Policy uncertainty, the Afforestation Grant Scheme, and the Emissions Trading Scheme

Alex Olssen

Motu Economic and Public Policy Research

Motivation

- Emissions Trading Scheme (ETS) from 2008
- Afforestation Grant Scheme (AGS) from 2008 to 2011
- What situations justify both?
- Start thinking about policy uncertainty

A Simple Model

- Rodrik (1991) applied to forestry in New Zealand
- Positive externality on forestry
- Allow for policy uncertainty
- Compare outcomes of a social planner and a land manager

Some Notation

- Let r be the social return to forestry.
- Let τ_0 be the social benefit of sequestration.
- Thus, $r - \tau_0$ is the private benefit to forestry.
- Let r^* be the private return on the outside option for rural land.
- Assume that under the ETS land managers get all the social benefit of forestry so that the private return is r.
- Let κ be the cost of converting from the outside use into forestry.
- Let η be the cost of converting from forestry back to the outside option.
- Assume the land–owner expects a complete policy reversal at time R with probability π.
- Assume throughout that the land–owner is risk neutral expected–utility maximiser.

Two possible decisions

- Consider the decision of a land–owner, who is initially *not* in forestry, *after* the policy is introduced.
- They can stay in the outside land use forever

$$V_0 = \int_0^\infty r^* e^{-\rho t} dt = \frac{r^*}{\rho}$$

- Or they can convert to forestry

$$V_1 = \int_0^\infty r e^{-\rho t} dt - \kappa - \pi \int_R^\infty [r - \max\{r - \tau_0, r^* - \rho\eta\}] e^{-\rho t} dt.$$

The Social Planner's Problem

- The Social Planner faces no policy uncertainty so $\pi = 0$

$$
\begin{aligned}
V_1^{sp} &= \int_0^\infty r e^{-\rho t} dt - \kappa - \pi \int_R^\infty [r - \max\{r - \tau_0, r^* - \rho\eta\}] e^{-\rho t} dt \\
&= \int_0^\infty r e^{-\rho t} dt - \kappa \\
&= \frac{r}{\rho} - \kappa
\end{aligned}
$$

- Thus the Social Planner will afforest if

$$\frac{r}{\rho} - \kappa \geq \frac{r^*}{\rho}.$$

- For land where $r^* = r - \tau_0$, we get

$$\kappa \leq \frac{\tau_0}{\rho}.$$

Motu
Motu Economic and Public Policy Research

The Land Manager's Problem — Stay

- If exit costs are too large, $(r - \tau_0 > r^* - \rho\eta)$, then the land manager stays in forest even with policy reversal

$$
\begin{aligned}
V_1^{lm} &= \int_0^\infty r e^{-\rho t} dt - \kappa - \pi \int_R^\infty [r - \max\{r - \tau_0, r^* - \rho\eta\}] e^{-\rho t} dt \\
&= \frac{r}{\rho} - \kappa - \frac{\pi \tau_0 e^{-\rho R}}{\rho} \\
&= V_1^{sp} - \frac{\pi \tau_0 e^{-\rho R}}{\rho} \\
&\leq V_1^{sp}
\end{aligned}
$$

The Land Manager's Problem — Exit

- On the other hand if the exit costs are not so large, then

$$
\begin{aligned}
V_1^{lm} &= \int_0^{\infty} re^{-\rho t} dt - \kappa - \pi \int_R^{\infty} [r - \max\{r - \tau_0, r^* - \rho\eta\}] e^{-\rho t} dt \\
&= \frac{r}{\rho} - \kappa - \frac{\pi([r - r^*] + \rho\eta) e^{-\rho R}}{\rho} \\
&\leq V_1^{sp}
\end{aligned}
$$

Implications of the model

- With policy uncertainty the ETS can result in inefficiently low afforestation
- A grant can theoretically solve the problem
- Establishment costs on their own do not justify a grant (see the review)

