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The Economics of the Joseph Story: A Coasian Transaction Cost Analysis

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Abstract. The Joseph Story at the end of Genesis provides unusual detail of an economic nature beyond the biblical norm. This study analyzes the economics underlying the Joseph Story from a Coasian property rights/transaction cost perspective, with a focus on the potential benefits and costs of moving from a decentralized private landholding economy to a centralized state-controlled tenant farming economy. The Coasian analysis indicates that the economic trade-offs between the two systems of production involve issues of information asymmetry, monitoring costs and risk such that one system of production is not necessarily better than the other. While the Bible suggests that Joseph's economic policies were an unmitigated success, the underlying economics are far less clear cut. We also provide a potential economic explanation as to why the Bible reports that it was impossible to measure production during the seven years of plenty.

Keywords: Joseph story, Coase Theorem, property rights, transaction costs, monitoring, risk, tenant farming

1. Introduction

The purpose of this study is to analyze the Joseph Story through the prism of the Coasian property rights/transaction cost literature.[2] Rather than using property rights to focus on the political/constitutional implications of the Joseph Story as done by Wagner-Tsukamoto (2015), following in the footsteps of the influential studies by Wildavsky (1984; 1993), this study aims to focus on the potential economic benefits and costs of Joseph's policies in transforming Egypt from a decentralized private landholding economy to a centralized state-controlled tenant farming economy.[3] The Coasian analysis suggests that the economic trade-offs between the two systems of production, and their underlying property rights arrangements, involve issues of information asymmetry, monitoring costs, and risk—so that one system of

[1] I wish to acknowledge the helpful and constructive comments of the reviewers.

[2] See especially Coase (1960). For a comprehensive review of the Coase literature, see Medema (2020).

[3] Our biblical methodologies differ as well. While Wagner-Tsukamoto (2015) is grounded in a textual-narrative approach, our analysis takes an historical approach to the textual-narrative by assuming that the stories in the Bible including Genesis (from Abraham on) reflect historical settings and events. Issues of biblical authorship and dates of composition are not addressed in this study.

production is not obviously better than the other. While the Bible indicates that Joseph's economic policies were an unmitigated success, the underlying economics are far less clear cut.

In what follows, Section 2 provides a translation of the relevant Biblical sections. Section 3 gives a literature review. Section 4 specifies the baseline analysis in a world of zero transaction costs. Section 5 provides the essential Coasian analysis in a world of transaction costs. Section 6 briefly concludes.

2. The Biblical Economic Story

Prior to undertaking an economic analysis, it should prove useful to briefly recall the essential economic events in the Joseph Story, as recorded in the Bible. Although the Bible does not often record economic events in detail, the Joseph Story towards the end of Genesis is an exception. In response to the impending seven years of famine prophesied by Joseph, Pharaoh gives Joseph extensive powers during the years of plenty—which apparently, he put to good use—to revamp the Egyptian economy as he (Joseph) sees fit.[4]

> During the seven years of plenty, the land produced in abundance. And he [Joseph] gathered all the grain of the seven years that the land of Egypt was enjoying and stored the grain in the cities; he put in each city the grain of the fields around it. (Genesis 41: 47-8)

The Bible also indicates that Joseph executed two revolutionary changes to the economy.

> Now there was no bread in all the earth for the famine was very severe; both the land of Egypt and the land of Canaan languished because of the famine. Joseph gathered all the money that was to be found in the land of Egypt and in the land of Canaan, as a payment for the rations that were being procured, and Joseph brought the money into Pharaoh's palace. And when the money gave out in the land of Egypt and in the land of Canaan, all the Egyptians came to Joseph and said, "Give us bread, lest we die before your very eyes; for the money is gone!" And Joseph said, "Bring your livestock, and I will sell to you against your livestock, if the money is gone." So, they brought their livestock to Joseph, and Joseph gave them bread in exchange for the horses, for the stocks of sheep and cattle, and the donkeys; thus, he provided them with bread that year in exchange for all their livestock. And when that year was ended, they came to him the next year and said to him, "We cannot hide from my lord that, with all the money and animal stocks consigned to my lord, nothing is left at my lord's disposal

[4] The Hebrew translation in this paper is taken from the revised Jewish Publication Society 2023 version.

