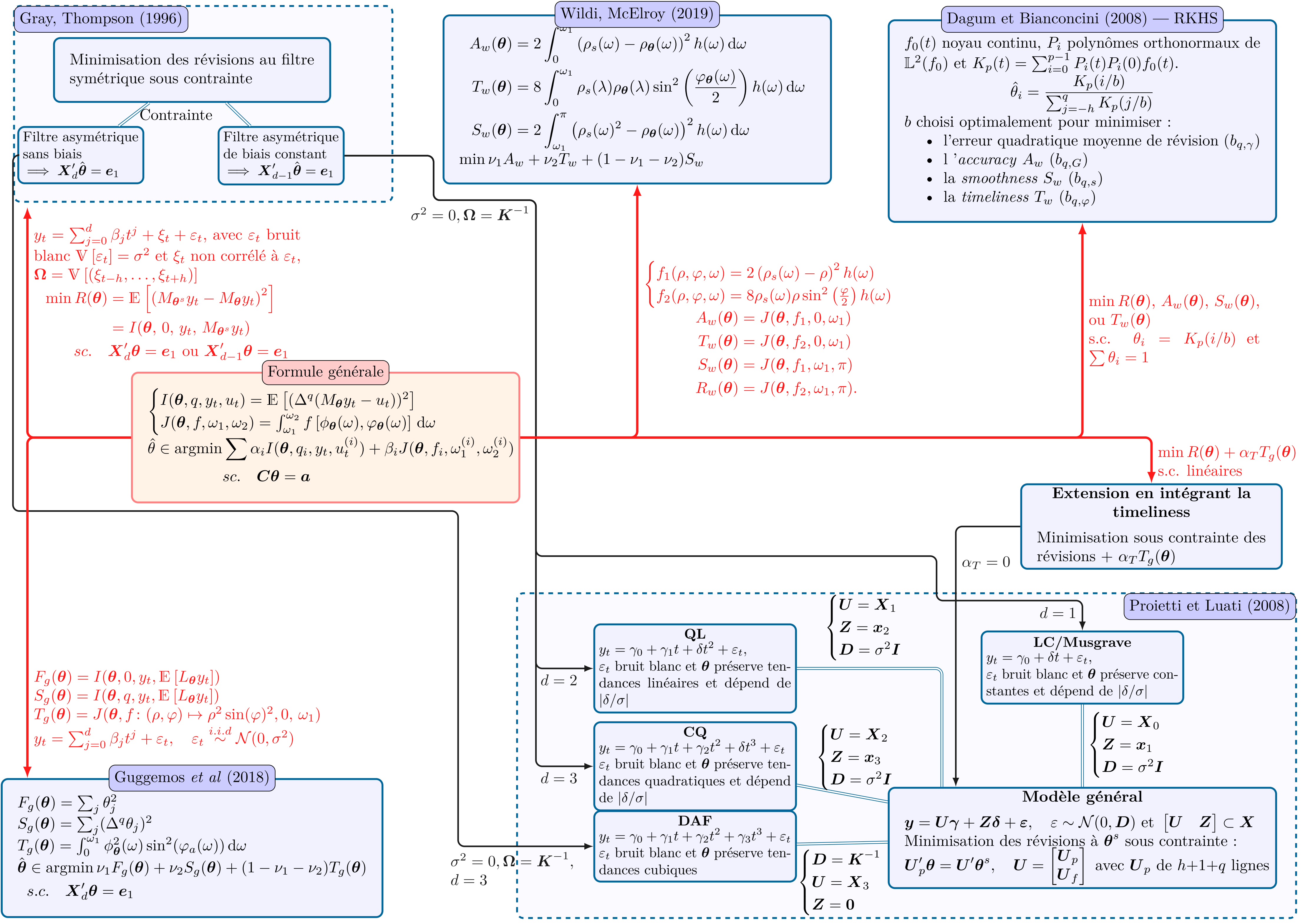

Gray, Thompson (1996)
Minimisation des révisions au filtre symétrique sous contrainte
Contrainte
Filtre asymétrique sans biais $\implies \boldsymbol{X}_d'\hat{\boldsymbol{\theta}} = \boldsymbol{e}_1$
Filtre asymétrique de biais constant $\implies \boldsymbol{X}_{d-1}'\hat{\boldsymbol{\theta}} = \boldsymbol{e}_1$
Wildi, McElroy (2019)
$A_w(\boldsymbol\theta) = 2\int_0^{\omega_1} (\rho_s(\omega) - \rho_{\boldsymbol\theta}(\omega))^2 h(\omega)\,d\omega$
$T_w(\boldsymbol\theta) = 8\int_0^{\omega_1} \rho_s(\lambda)\rho_{\boldsymbol\theta}(\lambda)\sin^2\left(\frac{\varphi_{\boldsymbol\theta}(\omega)}{2}\right) h(\omega)\,d\omega$
$S_w(\boldsymbol\theta) = 2\int_{\omega_1}^{\pi} (\rho_s(\omega)^2 - \rho_{\boldsymbol\theta}(\omega))^2 h(\omega)\,d\omega$
$\min \nu_1 A_w + \nu_2 T_w + (1-\nu_1-\nu_2) S_w$
Dagum et Bianconcini (2008) — RKHS
$f_0(t)$ noyau continu, P_i polynômes orthonormaux de $\mathbb{L}^2(f_0)$ et $K_p(t) = \sum_{i=0}^{p-1} P_i(t)P_i(0)f_0(t)$.
