Assume: Show:

(1) $\vdash H : *$ (I) $H, FS, TS \rightsquigarrow H', FS', TS'$

(2) $H \vdash FS$ (II) $\vee\ TS = \{\} \wedge FS = \varepsilon$

(3) $H; a \vdash FS$ ok (III) $\vee\ FS = F \circ FS'$ where some things null

(4) $H \vdash TS$

Show: $H, FS, TS \rightsquigarrow H', FS', TS'$

Case distinction on FS:

- ε: Case distinction on TS:
  - $\emptyset$: Case II: Execution done
  - $\{FS'\} \uplus TS'$: E-Switch: ↯ Rule undefined

    $H, \varepsilon, \{FS'\} \uplus TS' \rightsquigarrow H, FS', TS'$
- $\langle \text{FINISH } f, f' \rangle \circ FS'$:

  If $\exists T \in TS.\ T = GS \circ \langle \text{FINISH } f', f'' \rangle \circ GS'$
  - true: E-Switch

    $H, FS, TS \rightsquigarrow H, T, \{FS\} \uplus TS \setminus T$

    For termination: Finish builds tree-structure ⇒ A waits on B & B waits on A impossible
  - false: E-Finish 2

    $H, FS, TS \rightsquigarrow H, FS', TS$
- $\langle L, u, P \rangle^t \circ FS'$:

  Induction on u:

  let $x = \text{task}(b')\ \{x \Rightarrow t\}$ in s:

  Cases of $L(b')$ by (8)
  - null: Case III: Stuck
  - $b(o, p)$: E-Task

    $H, FS, TS \rightsquigarrow H, (L[x \mapsto \text{task}(b(o,p), t)], s, P)^t \circ FS', TS$

    (5) $H \vdash \langle L, u, P \rangle^t$ by From(2), T-FS-A, T-FS-NA

    $H \vdash \Gamma; L$ by ||, T-Frame1

    $H \vdash \Gamma; L; b'$ by ||, WF-Env, (6)

    (8) $L(b') = \text{null} \vee L(b') = b(o, p)$ by ||, WF-Var, (7)

    ↯ type of $(H, o) <: C$ missing

    $\Gamma; a \vdash \text{let } x = \text{task}(b')\ \{x \Rightarrow t\} \text{ in } s : \sigma$ by (5), T-Frame1

    $\Gamma; a \vdash \text{task}(b')\ \{x \Rightarrow t\} : \tau$ by ||, T-Let

    (7) $\Gamma; a \vdash b' : Q \triangleright \text{Box}\ [C]$ by ||, T-Task

    (6) $b' \in \text{dom}(\Gamma)$ by ||, T-Var