> save our persons and our farmland. Let us not perish before your eyes, both we and our land. Take us and our land in exchange for bread, and we with our land will be serfs to Pharaoh; provide the seed, that we may live and not die, and that the land may not become a waste." So, Joseph gained possession of all the farmland of Egypt for Pharaoh, all the Egyptians having sold their fields because the famine was too much for them; thus, the land passed over to Pharaoh. And he removed the population town by town, from one end of Egypt's border to the other (Genesis 47:13-21).

According to the biblical account, Joseph first changed a decentralized production/storage/distribution agricultural economy to a centralized agricultural economy in which all factors of production, including livestock, land and labor, belong to the state. Second, Joseph changed the structure of Egyptian agriculture from an economy of private land holdings to an economy of tenancy farming (at a rate of 80% to the tenant farmer)—except for the priests, who were exempted from selling their land to the central state authority.

> Only the land of the priests he did not take over, for the priests had an allotment from Pharaoh, and they lived off the allotment that Pharaoh had made to them; therefore, they did not sell their land. Then Joseph said to the people. "Whereas I have this day acquired you and your land for Pharaoh, here is the seed for you to sow the land. And when the harvest comes, you shall give one-fifth to Pharaoh, four-fifths shall be yours as seed for the fields, and as food for you and those in your households, and as nourishment for your children (Genesis 47:22-4).

Ostensibly, Joseph was so successful in increasing production during the years of plenty that the amount of food produced and stored proved impossible to count. "So, Joseph collected produce in very large quantity, like the sands of the sea, until he ceased to measure it, for it could not be measured" (Genesis 41: 49).

3. Literature Review

Although political, sociological, economic and biblical scholars, among others, have found great interest in the Joseph Story, their analyses were generally more political than economic, following the influential political analysis of Wildavsky (1984; 1993). The latter argued that Joseph used the crisis of the famine to break the power of the local elites by centralizing the economy, enforcing state-led nationalization, imposing serfdom on the non-elites and bringing about tyranny through absolute monarchy. Wildavsky's works paved the way for scholars to use the Joseph Story as a case study of state capture by a tyrant, albeit with different emphases. Those looking at rent-seeking behavior use the Joseph Story (as analyzed by Wildavsky) to illustrate how a government can use a monopoly on a vital resource (grain) to extract all wealth (silver, livestock, land) from a population (Hurowitz 1994; Strine 1994; Knohl 2019; Shupak 2020). Scholars such as John T. Brink (1954), referenced in James Boice's (1985) commentary on Genesis, built upon similar critical views, accusing Joseph of abusing his power to design a centrally managed economy to impoverish and enslave the Egyptians. Economists studying the "Resource Curse"—how abundant natural resources can lead to poor development outcomes—often use frameworks similar to Wildavsky's to explain how a state's control over a vital resource—such as Egypt's grain—can shape political institutions and income inequality (Humphreys et al. 2007; Campbell 2014).

In his work *The Prophetic Imagination*, theologian Brueggemann (2001) offers a socio-economic critique of Joseph's policy. Brueggemann argues that Joseph created a "liturgy of scarcity." By controlling the grain, Joseph gained control over the people's money, then their livestock, and finally their bodies. From a sociological standpoint, his study highlights how this narrative explains the transition of the Israelites (and Egyptians) from independent producers to state-dependent laborers.

In his books, such as *The Challenge of Wealth*, Tamari (1977) looks at Joseph's 20% tax and land-acquisition policy. While he is more sympathetic to the religious context of Joseph than Wildavsky, he acknowledges Wildavsky's point that Joseph's economic policy was a radical departure from the "free-market" ancestral norm.

Pava (1993) analyzes the Joseph Story from the perspective of insider information. He argues that Joseph provided the information of the seven good and bad years solely to Pharaoh and his court rather than disseminating the information throughout Egypt. He could have suggested to Pharaoh that an alternative solution to the years of famine was to disseminate the information among Egyptians and let competition among private landholders provide for the years of famine without having to centralize the economy. However, Pava (1993) does not analyze the economics of one form of production versus the other.

