and the tenant find themselves. The landlord has a field that he is giving over to the renter for his use in return for some compensation. The landlord can get that compensation either in the form of a guaranteed amount that does not depend on the yield on the field, or he can get a

proportion that does depends on the yield, or a combination. Furthermore, the proportion does not have to be a fixed number. The renter and the landlord can agree that this proportion can depend on other observable eventualities. What kind of eventualities might be relevant? The yield on the field in any given year can be thought of as the sum of two components. The first component (call it the macro effect) depends on effects operating over a wider area, such as the general climate in that part of the country in that year. The second effect depends on the peculiarities of that particular field during that year (call it the specific effect).<sup>6</sup> The landlord and renter may want to tie the landlord's share to the sizes of these yield components in addition to the size of the total yield.

Now, at harvest time, it should be possible to get a reasonable split of the total yield into the specific and macro components. For example, to estimate the macro component, one might look at the yield of fields in that part of the country that year, and assume that that would have been the yield in the landlord's field except for circumstances special to that field that year. If one wanted an even better estimate, one might simply look at the average yield of fields that have been identified ex-ante as being similar to the field of interest. In spite of this, it is possible that there may be disagreement between the landlord and the renter regarding the relative sizes of the macro and the specific components. In such cases, it may be useful for the *bes din* to act as an impartial referee. For the purposes of the landlord and the renter, it may be sufficient to divide the macro effects into three sub-categories: one, times of abundance; two, normal times; and three, times of catastrophe. In this article, we identify this last sub-category of macro effects with the category described in the *mishna* as *makas*

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<sup>6</sup> These field-specific peculiarities may be what the *Gemora* has in mind when it talks about the *mazel* of the renter.

*medina*. We will see later that it is sufficient to be able to determine when a *makas medina* has occurred.

Now, what determines the sharing rule that the landlord and the tenant will use? Keep in mind that the agreement that they arrive at must be mutually agreeable. No one forces the landlord to rent to that particular renter, and no one forces the renter to rent from that particular landlord. Hence, excepting special situations when the one or the other of the parties might be particularly astute bargainers, neither party is going to get something for nothing. Or, to put it positively, each one will get fair value for what they are giving up. The value of the share that the renter retains will be at least as much as the value of the effort that he puts into tilling the field. The value of the landlord's share will be at least equal to the market rental value of the land. Assuming that there is no paucity of renters willing to work the fields or of landlords willing to rent out land, the value of the deal to each party will depend mainly on market wide forces.

### **The role of risk-aversion in the optimal contract:**

In this environment, there may be a variety of sharing arrangements that the landlord and renter may be able to agree upon. Nevertheless, some of these would be preferable to others. We suggest that the main motivation of both parties in arriving at a rental agreement is risk-sharing. That is, both parties wish to avoid risk. Now, if both parties are exactly the same, and neither has any other assets, then they would simply agree to split the yield from the field according to some predetermined proportion. The actual proportion would depend on the value of farmland relative to the value of the renter's effort. Nevertheless, the rental agreement would be a simple sharing rule.

Consider, however, the following modification to the relative economic situations of the landlord and the renter. Suppose on the one hand, that landlords are, in general,

wealthier than renters.<sup>7</sup> Then, it would make sense that the landlord would be more willing to bear risk than the renter.<sup>8</sup> In the extreme, if the landlord were completely risk-neutral, he would pay the renter a fixed wage, independent of the yield and he, himself, would shoulder all the uncertainty regarding the yield. More generally, the renter would get a share that is less dependent on the vicissitudes of the yield, while the landlord would get a share that is more sensitive to the actual yield on the field in that year. Furthermore, the renter would be more desirous of avoiding risk during times when he is relatively poorer. Let us make the additional reasonable assumption that the tenant's risk aversion varies less between normal times and prosperous times, than between times of catastrophe and all other times. This means that the optimal risk sharing between a wealthier landlord and a poorer tenant might be nothing more than a simple sharing rule, plus an insurance contract for the tenant providing for a guaranteed minimum return in bad times.

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<sup>7</sup> On p. 333, Safrai (1994) says: "The estate system served as the economic foundation for the social and economic structure of the Roman Empire (and of most Hellenistic kingdoms). The rich landowners who lived in the cities together with their slaves enjoyed rather respectable incomes from the rural sphere." This suggests that landlords were quite wealthy.

Tenant farmers, on the other hand, were probably not well-to-do. Hamel (1990) mentions that sharecroppers were frequently in debt. She brings evidence from the New Testament (Luke 7.41-42, 6.34, 12.58-59 and 16.1-9; Matthew 5.25-26) to support her statement: "Debt was a permanent feature of the economic structure, as in any agriculture making great use of sharecropping arrangements."

