Tendencia estocástica vs. tendencia determinística

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Documento basado en el código de R 3.1 de Pfaff(2011).

Experimento 1

White noise

```
set.seed(123456)
T=200
e <- rnorm(T)
```

Pure random walk

$$\Delta y_t = \epsilon_t$$

$$y_t = y_{t-1} + \epsilon_t$$

$$y_{t-1} = y_{t-2} + \epsilon_{t-1}$$

$$y_t = y_0 + \sum_{j=0}^{t-1} \epsilon_{t-j}$$

```
rw.nd <- cumsum(e)
plot(rw.nd, type="l")
```

Random walk with drift

$$y_t = y_0 + \beta t + \sum_{j=0}^{t-1} \epsilon_{t-j}$$

```
trd <- 1:T
rw.wd <- 0.5*trd+ cumsum(e)
```
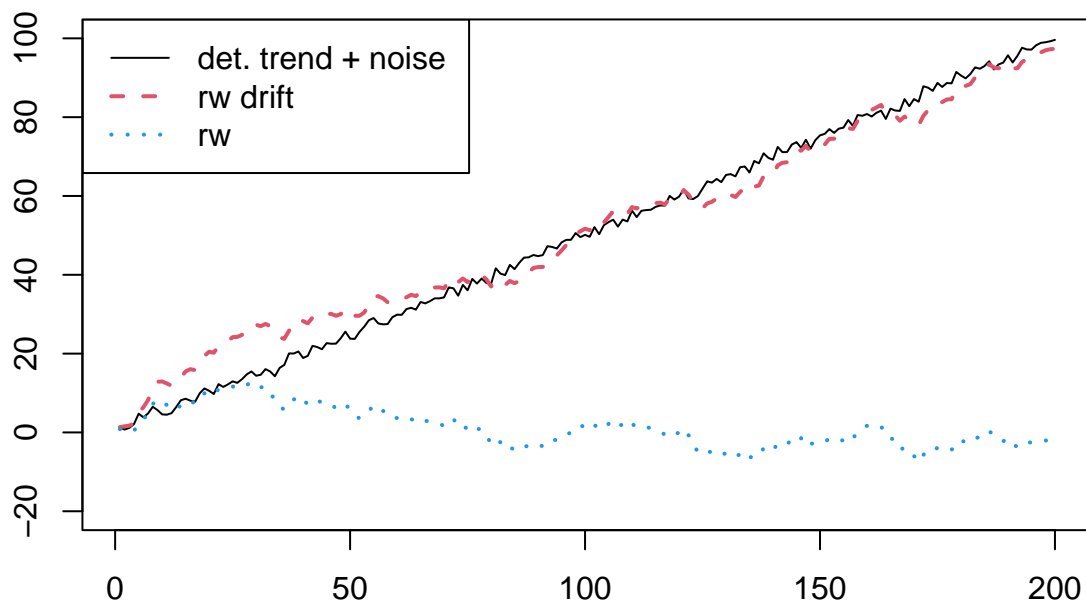
Deterministic trend and noise

$$y_t = \beta t + \epsilon_t$$

```
dt <- e + 0.5*trd
```

Plot

```
plot.ts(dt, lty=1, ylab='', xlab='', lwd=1, ylim=c(-20,100))
lines(rw.wd, lty=2, lwd=2, col=2)
lines(rw.nd, lty=3, lwd=2, col=4)
legend("topleft", legend=c('det. trend + noise ', 'rw drift ', 'rw'),
       lty=c(1, 2, 3), lwd=c(1,2,2), col=c(1,2,4))
```

Moraleja: es difícil distinguir entre dt y rw.wd.

Experimento 2: aumentamos la varianza

White noise

```
set.seed(1234)
T=200
e <- rnorm(T, 0, 10)
```

Pure random walk

```
rw.nd <- cumsum(e)
plot(rw.nd, type="l")
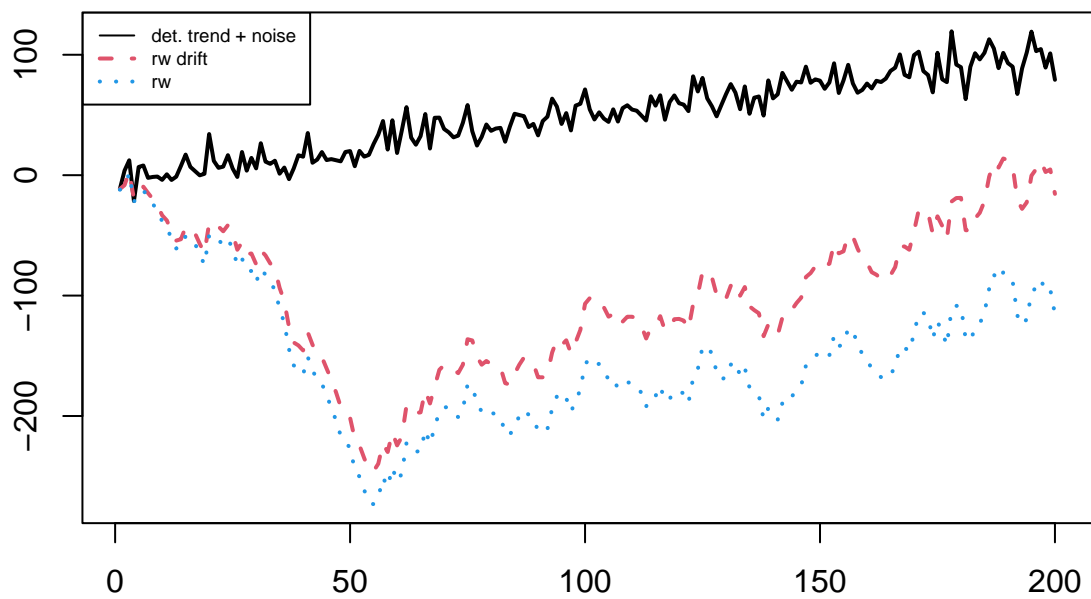```

### Random walk with drift

```
trd <- 1:T
rw.wd <- 0.5*trd+ cumsum(e)
```

Deterministic trend and noise

```
dt <- e + 0.5*trd
```

Plot

```
matplot(cbind(dt,rw.wd,rw.nd), type="l", col=c(1,2,4), lwd=2, ylab="")
legend("topleft", legend=c('det. trend + noise ', 'rw drift ', 'rw'),
       lty=c(1, 2, 3), lwd=c(1,2,2), col=c(1,2,4), cex=0.6)
```

Al aumentar la varianza, es mas simple distinguir ambos procesos.