Fiscal and trade distorting effects of capital gains tax on land sales - empirical evidence from agricultural land market in Finland

Tuottaako peltokauppojen luovutusvoiton verotuksen huojentaminen vain hyötyjiä?

Kyösti Pietola[1)], Sami Myyrä[1)] ja Eija Pouta[1)]
[1)] MTT Taloustutkimus, Luutnantintie 13, 00410 Helsinki, etunimi.sukunimi@mtt.fi

Luovutusvoittojen verotus on keskeinen osa rikkaiden maiden verojärjestelmiä varsinkin korkean veroasteen pohjoismaissa, kuten Suomessa. Luovutusvoittojen verottaminen kuitenkin vääristää markkinoita vähentämällä myyntejä, jotka laukaisevat ajan mukana syntyneestä arvonnoususta kannettavan veronmaksun (=lock-in effect). Ilmiötä on tutkittu aikaisemmin pääasiassa osakeomistuksen kohdalla, mutta myös viljelysmaan kohdalla ongelma on ilmeinen. Viljelysmaan kohdalla ongelma korostuu, koska se aiheuttaa merkittäviä kustannuksia reaalitalouteen. Maanomistus pirstaloituu samalla kun aktiiviviljely keskittyy yhä pienempään määrään ammattiviljelijöitä. Maan vuokraus lisääntyy, maan tuottavuuskasvu pysähtyy ja ympäristöohjelmien tehokkuus heikkenee.

Tässä tutkimuksessa haetaan keinoja vauhdittaa peltokauppoja verotuksen keinoin ja arvioidaan verotuksellisten keinojen vaikutusta verokertymään. Selvitämme luovutusvoitosta kannettavan veron ja siihen kohdistuvan, määräaikaisen verohuojennuksen vaikutukset peltokauppoihin ja valtion verokertymään kahdesta eri näkökulmasta ja kahdella eri menetelmällä. Ensimmäinen menetelmä on maanomistajan myyntitilannetta kuvaava matemaattinen optimointimalli, jonka tulokset osoittavat, että yksin taloudellisesta näkökulmasta katsottuna myyntivoittoverotuksella on keskeinen merkitys myyntien ajoitukseen. Toinen menetelmä on ekonometrinen malli, jolla selvitetään maanomistajien omat näkemykset siitä, millä tavoin he reagoisivat myyntivoittoveron huojennuksiin. Tässä osassa hyödynnetään Suomalainen pellonomistaja -tutkimuksen kyselyaineistoa ja sen pohjalta laadittuja malleja pellonomistajien reaktioista veromuutoksiin. Omistajien reaktiot veromuutoksiin tarjoavat mahdollisuuden tarkastella verohuojennuksen verokertymävaikutuksia ja optimoida kertymää.

Tulosten mukaan luovutusvoittojen verotuksella on merkittävä vaikutus peltomarkkinoihin. Määräaikainen luovutusvoiton verohuojennus voisi tuottaa nykyisen verokertymän ja samalla oikaista verotuksen peltomarkkinoille aiheuttamaa vääristymää siitäkin huolimatta, että pellon myyntihalukkuus on yleisesti ottaen heikko. Peräti 87 % omistajista ei myisi peltoaan, vaikka vero poistuisi kokonaisuudessaan. Verotasojen muutoksilla olisi kuitenkin huomattavia vaikutuksia nykyisin kovin ohuilla peltomarkkinoilla. Kolmanneksen verotason alennus johtaisi 50 prosentin nousuun myyntien todennäköisyydessä. Veron tilapäinen poistaminen nelinkertaistaisi myyntien todennäköisyyden. Näin ollen voidaan todeta pellonomistajien reagoivan varsin joustavasti myyntivoittoveron huojennuksiin. Verohuojennukset olisi kuitenkin saatava nopeasti voimaan, koska markkinoilla oleva tieto tai epäilys tulossa olevasta huojennuksesta pysäyttää peltokaupat kokonaan siihen saakka, kunnes huojennus astuu voimaan.

Key-words: Capital gains tax, land market, dynamic programming, willingness to sell, econometrics.