<sup>8</sup> This is also consistent with empirical evidence on risk aversions of landlords and tenants.

### **The role of diversification in the optimal contract:**

Would this risk-sharing extend to uncertainties in the macro component, as well as uncertainties in the specific component of the yield on the field? The answer to this question depends on the other assets that the parties might have. Suppose that the renter as well as the landlord had other sources of income, such as other plots. We know that the economy of Palestine in Mishnaic times was heavily dependent on agriculture.<sup>9</sup> This means that all alternative sources of income would probably have been highly correlated due to the common dependence on agriculture. However, the specific components of these different income sources might very well have been uncorrelated. This means that neither the landlord nor the tenant would have to bear the uncertainties regarding the specific components of their respective shares: these specific components would simply have cancelled out.<sup>10</sup> As far as our rental contract is concerned, the implication is that only macro risks are relevant.

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<sup>9</sup> Safrai (1994, p. 352) argues that agriculture was the economic basis of the Land of Israel, and that most residents of the province engaged in an agriculture-related occupation. He adduces the following proofs:

- ?? The majority of examples cited in the cases in halachic literature refer to agriculture. Many people sages and commoners, rich and poor, made their living from the various branches of agriculture. R. Tarfon, e.g. had agricultural estates. R. Eliezer b. Hyrcanus came from a family, which owned land. Rabban Gamaliel also possessed land, etc.
- ?? Land alone was considered to be a stable possession that one could depend upon either to pay taxes or to earn a living (Gulak, 1929, p. 94-131).

<sup>10</sup> This is what is known in economics as the insurance principle. An insurance company that writes policies to insure against specific risks, such as the risk of auto theft will know, with a great degree of certainty, the amount of claims that will be filed in a given period. This is because the average value of cars stolen does not vary much from year to year.



Taken together with our earlier conclusion that it would make sense for the landlord to protect the tenant vis-à-vis downside risk, we see that the optimal contract would be a sharing rule plus a guaranteed minimum return for the tenant during times of *makas medina*. While a share-cropping contract may be optimal from a risk-sharing point of view, it can be inefficient in terms of providing the tenant with an incentive to work hard. Consequently, the parties may want to set the rental in terms of a fixed amount of money (*sokher*) or grain (*khoker*). But even if the parties choose a straight rental contract, it will still be true that when times are really bad, the renter's need to minimize risk overrides the incentive effects of a fixed rental contract. Hence, the optimal contract will still call for the tenant to be able to reduce his losses during times of *makas medina*. The optimal contract that we have derived in this section is precisely the contract laid out by the *mishna*!

Our results, however, depend upon two assumptions that we have made; one, that farm incomes were very uncertain, and two, that tenants and landlords were able to diversify away the uncertainty regarding the specific component of the field's yield. In the next section, we will discuss the specific implications of our assumption and evidence supporting this assumption. **11**

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**11** An alternative rationale for the mishnaic law might be the following. Suppose the renter really desires to share risk at all times, both during *makas medina*, and otherwise. Why, then, does the *mishna* restrict risk-sharing to times of *makas medina*? The answer, according to this second rationale, is that, during non-*makas medina* times, the reduced yield has a greater chance of being attributable to the renter's own folly. A provision for rent relief in general might lead the renter to take excessive risk, since he would be protected against having to bear the negative effects of that risk. Hence the restriction of the risk-sharing in the *mishna* to times of *makas medina*. We do not pursue this line of investigation because we see from the other *mishnayos* in the *perek* that the law placed strong restrictions on what actions of the renter were acceptable, and what were unacceptable. There was little flexibility for the renter to take additional risk.

### III. Empirical Support for the Risk-Sharing Explanation

The risk-sharing model, presented above, can be tested by looking at the economic history of the areas in which, and during the times in which the mishnaic laws are presumed to have been applied. We discuss below some aspects of economic life in Roman Palestine that could be used to evaluate the model presented in this paper.

#### Volatility of Agricultural Prices and Incomes:

Clearly, it would be worthwhile to incorporate risk-sharing in a default contract, only if incomes were sufficiently volatile to warrant a means of risk-transfer. Unfortunately, we have little direct and reliable evidence of price volatility from longitudinal price data, and even less for income data. While prices of items are frequently mentioned in the rabbinic literature, it is unclear as to whether these prices are realistic (Safrai, 1994; p. 432). Sometimes, important auxiliary information necessary to make sense of prices is often missing (such as the size of the area being rented in the case of a mention of rental fees; Safrai, 1994, p. 432). Finally, the different sources are often contradictory (*ibid.*).