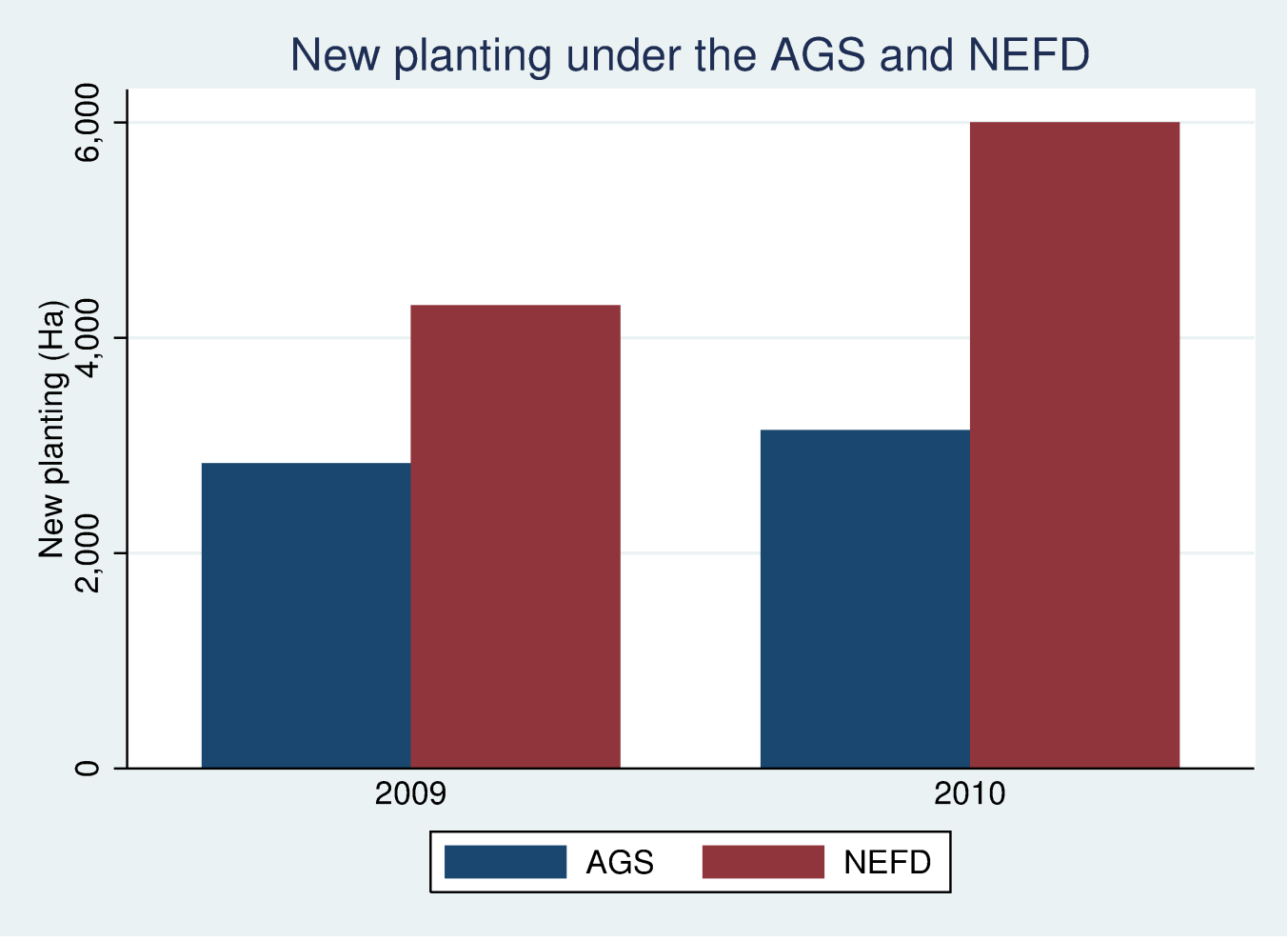
The AGS

- Eligible land owners propose to plant a new forest and apply to the AGS
- If successful, then they get a cash grant once a forest is established to certain standards
- They must maintain the forest and give the government the credits for 10 years
- Funding split into a public pool and a Regional Council pool
- The public pool funding was allocated by tender