Introduction

Capital gains taxes are, in addition to labour and capital income taxes, an essential part of fiscal policies in most countries. They are important, in particular, in Scandinavian countries where the public sectors are large and the share of taxes out from the total GDP is amongst the highest in Europe. Nevertheless, the existing literature supports the view that capital gains taxes also have significant market distortion effects and adverse effects in the real economies. They likely distort the market and resource allocations through so called “lock-in” effect, which results in a tendency to postpone asset sales and to discourage trade transactions that trigger the tax payments (Ayers *et al.* 2007; Daunfeldt *et* *al.* 2007; Dammon and Spatt 1996; Holt and Shelton 1962)[1]. The lock-in effects would most probably apply also land assets.

When it comes to agricultural land, at least in many European countries, the lock-in effect implies that, along the structural development in agriculture, the land ownership and active farming deviate from each other. Land ownership fragments, e.g. through heritage, gradually to a larger and larger number of individual land owners, while competition and structural adjustment programs concentrate active farming through land tenancy into a smaller and smaller number of active farms. When more land is cultivated under lease contracts, land tenure insecurity increases, which affects adversely real economies. Recent literature reveals that increasing land tenure insecurity significantly discourages and delays irreversible land improvements that would be necessary for maintaining productivity of land (Soule *et al.* 2000; Myyrä *et al.* 2005; Yoder *et al.* 2008). At the same time, agricultural and environmental policies reach a decreasing number of true land owners losing their efficiency. Efficiency of environmental programs is decreased, in particular, when they require long term commitments, such as irreversible land improvements with long payback periods.

Even if the significant market distortion effects in the asset markets, as well as their potential adverse effects on land productivity and agri-environmental programs are all acknowledged, the existing literature does not, nevertheless, include analysis on the effects of the capital gains taxes in the land market. Thus, we do not have estimates on how elastic the timing of land sales decisions would be with respect to adjustments in the capital gains taxes, and how the resulting market distortions could be minimized in the agricultural land market. Similarly, we do not currently have estimates on the marginal fiscal effects, if certain tax waives were scheduled in the land market.

This study contributes to the existing literature by first building a normative Dynamic Programming (DP) model for land sales decisions (the policy rules), conditional on capital gains taxes. The main characteristics of the model originate in the asset trade model of Dammon and Spatt (1996), but here the model is more general, it is calibrated to the Finnish tax system, and solved numerically. The optimization model is then used to simulate the timing of land sales as a response to certain tax schemes. Thereafter, land owner willingness to sell their land is estimated in survey data. Estimating the reduced form thresholds for land sales decisions and the empirical linkage between certain tax waives, land trading quantities and fiscal tax revenues draw for the most part on an earlier work of Myyrä and Pouta (2009).

Dynamic Programming Model

The normative Dynamic Programming (DP) model is built for an investor who owns a unit of arable land. Then, depending on the tax base and the expected annual drift rate in the land price, he/she decides each period whether to keep the land for the next year (continuation region), or sell the land (stopping time). When the investor decides to sell the land, he/she receives the price of land, net of capital gains tax and transactions costs such as the closing fees.

Within the continuation region, *i.e.* when the land owner decides not to sell the land, the optimal value function, V_t, satisfies the Bellman equation of the form:

$$V_t(P_t, h(\tau,t)) = R_t + \beta E\left[V_{t+1}(P_{t+1}, h(\tau,t+1)) \mid d_t = 0\right], \quad t \le T-1 \qquad (1)$$

Where P_t is the price of land, $h(\tau,t)$ defines the capital tax base and, besides the tax rate, it also depends explicitly on the time. The opportunity cost for capital is denoted by the discount factor β and E is the expectations operator. In theory, the problem has an infinite horizon, but because it will be solved numerically, the time horizon is set finite, at 50 years.

The threshold returns to capital that trigger the sales decisions are measured by the expected drift rate in the price of land. The tax treatment follows the Finnish tax institution. Depending on the duration of the holding period, the tax base separates into a short regime and a long regime. The duration of the short regime is ten years from the purchase of land, and within it only the standard

[1] The literature also identifies a demand side "capitalization effect", as the tax treatment affects on how the asset returns are capitalized on their prices (e.g. Doi et al. 2008). Here we focus, nevertheless on land owner behaviour and the supply effect.

method can be used in computing the taxable capital gain. The gain is the difference between the sales price and the purchase price, including transactions costs such as the closing fees. When the seller has owned the land for at least ten years, the tax base enters into the long regime. Within the long regime, either the above described standard method, or a 40% share of the sales price can be used to compute the deductible. The option for using the computational 40% deductible provides a tax incentive to delay land sales from the short regime to the long regime, if the land price increases by more than 60% from its purchase price. The tax rate (τ), imposed on taxable capital gain equals between the short and long regimes and the capital gains remain untaxed until the landowner sells the land.