In the study closest to ours, Wagner-Tsukamoto (2015) focuses on the political aspects of the Joseph Story—but through the lens of economic property rights. Wagner-Tsukamoto (2015) utilizes Buchanan's (1975; 1987) approach to constitutional and institutional economics to argue that Joseph's policies diminished attack and defense costs by moving society out of a state of "war of all against all" that arises when a group attempts to escape from the natural distribution state through structured state intervention.[5] A key thesis of the author is that Joseph's policies encouraged interacting parties out of self-interested choice to engage in societal contracting and cooperation to mitigate the "war of all," thereby reaping mutual gains. More specifically, this study examines how Joseph's policies regarding farming

[5] On the use of institutional economics to understand the Bible generally, see Wagner-Tsukamaoto (2001). In addition to Buchanan, Wagner-Tsukamaoto (2001; 2015) also references related views by North and Thomas (1973), North and Weingast (1989), Williamson (1975; 1985; 2000; 2010) and Coase (1937). Interestingly, Wagner-Tsukamaoto does not cite Coase (1960) directly, although Williamson's analyses are based on Coase (1960).

property rights arrangements, multi-layered bureaucratic hierarchies, and 20% tax (one-fifth of crop production) credibly and more reliably guaranteed property rights—which in turn lowered transaction costs of the interacting parties (Pharaoh, the Egyptian elite and commoners; Egypt and Israel), effectively generating cooperation on purely economic grounds and allowing for mutual gains and high economic performance for the Egyptian economy.[6]

4. The Base Analysis: Zero Transaction Costs

The question we wish to ask in this study is whether Joseph's economic policies can be rationalized from a Coasian property rights/transaction cost perspective based purely on economic grounds rather than political/constitutional grounds.[7] As expressed by the Coase (1960) theorem (and see also Cheung 1969 in the context of tenant farming), in a world of zero transactions and abstracting from wealth effects, resources will go to their highest value use independent of the underlying legal structure of the economy (whether that be private land holdings or tenancy farming).[8] If the state allows for private landing holdings, as was apparently the case prior to Joseph's reforms, and tenant farming is more efficient, farmers will sell their land (costlessly) to the state or to other investors, and adopt a tenancy production structure. If the state allows for tenant farming, and it is less efficient than private land holdings, tenant farmers would recontract (costlessly) with the owners to buy up their land and produce more efficiently. Therefore, with zero transaction costs, the organizational structure of agricultural production is irrelevant, and the solution that Joseph imposed would have been quite unnecessary (since it would have evolved without state [Joseph's] intervention).[9]

It is worth noting that the latter argument does not assume that economies of scale are similar for the two possibilities (private land ownership versus tenant farming). If economies of scale devolve more on one organizational farming structure than the other, the Coase argument still goes through. What would change is the calculus of efficiency.

[6] The mutual benefits view of Joseph's actions, as understood by Wagner-Tsukamoto (2015), contrasts with the view that Joseph's actions led to one-sided rent seeking and enslavement of Egyptian society, as noted above.
[7] Our focus is quite different from that of Wagner-Tsukamoto (2015), who follows Wildavsky to evaluate the Joseph Story from a constitutional-governance-macroeconomic perspective rather than a micro-Coasian transaction cost perspective.
[8] By transaction costs, we mean the costs of obtaining, maintaining, and trading property rights. See Cheung (1969), Allen (1991; 1998; 1999) and Barzel (1985; 1997).
[9] In addition to no wealth constraint, we also assume that the core of any negotiations is not empty. On the issue of the empty core in the context of the Coase theorem, see Aivazian and Callen (1981; 2017; 2023).

5. Transaction Costs

Of course, the world is not costless and wealth does matter. Indeed, as Coase (1960) emphasized, the world of zero transaction costs provides a baseline by which to analyze what happens in a world of transaction costs. With transaction costs, the form of agricultural production/storage/distribution is likely to matter. Private land holdings may not be efficient because of diseconomies of scale in grain production by small landholdings—coupled with diseconomies of scale in private warehousing of surplus grain in the years of plenty. Indeed, negotiations among many farmers to form large holdings to help exploit economies of scale are likely to be daunting and quite costly. There is also a free-rider problem with which to contend.[10] Furthermore, constructing large warehouses in each city to store and then distribute produce across the Egyptian population undoubtedly required large capital investments. Wealth, especially grain, was stored in temples, at least by the elites, but the priests had little incentive and probably little interest in financing these endeavors because they received their food allotment irrespectively, without incurring risk.[11] By forcing all landholders (except for priests) to sell their land to the state by fiat, Joseph could generate economies of scale in production and storage. By forcing the Egyptian population to leave small towns across Egypt to central places of distribution in cities, Joseph also economized on distribution expenses. Nevertheless, it would not have been costless to move entire populations and provide them with new housing.

