Finding the Regresion estimate of the population total

Here is some R code that finds the point and 95% interval regression estimates for the population total given a sample.

Here is some R code, which given a samaple, will calculate the regression estimate and find its absolute error as an estimate of the population total. It also finds the usual 95% confidence interval, its length and checks to see if it contains the true population total.

```
> regtot<-function(smp,popy,popx)
+   {
+     xsamp<-popx[smp]
+     ysamp<-popy[smp]
+     mnpopx<-mean(popx)
+     mny<-mean(popy)
+     trtot<-sum(popy)
+     n <- length(xsamp)
+     N<-length(popy)
+     ff <- n/N
+     out <- lsfit(xsamp, ysamp)
+     bb<-as.numeric(out$coef)
+     res <- out$residuals
+     mnxsamp <- mean(xsamp)
+     mnysamp <- mean(ysamp)
+     esttot <- N*(mnysamp + bb[2] * (mnpopx - mnxsamp))
+     abserr <- abs(esttot - trtot)
+     dum1 <- N*N*((1 - ff)/(n*(n-2)))
+     estvr <- dum1*sum(res * res)
+     lwbd <- esttot - 1.96 * sqrt(estvr)
+     upbd <-esttot + 1.96 * sqrt(estvr)
+     if(lwbd <= trtot & trtot <= upbd) { cov<-1}
+     else {cov<-0}
+      ans<-c(esttot,abserr,lwbd,upbd - lwbd,cov)
+     return(ans)
+   }
```

Next we generate a population, take a sampe and use our function.

```
> set.seed(1999)
> popx<-rgamma(500,5)
> popy<-rnorm(500,75 + 3*popx,20)
> cor(popx,popy)

[1] 0.3875723

> smp<-sample(1:500,25)
> regtot(smp,popy,popx)

[1] 44973.2699   772.4932 40909.2531  8128.0337     1.0000

> out<-lsfit(popx[smp],popy[smp])
> names(out)

[1] "coefficients" "residuals"    "intercept"    "qr"

> as.numeric(out$coef)

[1] 65.654412  4.872223
```