The price of land follows a geometric series around a deterministic drift, and the annual drift rate for region i (μ_t^i) is computed simply as:

$$\mu_t^i = \Delta P_t^i / P_t^i \tag{2}$$

where Δ is the difference operator and P_t^i is the median price in the land trades within region i during the year t. The geometric averages for the annual drift rates are computed for two periods, 1981-2008 and 1995-2008. The latter time period represents the years when Finland has been within the EU. The regional land prices have increased annually in average by 4.1% over the years 1981-2008 and by 6.5% over the years 1995-2008. The standard deviation of the annual price change has been either 20% or 16% of the mean, depending on the time period.

In the numerical DP-algorithm, the stochastic price process is approximated by a 3x3 Markovian type probability matrix. The price is allowed to have three states. In the middle state, referred later to as the “equilibrium price”, the price follows the expected drift. The state of low price is 20% below, and the state of high price is 20% above the equilibrium. The probability matrix (*Prob*) defining the probabilities for the price movements between these three states is:

$$Prob = \begin{bmatrix} 0.4 & 0.3 & 0.3 \\ 0.3 & 0.4 & 0.3 \\ 0.3 & 0.3 & 0.4 \end{bmatrix} \tag{3}$$

Thus, the probability of the price staying unchanged at equilibrium, above the equilibrium, or below the equilibrium, is 0.4 (the diagonal elements). The probability that the price will change from its current state to either of the two other possible states is 03, each. If, for example, the current price is at the equilibrium, it has a 30% probability to increase to 20% below the expected equilibrium (drift), 40% probability to increase along the drift as expected, or 30% probability to decrease 20% below the expected equilibrium.

The DP model is simulated for three different scenarios concerning uncertainty: (*i*) the deterministic problem, (*ii*) stochastic problem for risk neutral investor, and (*iii*) stochastic problem for risk averse investor.

The deterministic version (*i*) is specified by imposing all diagonal entries at value one and all off-diagonal entries at value zero in the probability matrix (*Prob*). In the stochastic version (*ii*) the probability matrix is specified as in (3) but the investor is risk neutral, as in Dammon and Spatt (1996). The third version (*iii*) is stochastic and the investor risk preferences are described by a Constant Relative Risk Aversion (*CRRA*) in the utility (*U*) function

$$U(\tilde{V}) = (1-\theta)^{-1} V^{(1-\theta)} \tag{4}$$

where V is defined in (1) and θ is the *CRRA* coefficient measuring risk aversion and it is imposed at 0.5. The slight risk aversion preferences indicated by our *CRRA* coefficient, already show how risk aversion alters land owner behaviour, as compared to deterministic and risk neutral stochastic cases.

With regards to the capital gains taxes we consider three scenarios: (*a*) no tax waive other than the computational deductible in the long regime, (*b*) abolition of the tax for a year at the end of the short regime, and (*c*) abolition of the tax for a year within the long regime. The first scenario of “no tax waive" (*a*), is to highlight on how a forthcoming access to the long regime with a computational deductible already affects behaviour of the land owners, who have received their land recently and are currently at different points of time within the short regime (from the first to the last year).

In presenting the results the time *t* indices the number of years remaining to the tax break points, *i.e.* to the switch from the short to long regime, or to the tax waive, or both. In each case we start ten years (*t=10*) before the break point (*t=0*). Because ten years is the maximum length of the short regime, all tax scenarios (*a,b,c*) continue within the standard long regime once the break point is passed (*t= -1, -2, …*).

DP Results

The threshold returns for selling the land, as depicted in Figures below, are defined as the drift rates in the price of land (annual capital gains) that trigger optimal sales decisions. If the drift rate falls below the threshold, it is optimal to sell and otherwise to continue owning the land.

