[General] Suppose in the future, the economy becomes one where every person is a producer who creates and sells product that has zero marginal cost (e.g. things that can be downloaded like music, books, software, blueprints, etc.). As a result, everyone sets prices where the demand curve is unitary elastic (i.e. "the pure selling problem" or "revenue maximization"). Propose and discuss some alternative tax systems for an economy that has this characteristic. A way to think about this might be to ask "what might an optimal tax system look like in this context?" and then discuss these systems in the context of the tax policy criteria and other models of public finance. Are there any considerations for the larger public finance system and budgeting practices? Be sure to specify what considerations need to be known, the assumptions being made, and the importance of any of these key parameters.

~Response Posed by Justin M. Ross, who is normally too lazy to write things like this. He would like to emphasize this is not "the correct answer" but merely an answer that would reveal the kind of comprehensive understanding of the field necessary to receive a passing grade. See notes at the end.

A few rudimentary assumptions are useful in thinking about the optimal tax in this world. Let's presume that even though the marginal cost of production is zero, there are still real resource costs involved in producing the first unit (i.e. fixed costs exist). Let's also assume that there is still a democratic demand for government revenue for maintaining the money supply, providing income support, and affecting the business cycle through public finance systems. They are also perhaps providing public goods that may or may not have positive marginal costs or are otherwise rival in provision and entail some fixed cost, motivating the prospect for a federalist system of overlapping governmental units.[1]

Optimal tax systems require a normative statement of objectives and identification of constraints. Contractarians like Rawlsian and Buchanan favor tax systems that generate widespread acceptance through some kind of proper procedure. Rawls favored the "veil of ignorance" and Buchanan favored status quo with a procedure for negotiated improvements. Most conventional models of optimal tax systems, however, are developed in normative branches of welfare economics and those will be the primary emphasis here.

Models of optimal tax systems generally tend to model the objective of the tax system to minimize efficiency costs subject to a revenue constraint. An example of this would be Ramsey's

[1] By assumption, it seems that some governmental services are either not provided by humans or are not provided at all. Policing and legislating that require positive marginal labor costs, for example, appear to be ruled out by assumption.

(1927) work on optimal commodity taxation, in which it is demonstrated that if there exists an untaxed sector of consumption, then deviating from a uniform ad valorem rate is preferable under those objectives. This paper famously yielded the "inverse elasticity rule" which demonstrates the optimal commodity tax ratios are inversely related to their ratio of elasticities, with more inelastic goods receiving higher tax rates. Interestingly, in the hypothetical economy at hand, producers are already incentivized to produce at the same point on their demand curve ($\varepsilon = -1$), so the Ramsey model would also seem to imply that the tax rates be uniform.

However, many optimal tax models also seek to introduce equity concerns as a trade-off to efficiency (Slemrod, 1990; Mankiw, Weinzierl, and Yagan, 2009). Stern (1987) and Stiglitz (1982) offer examples where the social welfare function weighing individuals differently against the revenue requirement. This requires some speculation about this hypothetical world bundled with some observations from the description: 1) After the commodity is produced, there are marginal costs, so revenue from product sales is equal to income; 2) If marginal costs are zero, then there are only extensive margin efficiency costs if the tax rate is less than 100%, as tax rates discourage the development of *future* products not the desirability of selling products already made (i.e. the intensive margin).

A reasonable interpretation of these observations is that optimal tax models that favor both equity and efficiency confronted with a world that seems to lack intensive margin efficiency costs should probably favor a highly progressive income tax system. This might be particularly important if this sort of world mimics a tournament-style setting with a few "winners" that receive top pay and many "losers" who make very little. If tournament winners can be identified using unchangeable personal characteristics, then optimal tagging (e.g. Stiglitz, 1982) where increasing lump sum poll taxes are ascribed according to their abilities. More likely, I would guess, is that there is a significant luck component and each person is likely to get just a few "hits" over the course of their lifetime, in which case the desirable form of government might be one that is highly redistributive, highly taxing the current year's winners and using the proceeds to ensure people have sufficient means until they realize their lifetime hits. This might require us to think of optimal tax systems in a model of lifetime wealth (e.g. Fullerton and Rogers, 1991) rather than annual terms. Progressive marginal tax rates based on lifetime income accumulations from product sales might also clarify to policy makers what type of return on investment would be deterred from extensive margin investment decisions.

