

Getting Started with SsfPack 3 for Ox 7

Siem Jan Koopman and Jurgen Doornik

June 21, 2013

1 Introduction

SsfPack is a suite of routines that allows *Ox* programs to carry out computations involving the statistical analysis of univariate and multivariate models in the linear Gaussian state space form. *SsfPack* allows for a full range of different state space forms: from a simple time-invariant model to a complicated time-varying model.

The documentation for Ssfpack is provided in:

- Koopman, S.J., N. Shephard and J.A. Doornik (1999) Statistical algorithms for models in state space using SsfPack 2.2 *Econometrics Journal*, 1999, **2**, p.113-166.

See `doc/SsfPackV22.pdf`.

- Koopman, S.J., N. Shephard and J.A. Doornik (2008) *SsfPack 3.0: Statistical algorithms for models in state space*, London: Timberlake Consultants Ltd.

2 Ox version

This SsfPack only works with Ox 7. The internal layout of some data structures changed between Ox 6 and Ox 7. As a consequence, dynamic link-libraries that work with Ox 7 do not work with Ox 6.

3 SsfPack 3 versions

There are two versions of SsfPack 3:

- **SsfPack Basic**

This provides the basic functionality, as discussed in Koopman, S.J., N. Shephard and J.A. Doornik (1999).

- **SsfPack Extended**

This is the professional version of *SsfPack*. The *SsfPack Extended* version includes the functionality of the *SsfPack Basic* version. In addition to that, it contains algorithms that are computationally more efficient, and allows for exact treatment of the diffuse conditions for the initial state vector.

Table 1 provides a detailed comparison of the two versions.

	<i>SsfPack Basic</i>	<i>SsfPack Extended</i>
Free for academic use only	✓	
Includes book		✓
Available from Timberlake Consultants		✓
Basic examples	✓	✓
Extended examples		✓
Windows (32-bit)	✓	✓
Windows (64-bit)		✓
OS X	✓	✓
Linux (32-bit)	✓	✓
Linux (64-bit)	✓	✓
Other platforms on request		✓
AddSsfReg	✓	✓
GetSsfArma	✓	✓
GetSsfReg	✓	✓
GetSsfSpline	✓	✓
GetSsfStsm	✓	✓
KalmanFil	✓	✓
KalmanSmo	✓	✓
SimSmoDraw	✓	✓
SimSmoWgt	✓	✓
SsfAbout	✓	✓
SsfCondDens	✓	✓
SsfLik	✓	✓
SsfLikConc	✓	✓
SsfLikSco	✓	✓
SsfMomentEst	✓	✓
SsfRecursion	✓	✓
SsfVersion	✓	✓
SsfWarning	✓	✓
SsfWeights	✓	✓
GetSsfSarima		✓
KalmanFilEx		✓
KalmanFilMeanEx		✓
KalmanFilSmoMeanEx		✓
KalmanInit		✓
KalmanSmoEx		✓
KalmanSmoMeanEx		✓
SsfBootstrap		✓
SsfCondDensEx		✓
SsfForecast		✓
SsfFreqGain		✓
SsfLikConcEx		✓
SsfLikEx		✓
SsfLikMulti		✓
SsfLikScoEx		✓
SsfMomentEstEx		✓
SsfMomentEstMulti		✓
SsfSignalEst		✓
SsfSimObs		✓
SsfSimState		✓
SsfWeightsEx		✓

Table 1: Comparison of functionality between *SsfPack Basic* and *SsfPack Extended*.

4 SsfPack Extended Installation

4.1 Windows 8, Windows 7, Windows Vista, Windows XP

First ensure that Ox Professional 7 is installed.

Insert the SsfPack CD. If Autorun is on, the installation program is started automatically. Otherwise start `ssfpackex300_ox7.exe` from the root folder of the CD.

By default, installation is to `C:\Program Files\OxMetrics7` (or your language-specific location for program files). You may choose another location for the `OxMetrics7` folder, but the selected folder must hold the Ox tree (by default, Ox would be installed into `C:\Program Files\OxMetrics7\ox`).

4.2 Windows 8 64-bit, Windows 7 64-bit, Windows Vista 64-bit, Windows XP x64

First ensure that Ox Professional 7 (64-bit) is installed.

All 64-bit Windows components are in the `x64` folder of the SsfPack CD.

Insert the SsfPack CD. If Autorun is on, the installation program is started automatically. Otherwise start `x64\ssfpackex300_ox7_64.exe` from the CD.