$\hat\theta_i = \frac{K_p(i/b)}{\sum_{j=-h}^{q} K_p(j/b)}$
b choisi optimalement pour minimiser :
• l'erreur quadratique moyenne de révision $(b_{q,\gamma})$
• l'*accuracy* A_w $(b_{q,G})$
• la *smoothness* S_w $(b_{q,s})$
• la *timeliness* T_w $(b_{q,\varphi})$
$\sigma^2 = 0, \boldsymbol\Omega = \boldsymbol{K}^{-1}$
$y_t = \sum_{j=0}^d \beta_j t^j + \xi_t + \varepsilon_t$, avec ε_t bruit blanc $\mathbb{V}[\varepsilon_t] = \sigma^2$ et ξ_t non corrélé à ε_t,
$\boldsymbol\Omega = \mathbb{V}[(\xi_{t-h},\dots,\xi_{t+h})]$
$\min R(\boldsymbol\theta) = \mathbb{E}\left[(M_{\boldsymbol\theta^s}y_t - M_{\boldsymbol\theta}y_t)^2\right]$
$= I(\boldsymbol\theta, 0, y_t, M_{\boldsymbol\theta^s}y_t)$
sc. $\boldsymbol{X}_d'\boldsymbol\theta = \boldsymbol{e}_1$ ou $\boldsymbol{X}_{d-1}'\boldsymbol\theta = \boldsymbol{e}_1$
$\begin{cases} f_1(\rho,\varphi,\omega) = 2(\rho_s(\omega)-\rho)^2 h(\omega) \\ f_2(\rho,\varphi,\omega) = 8\rho_s(\omega)\rho\sin^2\left(\frac{\varphi}{2}\right) h(\omega) \end{cases}$
$A_w(\boldsymbol\theta) = J(\boldsymbol\theta, f_1, 0, \omega_1)$
$T_w(\boldsymbol\theta) = J(\boldsymbol\theta, f_2, 0, \omega_1)$
$S_w(\boldsymbol\theta) = J(\boldsymbol\theta, f_1, \omega_1, \pi)$
$R_w(\boldsymbol\theta) = J(\boldsymbol\theta, f_2, \omega_1, \pi)$.