On the other hand, we can indirectly infer price instability from evidence regarding the frequency of famines.<sup>12</sup> Hamel (1990, p. 50), using evidence from

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*Mishna* 1 of our *perek* requires the renter to follow local custom regarding how to treat the field after the harvest; *mishna* 4 restricts the renter's decision whether or not to weed the field; and *mishna* 8 restricts the renter's choice of crop.

<sup>12</sup> Josephus (*Jewish Antiquities*, 15.300-10) describes a particularly terrible drought in 25/24 BCE (quoted in Hamel, 1990). Elsewhere (*Jewish Antiquities*, 15.299), he refers to the cyclical occurrence of famines.

Josephus and the *Mishnaic* texts, estimates that droughts must have occurred, on average, every twenty years or so, during the first two centuries of the millennium. Mishna *Avos* 5.8, even comes up with a typology of three types of famine. In addition, landowners frequently hoarded grain, thus causing prices to run up during famines. Hamel (1990) tells us that during times of famine, “In cities, prices shot up as long as those hungry had money (or other valuables) to buy it.”

### **Tendency of renters to have multiple sources of income:**

The main thrust of the model is that farmers did not find it worthwhile to insure risks in normal times, because the idiosyncratic risks could be diversified away, and only non-diversifiable risk had to be borne. Obviously, in order for diversification to take place, the farmer must have had multiple sources of income. There are two ways in which renters may have had multiple sources of income. One, they may have simultaneously rented several fields at different locations. This would ensure a kind of diversification of idiosyncratic risks. Two, they may have obtained income from sources other than the cultivation of their rented fields. There is support for both possibilities.

Of the second possibility, Safrai (1994; p. 353) says explicitly, “the accepted reality was usually that the farmer also functioned as an occasional artisan or laborer and at least part of his time was devoted to non-agricultural work.” He provides several pieces of evidence in support of this contention, mostly from the *Mishna*, from the *Tosefta*, from collections of *midrashim*, the *Talmud*, or from other textual sources of the period. Some of the alternative occupations of a farmer that are attested in texts are production of flax and woolen thread,<sup>13</sup> donkey transport,<sup>14</sup> ritual slaughtering,<sup>15</sup> store-

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<sup>13</sup> The textile industry was based on the farmer raising flax or sheep who used his free time to weave thread and to sew (Chapter 2.I.7, I.8 and 2.II of Safrai, 1994). The

keeping,<sup>16</sup> trading in wine,<sup>17</sup> manufacture of wine and lime,<sup>18</sup> working as a hired laborer,<sup>19</sup> and baking.<sup>20</sup>

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Palestinian *Talmud* (*Megilla* IV, 74d) depicts R. Hiyya as a farmer who grows flax and turns it into a net. The *Tosefta* (*Bava Metsia*, 9:19) requires a tenant farmer who cultivates flax to treat it until the stage of preparation of the stalks (Lieberman 1988, p. 114). Since most of the profit from the flax and wool industries went to the person producing thread or fabric from the fibers, it made sense for the farmer to engage in the processing of the fibers, particularly in the winter months, when he had more time available (Safrai, p. 193).

<sup>14</sup> A *midrash* on Psalms 12:1 (Buber, 1966; pp. 104-5 quoted in Safrai, 1994) tells of a group of donkey-drivers whose leader was also a farmer. According to the tradition, his agricultural pursuits were of more importance than his transport tasks.

<sup>15</sup> The slaughterers in a town plied their official trade rather infrequently. If so, it was impossible that they made their living exclusively from such an occupation.

<sup>16</sup> The *Tosefta* (*Bava Metsia* 5:12) mentions the case of a hired worker in a store, who is an "artisan," but who is forbidden to ply his trade at the store. It is inferred that the store-owner must not be in the store some of the time, else how would the artisan be able to at all get away with plying his trade. Presumably the store-owner went out to work on his field.

<sup>17</sup> A *midrash* on Lamentations 1:1 mentions a wine merchant who also grew grapes.

<sup>18</sup> Many lime pits have been discovered within an agricultural context (in a field or in a terrace). Moreover, in many instances, a wine press or lime pit have been discovered next to an agricultural tower (Dar, 1986, p. 111-13). These finds show that the farmer worked at labors associated with the wine press or lime pit in addition to his agricultural work in the field.

<sup>19</sup> The *Tosefta* (*Bava Metsia* 8:2) says "a laborer is not permitted to do his own work at night and then to hire himself out during the day to ... on account of stealing the labor of the employer." This suggests that the tradition recognizes the possibility of farmers who were hired laborers as well.

<sup>20</sup> The *Tosefta* (*Pesahim* 1(2):13 (2:3) and parallels) indicates that the baker in a village usually baked only once a day and it is clear that this was not sufficient to support his family. Again, he presumably worked in the fields the rest of the time.