If the land owner is initially within the short regime and the capital gains tax will be temporarily abolished at the end of the regime (*t=0*), the threshold returns will decrease quickly towards the tax break point (Figure 1). At the edge of the break point, it pays to postpone the land sales decision by one year unless the price of land decreases during that year by 20-25%, depending on the investor's risk preferences. Once the access to the tax waive is reached, a risk averse investor will sell the land immediately even if it expected to generate in subsequent years a capital gain of 10% per year, *i.e.* twice as much as the sure returns for the challenger. Once the year for tax waive is passed, the threshold returns fall to their long run equilibrium.

When the investor is initially within the long regime, the threshold returns to capital decrease less towards the tax waive than within the short regime. At the edge of the waive, a risk averse investor would sell the land only if the market price is expected to decrease by at least 8% within subsequent year of waiting (Figure 2). When the waive is in effect, it pays to sell when the future capital gains are expected to exceed 10%. For a risk neutral investor the threshold returns fall more before and increase less at the time of tax waive, as compared to a risk averse investor.

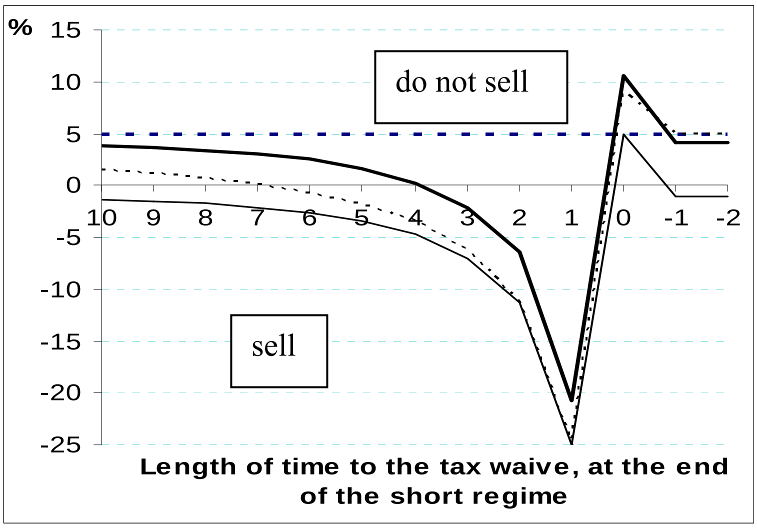

Figure 1. Threshold capital gains (drift rate %) with temporary abolition of the capital gains tax at the end of the short regime. Thick continuous line: stochastic returns and risk averse investor Thin continuous line: stochastic returns and risk neutral investor; Thin dotted line: deterministic returns; Thick linear dotted line: 5% opportunity cost of capital.

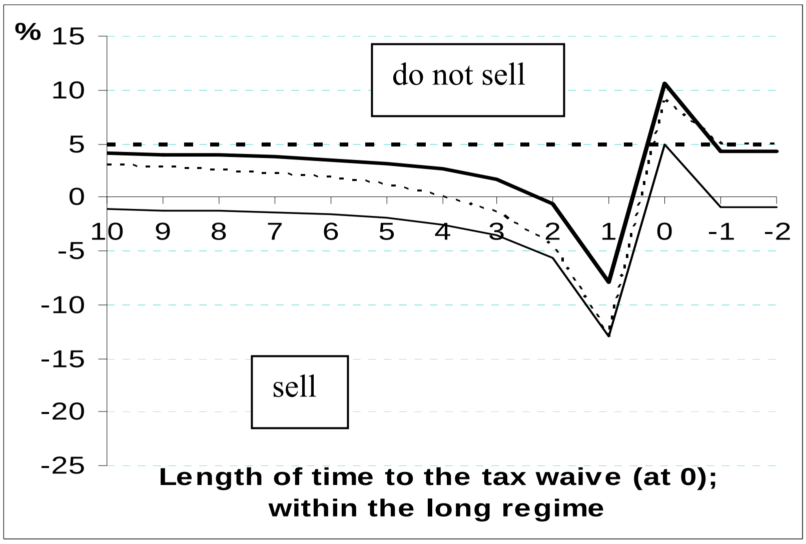

Figure 2. Threshold capital gains (drift rate %) with temporary abolition of the capital gains tax when the investor is initially in the long regime. Thick continuous line: stochastic returns and risk averse investor Thin continuous line: stochastic returns and risk neutral investor; Thin dotted line: deterministic returns; Thick linear dotted line: 5% opportunity cost of capital.

