**Apéndice Nº 1.** Diagnóstico de los residuos de los modelos estimados.

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| **Modelo: ARCH(3) con modelo de la media ARMA (2,1)** |
|  | Mediana | Media | Varianza | Error estándar | Asimetría | Kurtosis |
| Residuos (R)  | -0,0102 | 0,0945 | 1,0805 | 1,0395 | 2,2280 | 52,4957 |
| Shapiro-Wilk (R)  | 0,7511 | Prob[S-W(R)] | < 2.2e-16 |
| Shapiro-Wilk (R2)  | 0,0827 | Prob[S-W(R2)] | < 2.2e-16 |
| Ljung-Box(R)  | 0,96641 | Prob[L-B(R)] | 0,3256 |
| Ljung-Box(R2) | 0,05164 | Prob[L-B(R2)] | 0,8202 |
| Efectos ARCH (LM) | 8,0977 | Prob[L-M] | 0,7774 |

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| **Modelo: GARCH(1,1) con modelo de la media ARMA (2,1)** |
|  | Mediana | Media | Varianza | Error estándar | Asimetría | Kurtosis |
| Residuos (R) | -0,0057 | 0,0964 | 1,1236 | 1,0600 | 0,2378 | 28,6771 |
| Shapiro-Wilk (R) | 0,7898 | Prob[S-W(R)] | < 2.2e-16 |
| Shapiro-Wilk (R2) | 0,1332 | Prob[S-W(R2)] | < 2.2e-16 |
| Ljung-Box(R) | 0,44873 | Prob[L-B(R)] | 0,5029 |
| Ljung-Box(R2) | 0,11783 | Prob[L-B(R2)] | 0,7314 |
| Efectos ARCH (LM) | 4,5966 | Prob[L-M] | 0,9701 |

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| **Modelo: EGARCH(1,1) con modelo de la media ARMA (2,1)** |
|  | Mediana | Media | Varianza | Error estándar | Asimetría | Kurtosis |
| Residuos (R) | -0,00272 | 0,04448 | 0,242307 | 0,492247 | 0,513172 | 25,00642 |
| Shapiro-Wilk (R) | 0,7945 | Prob[S-W(R)] | < 2.2e-16 |
| Shapiro-Wilk (R2) | 0,1482 | Prob[S-W(R2)] | < 2.2e-16 |
| Ljung-Box(R) | 0,53262 | Prob[L-B(R)] | 0,4655 |
| Ljung-Box(R2) | 0,03404 | Prob[L-B(R2)] | 0,8536 |
| Efectos ARCH (LM) | 6,0061 | Prob[L-M] | 0,9158 |
| **Modelo: GJR-GARCH(1,2) con modelo de la media ARMA (2,1)** |
|  | Mediana | Media | Varianza | Error estándar | Asimetría | Kurtosis |
| Residuos (R) | -0,0064 | 0,0932 | 1,087327 | 1,04275 | 0,32399 | 25,4524 |
| Shapiro-Wilk (R) | 0,8003 | Prob[S-W(R)] | < 2.2e-16 |
| Shapiro-Wilk (R2) | 0,1448 | Prob[S-W(R2)] | < 2.2e-16 |
| Ljung-Box(R) | 0,37367 | Prob[L-B(R)] | 0,541 |
| Ljung-Box(R2) | 0,02645 | Prob[L-B(R2)] | 0,8708 |
| Efectos ARCH (LM) | 4,6775 | Prob[L-M] | 0,9679 |
| **Modelo: APARCH (1,1) con modelo de la media ARMA (2,1)** |
|  | Mediana | Media | Varianza | Error estándar | Asimetría | Kurtosis |
| Residuos (R) | -0,0026 | 0,04678 | 0,25599 | 0,50596 | 0,62847 | 27,2023 |
| Shapiro-Wilk (R) | 0,7758 | Prob[S-W(R)] | < 2.2e-16 |
| Shapiro-Wilk (R2) | 0,1425 | Prob[S-W(R2)] | < 2.2e-16 |
| Ljung-Box(R) | 0,0177 | Prob[L-B(R)] | 0,8939 |
| Ljung-Box(R2) | 0,0792 | Prob[L-B(R2)] | 0,7783 |
| Efectos ARCH (LM) | 8,3436 | Prob[L-M] | 0,7577 |

 **Fuente:** elaboración propia. Nivel de significancia = 5%