Regarding the possibility of a single farmer cultivating more than one plot of land, Hamel (1990, p. 109) says explicitly “The scattering of plots in areas with different soil and climatic conditions also increased safety. This latter possibility was not necessarily restricted to the more important land-owners but could be practiced to some degree by small tenants through complex community and family arrangements.”

Safrai (1994) is only willing to say that the situation is unclear. In his words (p. 357): “Another problem that cannot be solved was whether every settler had only one plot. All the studies usually take this for granted, although there is absolutely no proof that this indeed the case.” On the other hand, there is some indirect evidence that farmers may indeed have cultivated more than a single plot. First of all, Safrai (1994; p. 330-1) points out that there were no economic forces pushing for the consolidation of small plots.<sup>21</sup> Secondly, while the minimum economic size of a holding, from Talmudic evidence,<sup>22</sup> was about 1.5 *dunams*, the size of a subsistence holding was closer to 20 *dunams* (Safrai, 1994; p. 355). This means that a farmer could easily have ten or more different viable plots making up his total land holding. The actual sizes of plots seem to have varied quite a bit from region to region. Several researchers have done field-work on ancient sites to determine the sizes of agricultural plots. Dar (1986) found that the average plot in one village in Samaria was 25 *dunams*, while the range of plots at another

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<sup>21</sup> He points out that in hilly areas, terrace farming is necessary or was practiced, and having a large tract in this context is not necessarily useful. As he points out elsewhere, one who ploughs with the aid of a cow is limited to the size of the plot that the beast can plow. Economies of scale in financing were probably also not very important given that the main factor of production, in the ancient world, was labor and hence the advantage enjoyed by estate owners in such matters was not all that great.

<sup>22</sup> According to the Babylonian *Talmud*, (*Bava Basra*, 12a), this area is approximately nine kabs or less than 1.5 *dunams* (1 kab = approx. 1/6 *dunam*). The *Tosefta* (*Bava Metsia*, 11:9) has 9.5 *kabs*).

village was from 39.7 to 45.6 *dunams*. Safrai found plot sizes varying from 6 to 11 *dunams* in the Galilee (Safrai, 1985; p. 129 cited in Safrai, 1994) and from 15 to 18 *dunams* in the Shekhem region (Safrai, 1986; p. 99-100 cited in Safrai, 1994). Golomb and Kedar (1971) cite holdings ranging from 4 to 60 *dunams*. Thus, the evidence, though far from clear, certainly supports a reasonable probability of multiple holdings.

Sperber (1978, Chapter X) provides two different kinds of evidence for fragmentation of land holdings. First, he cites textual evidence (Yerushalmi, Nedarim 9.7 recording Rav from the early third century) that relates this fragmentation to the sale of lands by farmers in increasing poverty, to pay off their loans. This led to estates that comprised of scattered properties. Second, he cites R. Yohanan from the Pesikta de R. Kahana, where R. Yohanan mentions three different properties that he used to own, and which he sold: a (wheat) field, close to Tiberias, a vineyard in the Galilean foothills and an olive grove, higher up in the mountains. The Pesikta does not mention the precise location of these holdings, but Sperber argues convincingly that they must have been separated plots. He further argues that the reason for this separation was to diversify the risks involved in the cultivation of different kinds of agricultural procedure.

### **Was the Palestinian Economy a Closed or an Open One?**

This question has some bearing in terms of support for the explanation presented here. The driving force for laws such as those incorporated in our *mishna* is income volatility. To the extent that the economy in which the renter lived and operated is a closed one, income volatility would be relatively low, even if price volatility were high. Since prices normally go up when supplies are low and vice-versa, it is usually the case that income, which is the product of quantity and price, will not be very volatile. In order to have greater income volatility, there must be some mechanism that reduces the

correlation between the domestic agricultural production and agricultural prices. The ability to export and import commodities constitutes such a mechanism. Evidence on this is presented in Safrai (1994). After evaluating the evidence, he concludes that the Palestinian economy in the Roman period was, indeed, an open one. He presents evidence that wine and oil was exported to Egypt and other countries, while grain (especially wheat) was imported, particularly during times of famine.

#### IV. Conclusion

We investigate the economic rationale for a law found in *Mishna Bava Metsia*, pertaining to tenancy in Roman Palestine. This law allows for risk-sharing between tenant and landlord when the macro-economic situation is severe (*makas medina*), but not if the harvest in the particular rental plot is bad. We show that this feature of the rental contract can be explained as the optimal rental contract in an economy characterized by tenants whose income sources are diversified. We provide empirical evidence supporting this possibility.

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