AGS Data

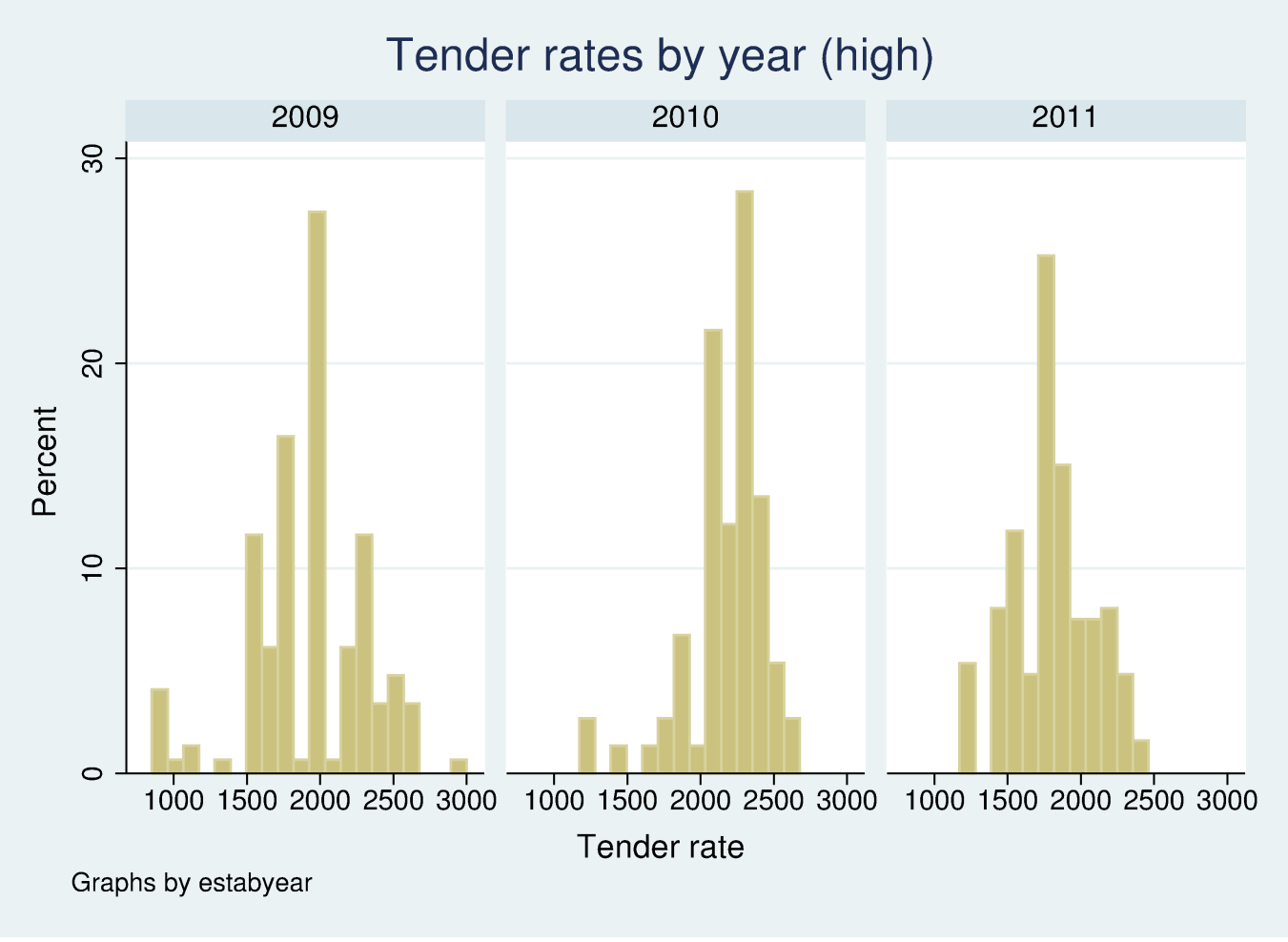
- We have data on **ALL** applications to the public pool
- Our unit of observation is a forest block, not a proposal
- We also have Regional Council pool grantees (high success rate anyway)

