A Proof of Lemma 3.1 and Theorem 3.1

Proof A.1 *Consider the model given in the following equations:*

$$\begin{aligned}\mathbf{x}_t &= \mathbf{y}_t + \boldsymbol{\eta}_t \\ \mathbf{y}_t &= \mathbf{A}_0\mathbf{y}_t + \sum_{\tau=1}^{L} \mathbf{B}_\tau \mathbf{y}_{t-\tau} + \boldsymbol{\epsilon}_t\end{aligned} \tag{A1}$$

Let $\mathbf{A} = (\mathbf{I} - \mathbf{A}_0)^{-1}$ *and* $\mathbf{v}_t = \mathbf{A}^{-1}\mathbf{y}_t$*. By simple re-parameterization, we have*

$$\begin{aligned}\mathbf{x}_t &= \mathbf{A}\mathbf{v}_t + \boldsymbol{\eta}_t \\ \mathbf{v}_t &= \sum_{\tau=1}^{L} \mathbf{B}_\tau \mathbf{A}\mathbf{v}_{t-\tau} + \boldsymbol{\epsilon}_t\end{aligned} \tag{A2}$$

Actually, the model after re-parameterization given in Equations A2 is the state-space model investigated by Zhang and Hyvärinen in [24]. Thus, we can follow the idea presented in [24] to prove the identifiability of our model.