Econometric Model

In estimating the econometric model for land owner willingness to sell land, we augment V_t by an error term v_t . The land will be sold and *d(t)=1* chosen if

$$V_t(P,h(t)\,|\,d_t=1)+v_{t,d=1}>V_t(P,h(t)\,|\,d_t=0)+v_{t,d=0} \quad (5)$$

which implies

$$v_{t,d=1}-v_{t,d=0}>V_t(P,h(t)\,|\,d_t=0)-V_t(P,h(t)\,|\,d_t=1) \quad (6)$$

Thus, the boundaries for the choices are determined by the differences between the value functions of keeping versus selling the land and by the differences in the corresponding errors.

We continue by specifying the boundary conditions in the reduced form and estimate the choices in the logit model. For the most part, the parameter estimates originate on the earlier work of Myyrä and Pouta (2009) and the detailed estimation approach is described therein.

The estimation builds on survey data from a random sample of Finnish land owners, including both active farmers, and passive land owners who either rent their field to active farmers or have set them aside (Myyrä *et al.* 2008). The mail survey yielded a total of 2 684 observations from the sample of landowners. This amounts to 47% of the total number of mailed questionnaires. In addition to the mail survey data, information from the register of agricultural taxation and income taxation was available for the respondents, including income from agriculture.

The questionnaire focus on a single parcel of farmland owned by the responding landowner and covered the past land sales during the previous ten years and future selling intentions. Hypothetical policy, the taxation on the proceeds of a farmland sale (TTF), were introduced for respondents. TTF currently averages €900/ha, which is about 28% of the average difference between the assumed or actual purchase and selling prices (*i.e.* “arbitrace”). In the questionnaire, landowners were asked about their willingness to sell their agricultural land under conditions where the current tax (€900) would be immediately reduced for five year period from €900/ha to the level quoted in the questionnaire €600/ha, €300/ha, €100/ha or €0/ha.

Econometric Results

The parameter estimates in the models explaining the past sales and future selling intentions without a tax policy and under TTF scenario are given Myyrä and Pouta (2009). The self selection bias was tested but found insignificant. The survey data were not informative enough to identify the “regime effect” so that the response of land owners within the short regime would differ from the response of the land owners within the long regime, once other model variables were controlled for. So, we continue to simulate results pooling the short and long regime land owners together.

The models and the data set were used to simulate the effect of tax policy and the level of tax on selling probability. By adding ten new observations for each respondent corresponding tax levels from €900, 800 etc. to 0, the reactions for varying taxes were calculated. All simulated observations were then used to estimate the probability for the land sale in all possible tax levels. Sale was predicted if estimated probability exceeded 0.5.

The simulation results show the effect of tax scheme on the land owners’ willingness to sell land (Figure 3). Even if the overall level of the probability to sell land is low and as much as 87% of all land owners would not sell their land no matter what the tax rates would be, the simulated adjustments in the tax rates would have economically considerable effect on the land market. If a temporary tax waiver program decreases the sales tax, for example, by one third, from Euro 900 to Euro 600 per hectare, the probability to sell land is predicted to increase by 50%, from 3.1%-points to 4.7%-points. A temporary abolition of the tax is predicted to quadruple the probability to sell land, as it is predicted to increase from 3.1%-points to 12.5%-points. Thus, the land owners’ willingness to sell land responds elastically to the tax scheme.

Approximately 20,000 hectares of land is traded annually, excluding the farm successions, gifts and transfers and could be defined as “arm-length”, and the tax collected per hectare of land traded has been in average Euro 900. This tax revenue sums up to a total of Euro 18 million. Using these figures as benchmarks, a temporary abolition of the tax is predicted to trigger (*ceteris paribus*) land trade that is four times the current quantity. Without the tax, the traded total land area is predicted at 80,000 hectares. The fiscal price tag, in terms of government tax revenues, for the quadrupled quantity of land trade would then be a loss of Euro 18 million tax revenue, corresponding to Euro 225 per traded land hectare (Figure 3).