Moreover, tenant farming is not costless, either. Absent costly monitoring by the state, tenant farmers would have an incentive to hide production for their own use. Indeed, it has been argued that costs related to monitoring production are crucial to tenant farming efficiency.[12] Thus, Joseph's solution surely must have involved costly monitoring by the state to ensure that farmers were not hiding produce. Indeed, by centralizing production and warehousing, Joseph was also ensuring that monitoring could be done more efficiently, minimizing monitoring costs.

Why does the Bible report that Joseph was unable to count production output? The narrative indicates that it was the sheer size of production output in the years of plenty that mitigated against quantifying the output. An alternative reason, I believe, revolves around the labor situation in Egypt. Given that priests, who were part of the literate Egyptian class, were exempt from selling their land and becoming tenant farmers, they had little incentive to be involved in Joseph's solution. It has been estimated that only 1% to 5% of Egyptians were

[10] On the implications of free riding to the Coase theorem, see Dixit and Olsen (2000).
[11] Wealth was stored in Egyptian (and other) temples, chosen for their solid construction and the presumed protection by the divinity. See Cancik and Schneider (2009, 14:317), Thompson and Tomkins (2024, 15), and Hernandez (2017). Documents/inscriptions supporting the storing of wealth in temples include the decree of Seti at Nauri (Griffith 1927), and the inscription of the high priest Amenhotep at Karnak (Wente 1967, 22), among others.
[12] See Allen and Lueck (2002).

literate at that time.[13] In addition to scribes, priests would likely have been a significant proportion of that literate class. Because the priests had little incentive to involve themselves in Joseph's enterprise, Joseph may have had a labor shortage of literate people. Thus, even though production and warehousing had become centralized, there may not have enough literate individuals to both monitor and count the output.

The analysis up to now suggests that Joseph's solution to the impending years of famine could be relatively efficient, but not necessarily so. Centralizing storage and distribution yields economies of scale, on the one hand, but involves costs of building large-scale warehouses and relocating and housing large populations, on the other. Transforming private farming to tenancy farming allows for more efficient centralized planning and distribution, on the one hand, but leads to potentially large monitoring costs, on the other. Moreover, it appears that ex post monitoring/counting was very costly because the society lacked sufficient literate workers for the task.

Another issue is the trade-off between risk and return. Under private farming, production risks and selling risks devolve primarily on the farmer. In a situation of state-controlled tenant farming, production risks are quite similar but selling risks are shifted to the state.[14] Indeed, by accepting selling risks, the state is better able to guarantee food to the population in the years of famine.

Another possibility was for Joseph to hire farmers for a fixed level of product or some sort of fixed cash alternative such as silver. Why tenant farming? The answer lies in the incentives and risk structure. A fixed cash- (or product-) paying scheme places the risk of production solely on the state. Farmers would have little incentive to produce efficiently and would likely slack off. Monitoring could solve this problem, but monitoring is costly. Alternatively, a tenant farmer with an 80% stake in the output is subject to risk and is thereby incentivized to produce efficiently. However, as noted above, monitoring would still be required to ensure that the tenant farmer does not "squirrel away" production owed to the state.

Although Joseph's solution to the impending seven years of famine was not costless and involved risks, his strategy according to the Bible was very successful. Centralization and tenancy farming solved the immediate acute issue of the impending famine, but whether this solution was efficient in the long run is simply unknown.

6. Brief Conclusion

The extant literature on Joseph's solution to the impending years of famine tends to emphasize its political aspects rather than its economic aspects, following in the footsteps of

[13] On literacy in ancient Egypt, see Baines (1983), and more recently Zinn (2018, especially 88).
[14] See Allen and Lueck (2002; 2009)

the influential work of Wildavsky. Even the insightful study by Wagner-Tsukamoto (2015), which does raise property rights and transaction costs concepts, is focused on constitutional issues, whereby Joseph's solution promotes societal contracting and cooperation to mitigate the "war of all" and to reap mutual gains. By contrast, this study evaluates Joseph's solution through the lens of the Coasian property rights/transaction cost approach by comparing the relative costs of Joseph's solution with its counterfactual, namely private land ownership and competition. Our analysis suggests that although Joseph's solution was apparently successful, it also involved ostensibly non-trivial costs and risks that might have been avoided in the short-run as well as the long-run if Joseph had adopted a private economy counterfactual solution.

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