By default, installation is to `C:\Program Files\OxMetrics7` (or your language-specific location for program files). You may choose another location for the `OxMetrics7` folder, but the selected folder must hold the Ox tree (by default, Ox would be installed into `C:\Program Files\OxMetrics7\ox`).

4.3 OS X and Linux

First ensure that Ox Professional is installed.

SsfPack Extended is provided as a zip-file archive.

Installation steps:

1. Unzip `ssfpack_ex_30_ox7.zip` (or a newer version if available) to the `ox/packages` folder. The default packages folder of Ox is:

- **OS X 10.5 (Leopard), 10.4 (Tiger)**

`/Applications/OxMetrics7/ox/packages/`

Move the `ssfpack` folder created by extracting the zip file to this `ox/packages` folder, to create the `ox/packages/ssfpack` folder. Your administrative password will be required to complete this action.

- **Linux 32-bit, Linux 64-bit**

`/usr/share/OxMetrics7/ox/packages/`

Put the zip file in `ox/packages/` and unzip from there, maintaining the folder structure. This will create the `ox/packages/ssfpack` folder, and should be done as root or superuser.

2. Check that there now is a `packages/ssfpack` folder in your `ox` folder which holds (among other files) `ssfpack_ex.h`.

The zip file contains the dynamic-link library for several platforms:

- `ssfpackex.so` - Linux 32-bit

- `ssfpackex_64.so` - Linux 64-bit
- `ssfpackex_osx.so` - OS X

Ox will automatically use the correct version.

5 SsfPack Basic Installation

Pre-requisites

1. First install Ox Console or Ox Professional (see www.doornik.com or www.timberlake.co.uk).
2. Download SsfPack Basic from www.ssfpack.com.

Installation steps:

1. Put `ssfpack_basic_30.zip` (or a newer version if available) in the `ox/packages` folder, and unzip from there. The default packages folder of Ox is:

- **Windows 8, Windows 7, Windows Vista, Windows XP**

`C:\Program Files\OxMetrics7\ox\packages`

Put the zip file in your `ox/packages` folder and unzip from there, maintaining the folder structure. This will create the `ox/packages/ssfpack` folder.

- **OS X 10.5 (Leopard), 10.4 (Tiger)**

`/Applications/OxMetrics7/ox/packages/`

Move the `ssfpack` folder created by extracting the zip file to this `ox/packages` folder, to create the `ox/packages/ssfpack` folder. Your administrative password will be required to complete this action.

- **Linux 32-bit, Linux 64-bit**

`/usr/share/OxMetrics7/ox/packages/`

Put the zip file in `ox/packages/` and unzip from there, maintaining the folder structure. This will create the `ox/packages/ssfpack` folder, and should be done as root or superuser.

2. Check that there now is a `ox/packages/ssfpack` folder in your `ox` folder which holds `ssfpack.h` (among other files).

The zip file contains the dynamic-link library for several platforms:

- `ssfpack.dll` - Windows 32-bit
- `ssfpack.so` - Linux 32-bit
- `ssfpack_64.so` - Linux 64-bit
- `ssfpack_osx.so` - OS X, 32 and 64-bit

Ox will automatically use the correct version.

6 SsfPack folder structure

The OxMetrics folder structure is as follows:

\Program Files\	(default)
OxMetrics7\	Root of OxMetrics 5
ox\	Root of Ox installation
packages\	Ox packages
ssfpack\	SsfPack libraries and headers
code\	SsfPack Basic example Ox code
code_ex\	SsfPack Extended example Ox code
doc\	Koopman, Shephard, Doornik (1999) and this document.

7 Using SSfPack Extended

Insert the following line:

```
#include <packages/ssfpack/ssfpack_ex.h>
```

at the top of any Ox file that uses *SsfPack Extended*.

Run any of the examples in `ox/packages/ssfpack/code_ex` to try *SsfPack Extended*, by loading the Ox file into OxMetrics and running it.

The `code_ex/ssfsupport.ox` program is a good one to start with.

Please note that the 3.0 release of SsfPack Extended supercedes all 3.x beta releases of SsfPack.

8 Using SSfPack Basic

Insert the following line:

```
#include <packages/ssfpack/ssfpack.h>
```

at the top of any Ox file that uses *SsfPack Basic*.

Run any of the examples in `ox/packages/ssfpack/code` to try *SsfPack Basic*, by loading the Ox file into OxMetrics or OxEdit and running it. The `code/ssfsupport.ox` program is a good one to start with.

Note that many example programs create graphs. These cannot be displayed when using Ox Console.

Also note that running programs that call any *SsfPack Extended* function would give a run-time error.