These considerations also inform the federalist, or vertical, structure of the tax system. The vertical dimension of the tax assignment problem in fiscal federalism is informed by the competing political and economic forces, sometimes referred to as "centripetal" (pulling towards the center) and "centrifugal" (directed away from the center). The desirability of subnational governments would depend on the existence of spatial heterogeneity of preferences, geographic spillovers, economies of scale, and the mobility of the private sector actors with regards to subnational choices of taxes and spending. There is nothing in the prompt to provide guidance on

how these may differ in the hypothetical economy, but some speculation is possible if we assume that it remains similar to contemporary concerns.

In the more familiar examples of zero marginal cost products given in the question (music, books, software, etc.), these things are digital in nature and currently occupy a considerably unsettled space of tax policy. The use of cloud technology and the growing importance of online sales has raised challenges to the concept of "nexus" in the United States, for example. In *Quill Corp. v. North Dakota* (1992), the US Supreme Court ruled that a business had to have some physical presence in a state before that state could mandate the business to collect use taxes on its behalf. States, however, are cutting deals with major online retailers like Amazon and attempting to revised policy through organizations like the Streamlined Sales Tax Project to harmonize sales tax bases. These legal and administrative concerns would also seem to push optimal tax policy away from consumption taxes and towards income tax administration if subnational governments are to be desired. They also suggest a more centralized tax assignment structure.

If income is to be taxed, the lifetime nature of the project also presumably favors further centralization if there are long time horizons. In contemporary practice, there are projects like oil drilling for which there may be several years of costs followed by decades of income, so that the profitability of the lifetime project is a multiperiod discounting problem. Taxation in the current economy is annual, and it attempts to deal with this problem with a variety of "carry back" and "carry forward" rules so that losses in one period can be smoothed into the other periods where revenues are realized. Assuming this economy is one where all the products resemble this, where it is produced once and then sold into perpetuity, then some similar feature would have to persist. Suppose I invest millions of dollars over 5 years producing my new product in California, then I might prefer to go live in Texas for the next 15 years while the product is sold for revenue at no marginal cost. It would be inefficient for carry rules to distort my location choice in either direction (either to stay in Indiana and realize my losses or to game the multistate tax system by realizing losses in high tax states and revenues in low tax states). If states are unable to coordinate this issue in a manner consistent with optimal lifetime income taxation, this would seem to further the case for a highly centralized income tax system.

As stated in the beginning, it is possible that there are still real resources used in the fixed costs of production. These might constitute the basis of a real property tax, especially if the tax revenues are used in support of local benefits. That is, the better local governments are able to adhere to benefit principles of taxation, then the property tax could exist because it would represent a quid pro quo for local services rendered. In the property tax debate, the "benefit view" of the property tax describes the conditions in which the tax is effectively converted into a user charge approximating a market price (see Hamilton 1975, 1976). Although this deviates considerably from the real property tax we have in most of the U.S. (Youngman, 2016), perhaps this economic transformation would be accompanied by the reforms necessary to allow for such

an instance to arise. The benefit view would permit the existence of local government in this economy because the property tax would become functionally equivalent to a poll tax.

If it proves impossible to realize the benefit view of property taxation, there does exist a variety of alternative fiscal schemes that would allow for subnational taxation. Central income taxation with grants to lower levels of government is a prominent feature of fiscal federalism in many countries (Musgrave, 1997; Oates, 1999). A federal mandating of a minimum income tax at the subnational level would similarly accomplish this, albeit local flexibility in going beyond the minimum might plausibly result in overtaxation if all the governments seek revenue maximizing tax rates (Sobel, 1997).

NOTES ON THE ANSWER ABOVE

- Notice that the first couple paragraphs take the time to define the topic of the question, optimal income taxation, as well as reveal what assumptions are important to make in such a problem. Ultimately, I made a set of assumptions that directed the discussion into areas that best suited my advantages in discussing the literature.
- The essay uses an understanding of optimal tax system literature to consider the merits of different tax systems. The wandering discussion allowed me to cover more topics to the extent I was competent with. The purpose was to have plenty of discussion on relevant topics, so I motivated the relevancy of the topic and discussed it. This promoted a better answer than just picking a tax in some arbitrary manner and then discussing it, albeit it is certainly possible that strategy could result in a passing answer.
- Of course, it impossible to write a completely comprehensive answer, but if I was grading the above I would probably note that the expenditure considerations are noticeably absent. Such a discussion could have brought up literature on expenditure smoothing, rainy day funds, tax buoyancy, etc. Other areas for improvement come from the fact that it is somewhat light on the tax competition aspect of the fiscal federalism, rather non-specific in grants or what the conditions are for the benefit view of the property tax. Those are the kinds of tradeoffs you might consider in “depth” vs “breadth” of your answer.