$\min R(\boldsymbol\theta)$, $A_w(\boldsymbol\theta)$, $S_w(\boldsymbol\theta)$, ou $T_w(\boldsymbol\theta)$ s.c. $\theta_i = K_p(i/b)$ et $\sum\theta_i = 1$
Formule générale
$\begin{cases} I(\boldsymbol\theta, q, y_t, u_t) = \mathbb{E}\left[(\Delta^q(M_{\boldsymbol\theta}y_t - u_t))^2\right] \\ J(\boldsymbol\theta, f, \omega_1, \omega_2) = \int_{\omega_1}^{\omega_2} f\left[\phi_{\boldsymbol\theta}(\omega), \varphi_{\boldsymbol\theta}(\omega)\right] d\omega \end{cases}$
$\hat\theta \in \operatorname{argmin} \sum \alpha_i I(\boldsymbol\theta, q_i, y_t, u_t^{(i)}) + \beta_i J(\boldsymbol\theta, f_i, \omega_1^{(i)}, \omega_2^{(i)})$
sc. $\boldsymbol{C}\boldsymbol\theta = \boldsymbol{a}$
$\min R(\boldsymbol\theta) + \alpha_T T_g(\boldsymbol\theta)$ s.c. linéaires
Extension en intégrant la timeliness
Minimisation sous contrainte des révisions + $\alpha_T T_g(\boldsymbol\theta)$
$\alpha_T = 0$
Proietti et Luati (2008)
$d = 1$
$d = 2$
$d = 3$
$\begin{cases} \boldsymbol U = \boldsymbol X_1 \\ \boldsymbol Z = \boldsymbol x_2 \\ \boldsymbol D = \sigma^2 \boldsymbol I \end{cases}$
QL
$y_t = \gamma_0 + \gamma_1 t + \delta t^2 + \varepsilon_t$,
ε_t bruit blanc et $\boldsymbol\theta$ préserve tendances linéaires et dépend de $|\delta/\sigma|$
LC/Musgrave
$y_t = \gamma_0 + \delta t + \varepsilon_t$,
ε_t bruit blanc et $\boldsymbol\theta$ préserve constantes et dépend de $|\delta/\sigma|$
$\begin{cases} \boldsymbol U = \boldsymbol X_2 \\ \boldsymbol Z = \boldsymbol x_3 \\ \boldsymbol D = \sigma^2 \boldsymbol I \end{cases}$
CQ
$y_t = \gamma_0 + \gamma_1 t + \gamma_2 t^2 + \delta t^3 + \varepsilon_t$
ε_t bruit blanc et $\boldsymbol\theta$ préserve tendances quadratiques et dépend de $|\delta/\sigma|$
$\begin{cases} \boldsymbol U = \boldsymbol X_0 \\ \boldsymbol Z = \boldsymbol x_1 \\ \boldsymbol D = \sigma^2 \boldsymbol I \end{cases}$
Modèle général
$\boldsymbol y = \boldsymbol U\boldsymbol\gamma + \boldsymbol Z\boldsymbol\delta + \boldsymbol\varepsilon$, $\varepsilon \sim \mathcal N(0, \boldsymbol D)$ et $\begin{bmatrix}\boldsymbol U & \boldsymbol Z\end{bmatrix} \subset \boldsymbol X$
Minimisation des révisions à $\boldsymbol\theta^s$ sous contrainte :
$\boldsymbol U_p'\boldsymbol\theta = \boldsymbol U'\boldsymbol\theta^s$, $\boldsymbol U = \begin{bmatrix}\boldsymbol U_p \\ \boldsymbol U_f\end{bmatrix}$ avec $\boldsymbol U_p$ de h+1+q lignes
DAF
$y_t = \gamma_0 + \gamma_1 t + \gamma_2 t^2 + \gamma_3 t^3 + \varepsilon_t$
ε_t bruit blanc et $\boldsymbol\theta$ préserve tendances cubiques
$\begin{cases} \boldsymbol D = \boldsymbol K^{-1} \\ \boldsymbol U = \boldsymbol X_3 \\ \boldsymbol Z = \boldsymbol 0 \end{cases}$
$\sigma^2 = 0, \boldsymbol\Omega = \boldsymbol K^{-1}$, $d = 3$
$F_g(\boldsymbol\theta) = I(\boldsymbol\theta, 0, y_t, \mathbb{E}[L_{\boldsymbol\theta}y_t])$
$S_g(\boldsymbol\theta) = I(\boldsymbol\theta, q, y_t, \mathbb{E}[L_{\boldsymbol\theta}y_t])$
$T_g(\boldsymbol\theta) = J(\boldsymbol\theta, f\colon(\rho,\varphi)\mapsto\rho^2\sin(\varphi)^2, 0, \omega_1)$
$y_t = \sum_{j=0}^d \beta_j t^j + \varepsilon_t$, $\varepsilon_t \overset{i.i.d}{\sim} \mathcal N(0,\sigma^2)$
Guggemos *et al* (2018)
$F_g(\boldsymbol\theta) = \sum_j \theta_j^2$
$S_g(\boldsymbol\theta) = \sum_j (\Delta^q\theta_j)^2$
$T_g(\boldsymbol\theta) = \int_0^{\omega_1} \phi_{\boldsymbol\theta}^2(\omega)\sin^2(\varphi_a(\omega))\,d\omega$
$\hat{\boldsymbol\theta} \in \operatorname{argmin} \nu_1 F_g(\boldsymbol\theta) + \nu_2 S_g(\boldsymbol\theta) + (1-\nu_1-\nu_2)T_g(\boldsymbol\theta)$
s.c. $\boldsymbol X_d'\boldsymbol\theta = \boldsymbol e_1$