given as the value of the vector *(3* that minimizes

1y, —xf,[31= iJ (0.5 — *1(y,..›-!x',/3))(y,—x;fi).* (23)

Koenker and Bassett (1978) show that the p-quantile estimator can be calculated by minimizing a generalization of the second expression in (23),

R = argtnin > *(p — J.(y p))(—x:13)* · (24)

Although these expressions do not permit explicit solutions, the parameters can be obtained quickly by linear programming methods.

2.1.4. Zeros: probils and Tobits

In development applications, as elsewhere in economics, many variables of interest have limited ranges, either a set of discrete values, or are continuous but limited to some interval. The most frequent example of the latter is when a variable is restricted to positive values; a farmer can produce nothing or something, but cannot grow negative amounts, a consumer may or may not smoke, but cannot sell tobacco, and so on.

Binary discrete choices are typically modelled by using probit or logit models, and often less formally using the linear probability model, in which a dichotomous dependent variable is regressed on the covariates. Provided the standard errors of the linear probability model are corrected for the hetero-skedasticity that is inevitable in such a specification, there is no good reason not to use it, especially when sample sizes are large enough so that computational costs of probit and logit are non-trivial. The fact that linearity is an inappropriate functional form for a probability is unlikely to be problematic provided the bulk of the data are in the range where predicted probabilities are far from either zero or unity.

Cases where the data are a partly discrete and partly continuous are harder to handle. The most common case is where a continuous response is censored at zero, for which the standard model is the Tobit, viz.

y_i = max(0, + u_i); *01,1.70=0; E(141x,)=* (25)

The model is also interpreted as one in which x',13 + *u,* is a latent variable, observed when zero or positive, but censored to zero, i.e. replaced by zero, when it would otherwise be negative. A more general version of this model, in which the censoring is controlled by a second latent variable, will be discussed in the subsection on selection below. Estimation is usually done by assuming