Proportion of New Planting in the AGS



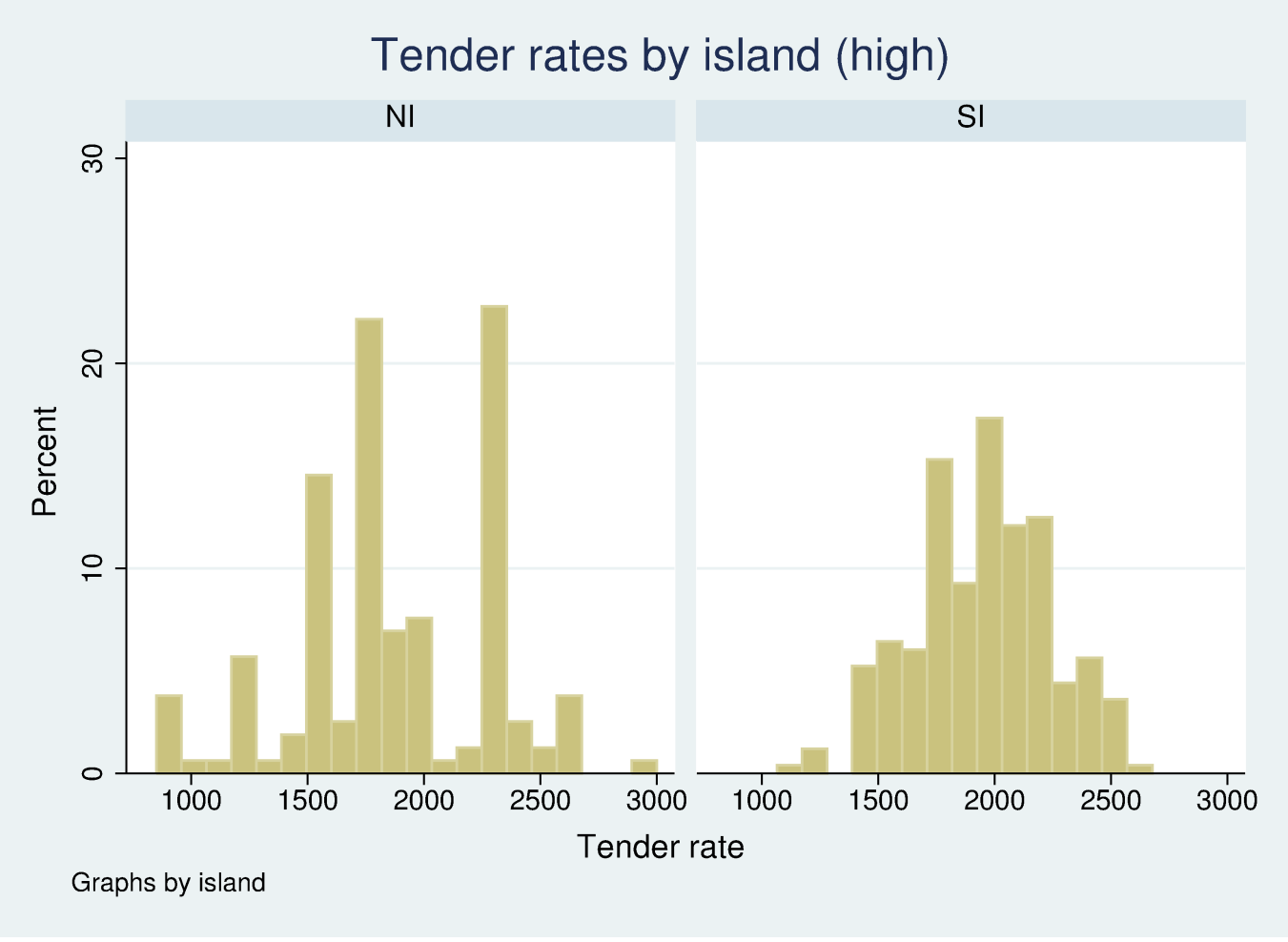
Motu
Motu Economic and Public Policy Research

Distribution of Tenders by Year



Motu
Motu Economic and Public Policy Research

Distribution of Tenders by Year



Take Away and Future Work

- Policy uncertainty can justify a grant scheme as well as a trading scheme
- Establishment costs and other reasons for grant schemes should be scrutinised
- What other instruments can be used to address policy uncertainty?