Decreasing the tax temporarily to Euro 100 per hectare of traded land would trigger land sales that are three times the current volume, *i.e.* 59,000 hectares, whereas the tax revenue would decrease from euro 18 million to Euro 5.9 million. Thus, tripling of the traded land quantity would decrease the tax revenue by two thirds, and the fiscal cost in terms of decreased tax revenue would be Euro 12 million. In this case, the lost tax revenue would be Euro 205 per traded land hectare.

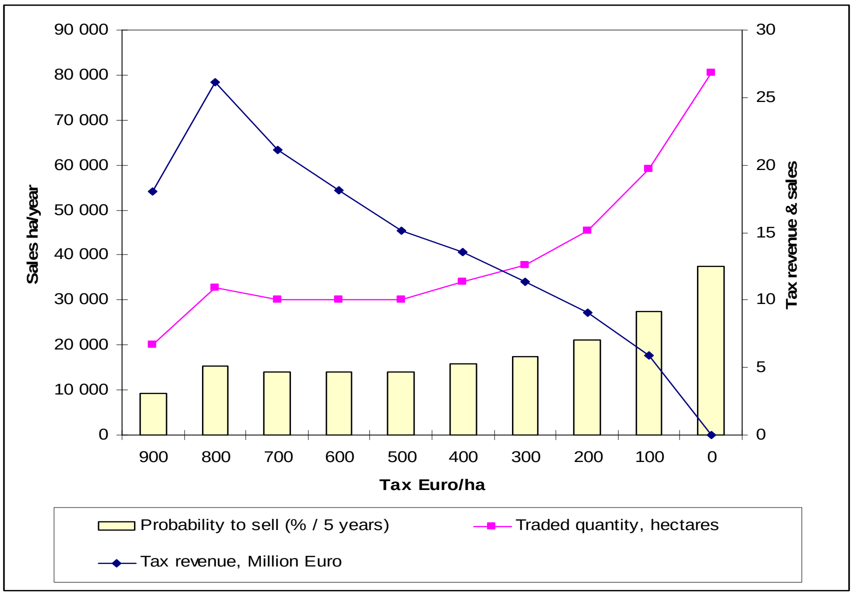

Figure 3. The predicted probability to sell land (the bars), the traded quantity of land (upwards sloping curve), and the tax revenue (downward sloping curve) conditional on alternative capital gains taxes (x-axis). The current tax rate is denoted by “900”.

When the tax rate is decreased from the current Euro 900 per hectare towards zero, the tax revenue is predicted to remain first about its current level (at Euro 600 tax) and then decrease almost linearly to zero. Thus, the results predict that the current tax revenue could be maintained by a tax waiver program that decreases the capital gains tax from Euro 900 to Euro 600 per hectare.

Given that about 60,000 hectares of land is annually transacted, either through land traded or a net increase in leasing, a tax cut to Euro 600 hectare would increase the quantity of annually traded land to above 30,000 hectares. This would be a sufficient increase *(ceteris paribus)* for temporarily maintaining the share between the leased and owner farmed land unchanged. In other words, a tax waive of euro 300 would cease the tenancy problem from gradually increasing pattern and keep the land tenancy at its current level and this would not cut the total amount of taxes collected from the land sales. If the tax is cut to below Euro 400, the traded quantities are predicted to increase to at least 34,000 hectares, which would turn the share of land tenancy to a downward sloping trend.

Concluding Remarks

The results provide new grounds for optimizing capital gains taxes on land market, while taking into an account both, their fiscal and market distorting effects. The results suggest that the timing of land sales and, hence, the fiscal revenues would respond elastically to certain temporary tax waiver programs. Temporary tax waives could therefore be used temporarily to maintain the current tax revenues with less trade distorting effects on the land market. The aggregate land sales quantities could be quadrupled by a temporary abolition of the capital gains tax. It is important, nevertheless, that the legislative proposals concerning the forthcoming tax waives will come quickly into effect. Our analysis reveals that if market has information about a forthcoming waive in capital gains tax, the trade for land will plunge, as the value of land should incur substantial depreciation before it pays to sell it before the forthcoming tax waive.

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